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Creating Moves to Opportunity: Experimental Evidence on Barriers to Neighborhood Choice[†]

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Low-income families often live in low-upward-mobility neighborhoods. We study why by using a randomized trial with housing voucher recipients that provided information, financial support, and customized search assistance to move to high-opportunity neighborhoods. The treatment increased the fraction moving to high-upward-mobility areas from 15 to 53 percent. A second trial reveals this treatment effect is driven primarily by customized search assistance. Qualitative interviews show that the intervention relaxed bandwidth constraints and addressed family-specific needs. Our findings imply many low-income families do not have strong preferences to stay in low-opportunity areas and that barriers in housing search significantly increase residential segregation by income. (*JEL* D83, G51, R21, R23, R31, R38)

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Recent research has established that children's outcomes in adulthood vary substantially across neighborhoods and that moving to lower-poverty, higher-opportunity neighborhoods earlier in childhood improves children's outcomes significantly (Chetty, Hendren, and Katz 2016; Chetty and Hendren 2018a; Chyn 2018; Deutscher 2020; Chyn, Collinson, and Sandler 2022). Yet the vast majority of low-income families in the United States, even those receiving rental assistance through housing vouchers from the government, live in low-opportunity neighborhoods (Metzger 2014; Mazzara and Knudsen 2019; Rosen 2020). This pattern prevails even though many families live near areas with similar or lower rental costs that historically have produced much better economic outcomes for children (Chetty et al. 2018b). Why don't more low-income families take advantage of these options and move to opportunity? More broadly, what explains the segregation of low-income families into high-poverty, low-opportunity neighborhoods?

One potential explanation is that low-income families prefer to stay in low-opportunity areas because these neighborhoods have other valuable amenities, such as shorter commutes, proximity to family and community, or greater racial and ethnic diversity. An alternative explanation is that low-income families do not move to high-opportunity areas because of a lack of information about the benefits of moving to such areas. A third possibility is that barriers in the housing search process itself—such as a lack of liquidity, difficulties in finding suitable units in high-opportunity areas, or reluctance among landlords to rent to voucher holders in such areas—limit moves to opportunity. Distinguishing between these explanations is important for understanding the drivers of residential segregation as well as for designing affordable housing policies to address any barriers that limit moves to opportunity.

We test between these explanations using a two-phase randomized controlled trial (Bergman et al. 2020) with 712 low-income families receiving housing vouchers, implemented in collaboration with the Seattle and King County housing authorities. The first phase of the trial enrolled families from April 2018 to April 2019 and evaluated the impacts of a bundled intervention of information and support services to move to high-opportunity areas. The second phase enrolled families from July 2019 through March 2020 and unbundled the original treatment into multiple arms to shed light on mechanisms underlying the impacts of the bundled intervention. The sample for both phases consisted of low-income families with a child below age 15 issued a Housing Choice Voucher in the Seattle and King County area, which provided $1,540 per month in rental assistance on average.

In the first phase of the experiment, families who applied for housing vouchers were randomly assigned (with 50 percent probability) to a control group or treatment group. The value of the vouchers and the restrictions governing their use followed preexisting regulations and did not differ between the treatment and control groups. Families in the control group received standard briefings on how to use their vouchers. Families in the treatment group were offered a supplementary program called Creating Moves to Opportunity (CMTO) that was designed to help them lease units in high-opportunity areas, defined as census tracts that have historical rates of

upward income mobility in approximately the top third of tracts in the Seattle and King County area.[1]

The CMTO program consisted of three components: customized housing search assistance, landlord engagement, and short-term financial assistance—all administered by staff employed by a nonprofit group, whom we term housing "navigators." The housing navigators met with families individually and provided information about high-opportunity areas, assistance in preparing rental documents, guidance in addressing issues in a family's credit and rental history, and help in identifying available units and connecting with landlords in high-opportunity areas. On average, navigators spent about six hours working with each family. CMTO navigators also engaged directly with landlords in high-opportunity areas to encourage them to lease units to CMTO families and expedite the lease-up process. Of those who moved to a high-opportunity neighborhood, 47 percent obtained the unit they leased through a landlord referral from navigators. Landlords who leased to CMTO families were additionally offered an insurance fund for damages to the unit above and beyond the security deposit. Finally, navigators provided financial assistance for security deposits and application fees on a case-by-case basis depending upon each family's needs, averaging $1,060 per family. The total up-front cost of the program, including all services, was $2,670 per family.[2] All families in the treatment group had the option to use their housing voucher in *any* neighborhood within the housing authorities' jurisdictions (although the CMTO services were only provided to move to high-opportunity areas).[3]

The CMTO treatment increased the share of families who leased units in high-opportunity neighborhoods by 37.8 percentage points (SE = 4.2 pp, $p < 0.001$), from 15.4 percent in the control group to 53.2 percent in the treatment group. We find similarly large treatment effects on moves to high-opportunity areas across several subgroups, including racial minorities, immigrant families, and the lowest-income households. Families in the treatment group moved to a variety of different census tracts across the Seattle and King County area: the 118 families in the treatment group who moved to a high-opportunity area live in 46 different tracts, mitigating the concern that the program might simply reconcentrate low-income families in different neighborhoods (Clark 2008).

Treated families moved to better neighborhoods as measured not just by their rates of upward mobility but also other more traditional indexes of neighborhood quality, such as median household incomes, the share of college graduates, or indexes of

[1] Although we define "high-opportunity" areas based on measures of upward mobility, our measures of high-opportunity areas overlap to a significant degree with traditional measures of "good" neighborhoods, such as having lower poverty rates or better educational outcomes. As a result, our experimental findings are not sensitive to the particular way in which neighborhood quality is measured, as we discuss further below.

[2] This $2,670 figure excludes downstream costs incurred in the form of higher housing voucher payments because treatment group families moved to more expensive neighborhoods with higher voucher payment standards. We discuss those costs in greater detail in Section IVD when evaluating the program's rate of return.

[3] This element of neighborhood choice is the critical distinction between CMTO and the Moving to Opportunity (MTO) experiment implemented in the 1990s, which *required* that families in the experimental group move to low-poverty census tracts to receive a voucher. Studies of the MTO experiment have shown that families who moved to higher-opportunity areas as required by the experimental treatment had improved mental health and well-being for the adults and better economic outcomes for their children (Kling, Liebman, and Katz 2007; Chetty, Hendren, and Katz 2016; Ludwig et al. 2012). The CMTO experiment asks why families receiving vouchers without such requirements typically do not live in such areas.

educational or environmental quality. In the process of moving to higher-opportunity areas, treated families did not have to make sacrifices on other neighborhood amenities, such as distance to their prior location or proximity to jobs, nor in the quality or size of the unit they rent.

Perhaps as a result of improvements in neighborhood quality, families in the CMTO treatment group tended to stay in high-opportunity areas when their leases came up for renewal. Three years after the initial lease-up, 58.6 percent of families in the treatment group lived in high-opportunity neighborhoods, compared with 22.4 percent in the control group. This represents a decline of only 4.9 pp relative to the treatment effect at lease-up. Furthermore, in a postmove survey of a randomly selected subset of families, families in the treatment group expressed higher rates of satisfaction with their new neighborhoods. For instance, 64.2 percent of families in the treatment group reported being "very satisfied" with their new neighborhood, compared with 45.5 percent in the control group.

To understand the mechanisms through which the CMTO program helped families move to high-opportunity areas, we implemented a second randomized trial with three treatment arms (and a control group) (Bergman et al. 2020). Families in the first treatment arm, "Incentivized Information," received information about opportunity neighborhoods and financial assistance for moving to an opportunity neighborhood but no search assistance or landlord engagement. Because the financial support (worth $1,090 for the average opportunity move, equivalent to nearly one month of income for the typical family in our sample) was available only if one moved to a high-opportunity area, families had strong incentives to pay attention to the information provided about the location of high-opportunity areas. The second treatment arm, "Reduced Services," provided information and financial assistance along with a lower-dosage version of the original treatment, with more limited housing search services (with less one-on-one assistance from navigators). The third treatment arm received the full CMTO program as in the first phase.

Relative to the control, the incentivized information increased the share of families who moved to high-opportunity areas by 8.9 pp (not statistically different from 0), the reduced services had a treatment effect of 13.8 pp, and the full services had a treatment effect of 40.8 pp—a magnitude similar to the impact of the full program in the first phase. The full services cost about three times as much as the reduced services and had three times as large a treatment effect, consistent with a linear dose response to service intensity. We reject the hypothesis that the three treatment effects are equal to each other with $p < 0.01$. These findings, which are robust across subgroups and different measures of neighborhood quality, show that the CMTO program does not change neighborhood choice solely by providing financial liquidity and information about high-opportunity neighborhoods. Rather, the customized, high-intensity services provided by the housing navigators during the housing search process appear to be necessary to the program's success in changing where families choose to live. The results are consistent with other experimental studies that document small impacts of information provision and low-dosage support services on neighborhood choice in other settings (Bergman, Chan, and Kapor 2020; Schwartz, Mihaly, and Gala 2017). The finding that financial liquidity has small impacts is also consistent with supplementary quasi-experimental analyses we conduct showing that increases in payment standards in high-opportunity areas in

Seattle and King County had positive impacts on the share of families who moved to high-opportunity areas (consistent with Collinson and Ganong 2018) but much smaller effects than the full CMTO services.

Having established that the services provided by navigators during the housing search process played a critical role in neighborhood choice, we next examine the barriers families face in moving to opportunity and how housing navigators addressed them. To do so, we use a novel two-phase qualitative design, conducting 251 in-depth (on average, two-hour) interviews with a stratified random sample of families in the treatment and control groups during and after their move.

In the first phase of the qualitative analysis, we systematically coded approximately 8,000 pages of interview transcripts collected from 161 families in the first phase of the experiment. This analysis identified five ways the CMTO program helped families move to opportunity: providing emotional support and communication, increasing motivation to move to a high-opportunity neighborhood by making such a move seem more feasible, streamlining the search process by helping to prepare rental applications and "rental résumés," providing connections to and representation with landlords, and deploying timely financial assistance for fees and deposits that could prevent a lease from being signed. We reported these five mechanisms in a working paper before collecting data from the second phase of the experiment.

We then used data from interviews with 90 families in the second phase of the experiment to conduct an out-of-sample test of the importance of the five mechanisms, designed to evaluate whether subjective judgments or overfitting of interview data might have led to spurious identification of mechanisms. An independent set of reviewers coded the second-phase interviews based on the same protocol as in the first phase without knowledge of individuals' treatment group assignments. We find that the five mechanisms identified in the first phase were mentioned frequently by families who received the full CMTO services in the second phase but were mentioned much less frequently by families in the reduced services and incentivized information groups, supporting the view that these mechanisms are systematically associated with the program's success.

The interviews also revealed that navigators' ability to respond in a customized manner to each family's specific needs from a higher dosage of available services was critical to the full CMTO program's larger impact. Service utilization was highly heterogeneous across families, with some families relying heavily on search assistance and others benefiting from assistance with landlord negotiation or taking advantage of direct landlord referrals. In short, the CMTO program changed where many families lived by providing customized support at critical junctures of the housing search process. This support helped families overcome tight bandwidth constraints that limited their time to search for housing and ultimately led them to revise the pessimistic beliefs about the feasibility of moving to high-opportunity areas they had formed based on a history of unfruitful searches.

We conclude that many low-income families do not have a strong preference to stay in low-opportunity areas; rather, barriers to moving to high-opportunity areas play a central role in explaining neighborhood choice and residential sorting patterns. This conclusion suggests that redesigning affordable housing programs and other policies (e.g., zoning laws and the location of affordable housing developments) to

facilitate more moves to opportunity could have substantial impacts on residential segregation by race and socioeconomic status.

Such programs may also have the potential to increase intergenerational income mobility for the children in families who move to opportunity significantly. Using data from Chetty et al. (2018b), we estimate that the moves from low- to high-opportunity census tracts induced by CMTO will increase average undiscounted lifetime household incomes by $212,000 (8.3 percent) for children who move at birth and stay in their new neighborhoods throughout childhood. An important limitation of this partial equilibrium estimate is that it assumes that the causal effects of places on mobility will not change when voucher holders move to different neighborhoods—an assumption that may not hold, particularly as the program is scaled up. As we discuss further below, in general equilibrium, changes in peer composition and the provision of public goods across areas may dampen or increase total impacts on upward mobility. Understanding the effects of scaling up policies such as CMTO and other efforts to increase socioeconomic integration on economic mobility will ultimately require specifying and estimating an equilibrium model of neighborhood choice. Our empirical results provide new insights into the specification of such neighborhood choice models—in particular, identifying a new set of constraints that low-income families face in the housing search process—as we discuss in Section VII.

Our analysis builds on a long literature in economics and sociology analyzing the sources of residential segregation (e.g., Schelling 1971; Kain and Quigley 1975; Massey and Denton 1987; Reardon and Bischoff 2011; Sampson 2012; Sharkey 2013; Turner et al. 2013; Lareau and Goyette 2014; Krysan and Crowder 2017). Our contributions to this literature are (i) establishing experimentally that barriers in the housing search process have substantial causal effects on neighborhood choice among low-income families; (ii) showing that the barriers extend beyond racial discrimination by landlords, a lack of information, or a lack of financial liquidity, and instead involve deeper psychological and social structural constraints; and (iii) demonstrating that these barriers can be reduced through feasible modifications of existing government programs.

The paper is organized as follows. Section I summarizes the facts on the geography of opportunity in the Seattle metro area that motivate our intervention. Section II provides institutional background on the housing voucher program and describes our intervention and experimental design. Section III describes the data we use. Sections IV and V present the results from the first and second phases of the experiment, respectively. Section VI presents qualitative evidence on how the navigators helped overcome the barriers families face in moving to opportunity. Section VII discusses the implications of our findings for models of neighborhood choice. Section VIII concludes.

I. The Geography of Opportunity in Seattle

In this section, we summarize three facts on the geography and price of opportunity that motivate our intervention.[4]

First, children's rates of upward income mobility vary substantially across nearby tracts. Figure 1, panel A plots upward income mobility by census tract in King County (which includes the city of Seattle and surrounding suburbs) using data from the Opportunity Atlas (Chetty et al. 2018a), which is constructed using information from anonymized tax records. The map shows the average household income percentile rank at age 35 for children who grew up in low-income (twenty-fifth percentile) families in the 1978–1983 birth cohorts.[5] There is substantial variation in upward mobility across tracts: the (population-weighted) standard deviation of children's mean income ranks in adulthood across tracts within King County is 4.7 percentiles (approximately $5,150, or 10.3 percent of mean annual income for children with parents at the twenty-fifth percentile).

Second, much of the variation in upward mobility across neighborhoods is driven by the *causal effects* of childhood exposure rather than sorting. Recent studies have established that moving to high–upward mobility ("high-opportunity") neighborhoods improves children's outcomes in adulthood in proportion to the amount of time they spend growing up there. These studies, summarized in online Appendix Figure 1, use research designs ranging from random assignment of vouchers (Chetty, Hendren, and Katz 2016) and quasi-experimental estimates based on variation in the age of children at the time of the move (Chetty et al. 2018b; Laliberté 2018) to demolitions of public housing projects (Chyn 2018). They find that approximately two-thirds of the observational variation in upward mobility across tracts is due to causal effects of place.

Third, low-income families tend to live in lower-opportunity neighborhoods. Even among families who receive rental assistance from the government in the form of housing vouchers, 76.2 percent of families in Seattle and King County live in tracts with below-median levels of upward mobility.[6] Figure 1, panel A illustrates this fact by showing the 25 most common locations where families with housing vouchers moved between 2015 and 2017 (as a percentage of the total population in each tract). Families are clustered in lower-opportunity tracts (red colors) even though there are many higher-opportunity tracts with comparable rents nearby, as shown in online Appendix Figure 3, which plots upward mobility versus median rents by census tracts in King County.

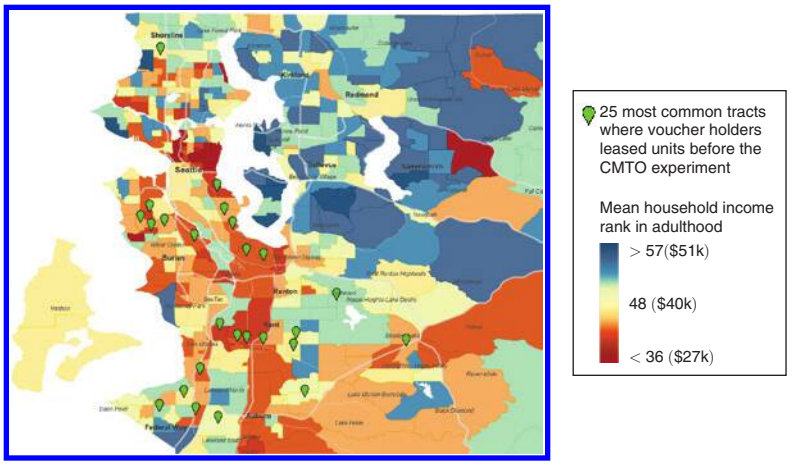
These facts motivate our central questions: Why don't more low-income families, especially those receiving housing vouchers, move to opportunity? Do families prefer lower-opportunity areas because they have other advantages (e.g., a shorter commute to work or proximity to family)? Or would they prefer higher-opportunity

[4] We establish these facts using data from Seattle and King County here, but the same three facts hold systematically in other metro areas across the country.

[5] Children are assigned to tracts in proportion to the number of years they spent growing up in that tract until age 23; see Chetty et al. (2018b) for further details.

[6] This result echoes evidence from Jacob and Ludwig (2012) and Jacob, Kapustin, and Ludwig (2015) showing that families who obtained housing vouchers in Chicago via a lottery continued to live in high-poverty neighborhoods.

Panel A. Fraction who lease units in high-opportunity areas



Panel B. CMTO high-opportunity neighborhoods

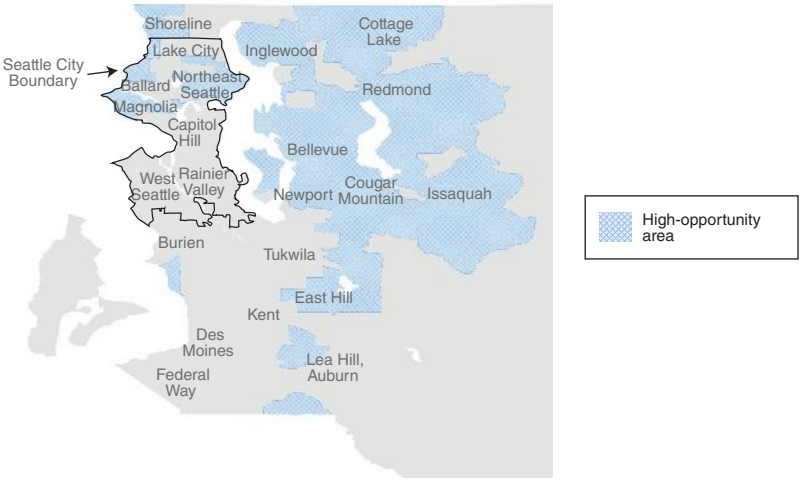


FIGURE 1. THE GEOGRAPHY OF OPPORTUNITY IN SEATTLE

Notes: The map in panel A shows the Opportunity Atlas estimates of upward mobility, defined as the mean predicted household income rank in 2014–2015 for children whose parents were at the twenty-fifth percentile of the national household income distribution (an income of $27,000) for children in the 1978–1983 birth cohorts. This measure is estimated separately in each tract as described in Chetty et al. (2018b). To facilitate interpretation of the percentile ranks, we also show the dollar value corresponding to each percentile shown in the legend based on the income distribution of children in the 1978–1983 birth cohorts. Green dots show the 25 most common tracts where families with children leased units using a Housing Choice Voucher administered by the King County or Seattle housing authorities in 2015–2017, before the CMTO experiment (based on voucher household shares of the total tract population in 2010). Panel B shows the tracts designated as high-opportunity areas in the CMTO experiment, which are shown in blue crosshatch, defined using the algorithm described in online Appendix A.

neighborhoods but lack information about them or face barriers that limit access to such areas? If families face such barriers, how can we intervene to help families live where they would like to live?

II. Intervention and Experimental Design

This section describes our intervention and experimental design. We begin by providing some institutional background on the Housing Choice Voucher (HCV) program. We then discuss the Creating Moves to Opportunity program and the design of the randomized controlled trial.

A. *Background on the Housing Choice Voucher Program*

The HCV program provides rental assistance to 2.2 million families in the United States each year, with a total program cost of approximately $20 billion annually; see Collinson, Ellen, and Ludwig (2015) for a comprehensive description of the program. The program is overseen at the federal level by the US Department of Housing and Urban Development (HUD) but is administered by local Public Housing Authorities (PHAs). In this study, we work with two PHAs: the Seattle Housing Authority (SHA), which issues vouchers that can be used in the city of Seattle, and the King County Housing Authority (KCHA), which issues vouchers that can be used in the rest of King County, excluding the cities of Seattle and Renton.[7] Both KCHA and SHA are among a small number of PHAs that participate in HUD's Moving to Work program, which gives them greater flexibility to implement policy pilots than other PHAs.

The HCV program is targeted at low-income families. To be eligible for a voucher from SHA and KCHA, families must have household income below 80 percent of area median income (AMI).[8] In line with national patterns, more families meet this criteria than the number of vouchers available. The PHAs address this problem by using a lottery to assign families positions on a waiting list. Families who are homeless or who have incomes below 30 percent of AMI are given priority on the waiting list. In practice, virtually all families who actually receive vouchers fall well below the 30 percent AMI cutoff, which corresponds to $29,900 for a family of 3. In Seattle and King County, the typical family who received a voucher during our experiment had been on the waiting list for about 1.5 years.

Families eligible for the HCV program are required to contribute 30 to 40 percent of their annual household income toward rent and utilities. They then receive a housing subsidy that covers the difference between a unit's listed rent and the family's contribution, up to a maximum amount known as the voucher payment standard. In SHA and KCHA, the maximum monthly voucher payments for a 2-bedroom unit were $2,278 and $2,110, respectively.[9]

Once families are issued a voucher, they typically have four to eight months to use the voucher to lease a unit; if the voucher is not used by that point, it is issued to another family. To use a voucher, families must find an interested landlord whose

[7] Vouchers from both SHA and KCHA may be ported out to use in other areas if they meet certain requirements; this occurs infrequently in practice.

[8] Families must also meet certain additional requirements, such as having children or meeting certain age requirements. The full set of requirements are available at https://www.seattlehousing.org/housing/housing-choice-vouchers/eligibility for SHA and at https://www.kcha.org/housing/subsidized/eligibility for KCHA.

[9] Both housing authorities have tiered payment standards that offer higher payments in more expensive areas. For example, between July 1, 2018 and December 31, 2018, the King County Housing Authority permitted a maximum rent of $1,795 for a 3-bedroom unit in the lowest tier and $2,685 in the highest tier.

unit passes a quality inspection conducted by the PHA using HUD-defined housing quality standards. After leasing, families remain eligible for the voucher they received indefinitely as long their income remains below eligibility thresholds.

B. *The Creating Moves to Opportunity Intervention*

In collaboration with our research team, the Seattle and King County Housing Authorities developed a bundle of services and resources designed to facilitate moves to high-opportunity neighborhoods. This section provides a brief overview of the program; see Bigelow (2021) for a detailed description of program implementation and DeLuca, Katz, and Oppenheimer (2023) for further details on how the program worked based on qualitative interviews. We discuss the full bundle of services that we provided in the first phase of the experiment here and then discuss how we unbundle this treatment into components in the second phase of the experiment in the next subsection.

Identifying High-Opportunity Areas.—We designated "high-opportunity" areas as census tracts that have historical rates of upward mobility in approximately the top third of the distribution across tracts within Seattle and King County based on a preliminary version of the Opportunity Atlas (Figure 1, panel A) (Chetty et al. 2018a). We adjusted these definitions to create contiguous areas and account for potential neighborhood change by examining more recent data on test scores (see online Appendix A for details). Figure 1, panel A shows the final set of census tracts that were designated as "high opportunity" after this process. Historically, around 12 percent of voucher recipients in Seattle and King County leased units in the areas we define as high opportunity.

Our upward mobility–based measures of opportunity are highly correlated with traditional measures of neighborhood quality, such as poverty rates, average test scores, the fraction of two-parent households, and the average incomes of residents in the neighborhood (Chetty et al. 2018b). These observables capture about 50 percent of the variance in upward mobility across census tracts. Our measures of high-opportunity areas thus overlap to a significant degree with traditional measures of "good" neighborhoods, although certain areas we identify as high opportunity would not have been identified as such by traditional measures. Because families may not have been aware that some of the areas we define as high opportunity offer high rates of upward mobility, the CMTO intervention effectively includes an informational treatment. We therefore test, among other things, whether providing information about which areas are high opportunity has an impact on where families choose to move (see Section IIC). We also study the impact of the CMTO treatment on traditional measures of neighborhood quality to evaluate whether families moved to better neighborhoods in general or places that would have been identified as high opportunity only in the Opportunity Atlas data.

To facilitate moves to high-opportunity areas, the program provided three types of resources and services (summarized in Figure 2, panel A): search assistance, landlord engagement, and short-term financial assistance.

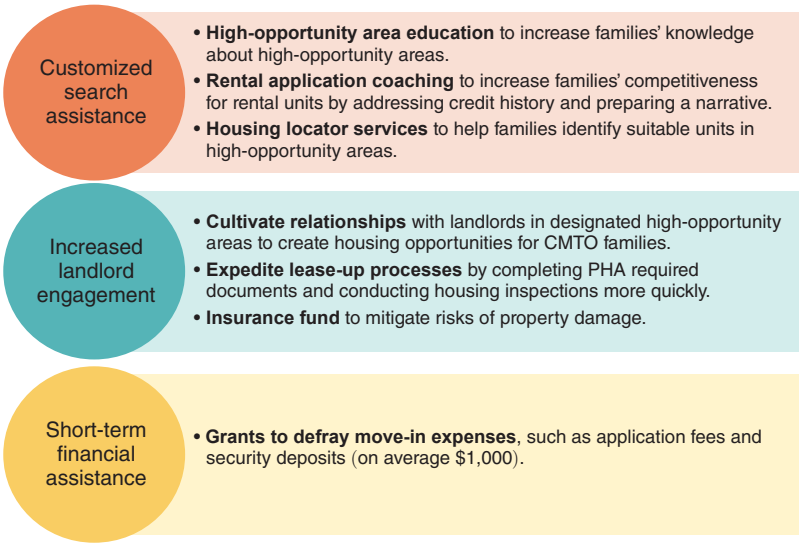
Search Assistance.—Search assistance services were provided by a nonprofit group, InterIm CDA, which employed four housing navigators to contact families and provide resources via in-person meetings, phone calls, emails, and text messages. These staff spent six hours directly assisting each family on average, spread throughout the search process from an initial meeting shortly after the family was notified of eligibility for a voucher to the point of lease-up (Figure 2, panel B). The resources provided included (i) information about high-opportunity areas and the benefits of moving to such areas for families with young children; (ii) help in making rental applications more competitive by preparing rental documents and addressing issues in their credit and rental history; and (iii) search assistance to help families identify available units, connect with landlords in opportunity areas, and complete the application process. Importantly, these resources were tailored to address the specific issues each family faced: for some families, search assistance focused extensively on application preparation and issues such as credit history, while for others they spent much more time on the search process itself. The resources could be customized in this manner because the navigators worked one-on-one in collaboration with families to find housing rather than providing resources through group workshops.

In their first meeting, navigators talked with families to develop rapport and understand their specific circumstances and goals. They also reviewed maps of opportunity areas with families and discussed which of those areas might best fit the family's needs. Navigators also described the various CMTO resources available for housing searches in opportunity areas, including the financial assistance available to offset moving costs and security deposits (discussed further below) and their availability to accompany families to visit units and meet with prospective landlords. Navigators encouraged families to set concrete housing search goals and provided rental application coaching. This coaching included screening for rental barriers (e.g., low or no credit scores, criminal or eviction histories) and providing resources or referrals to help families address these issues, as well as scripting to support families' conversations with landlords about these barriers, either in person, on the phone, or through a rental résumé. The rental résumé allowed families to explain any negative aspects of their applications (especially poor credit scores) and the steps they have taken since to remedy these issues in order to make a stronger case for tenancy.

Navigators provided tips on how to search for listings online, sent available unit listings to families, and helped to fill out rental applications when necessary. They also offered to step in during difficult moments in the lease-up process, especially with landlords. Navigators remained in communication throughout the entire housing search and lease-up processes, reaching out frequently to check in with families about their search progress. After families moved in, navigators stayed in contact with them for two weeks for postmove support. These light-touch interactions included provision of a neighborhood resource guide, check-ins to make sure that the unit was working well for families, and assistance to some families who needed help setting up utilities, looking up local school or childcare enrollment information, etc.

Landlord Engagement.—In addition to their family-facing roles, navigators directly recruited prospective landlords, often by searching local online rental

Panel A. Key elements of the intervention



Panel B. Intervention process timeline

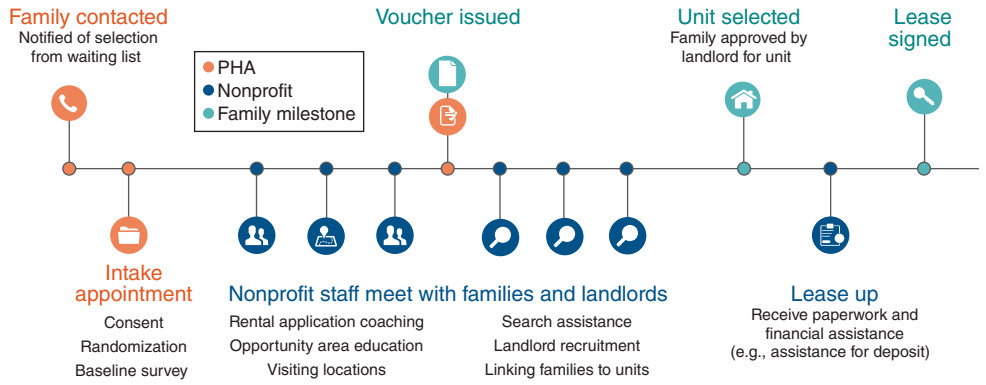


FIGURE 2. CMTO PROGRAM STRUCTURE

Notes: Panel A describes the key components of the CMTO intervention. Panel B presents a stylized timeline of the treatment intervention from the perspective of a family in the treatment group.

listings for units in opportunity areas. Navigators also educated landlords who were unfamiliar with the voucher program and pitched the benefits of the voucher and the CMTO program, not only for their prospective tenants but also for owners and property management staff themselves (see more details on landlord engagement in online Appendix D). In particular, navigators described how the stability of the income stream could be attractive to landlords and discussed their ability to expedite the lease-up process by streamlining paperwork and quickly conducting inspections themselves (the navigators were certified as HUD Housing Quality Standards inspectors)—a factor identified in prior work as a key reason landlords are reluctant to take housing vouchers (e.g., Garboden et al. 2018; Aranda et al. 2018). Such

staff outreach was an important source of listings for families: connections with landlords facilitated by CMTO navigators account for 47 percent of the moves to opportunity neighborhoods in the treatment group.

The navigators also acted as brokers between families and landlords for units families found themselves, giving landlords more information and context about specific families, usually around issues related to the rental barriers mentioned above or by meeting with them directly when accompanying families to visit their unit. More generally, navigators served as a liaison between families, landlords, and housing authority staff, available to answer any questions landlords might have throughout the process and adding a layer of customization for landlords.

Landlords were also offered a damage mitigation insurance fund for any damages not covered by the tenant's security deposit incurred within the first 18 months after the start of the lease (up to a limit of $2,000). Many landlords reported being reassured by the availability of these funds, although the funds were used to a very limited extent in practice: there were only two claims (of $2,000 each) filed as part of the program (out of 178 total units leased in high-opportunity areas during the two phases of the experiment).[10]

Financial Assistance.—Finally, families were provided with various forms of short-term financial assistance to facilitate the rental process. This included funds for application screening fees, security deposits, and any other expenses that arose and were standing in the way of lease-up. These payments were customized by navigators to address the specific impediments families faced, such as hesitant landlords who could be persuaded to accept families with eviction histories or poor credit with a larger security deposit. Families were usually eligible for a maximum of $3,500 in such expenses; on average, families in the treatment group in the first phase of the experiment received $1,057 in such assistance.

Unlike other mobility programs, such as the Moving to Opportunity experiment, which required families to use their vouchers (at least initially) in low-poverty (high-opportunity) areas, families in CMTO could use their housing voucher in *any* neighborhood within their housing authority's jurisdiction. However, the services and financial assistance described above were targeted specifically at supporting families to move to high-opportunity areas.

The total up-front cost of the services provided by the CMTO program was approximately $2,670 per family issued a voucher: $1,057 of financial assistance, $1,500 of labor costs for the services, and $111 in net additional PHA expenses to administer the program (Table 4).[11] Note that these up-front program costs do not include the downstream increase in housing voucher payments that resulted from treatment group families moving to more expensive neighborhoods, which we estimate and discuss in greater detail when analyzing the treatment effects of the intervention in Section IVD.

[10] This number is the total number of units leased in high-opportunity areas by treated families in the first phase and the units leased in high-opportunity areas by families who received the second or third treatment arm in the second phase (see below). Families in the incentivized information arm in the second phase were ineligible for the damage mitigation benefits.

[11] We present a detailed description of these cost calculations, a further breakdown of cost components, and comparisons to the other mobility programs in online Appendix B and online Appendix Table 1.

C. *Experimental Design*

The randomized trial was implemented by MDRC, with J-PAL North America staff providing project management.[12] The trial was registered in the AEA RCT Registry in March 2018 (Bergman et al. 2020). The experiment was conducted in two phases. The first enrolled families from April 2018 to April 2019, while the second enrolled families from July 2019 through March 2020. In both phases, we limited the sample to families eligible for housing vouchers from either the Seattle or King County housing authorities who had at least one child below age 15, in light of prior evidence that the benefits of moving to high-opportunity neighborhoods are largest for young children. We describe the experimental design of each phase in turn.

First Phase.—Families who had been on a waiting list to receive a voucher were invited to an intake appointment, at which point they were offered the option to participate in the CMTO experimental study by consenting and completing a baseline survey. Ninety percent of families who were identified as eligible on a preliminary basis consented to participate in the study.[13] These families were then randomized (with 50 percent probability, stratified by housing authority) into either the CMTO treatment or control groups. Control group families received the standard services provided by their housing authority, which included a group briefing about how to use the voucher but no specific information about opportunity areas or any search assistance. Treatment group families received the CMTO program described above in addition to the standard services. Overall, 497 families consented to participate in the first phase of the experiment, of whom 430 ultimately met the voucher eligibility requirements. Five families used their vouchers to move out of the Seattle/King County area and were dropped from our analyses, leaving 425 families in the final analysis sample for the first phase of the experiment.

Second Phase.—In the second phase of the experiment, we conducted a multiarm trial that unbundled the original CMTO intervention to better understand the mechanisms through which the treatment affected where families moved (Bergman et al. 2020). We randomly assigned families to one of three treatment groups or a control group, with 25 percent probability each (stratified by housing authority). In total, 326 families consented to participate in the second phase, of whom 287 ultimately met the voucher eligibility requirements and were included in our final analysis sample. The control group received standard services provided by the housing authority without any additional resources or information about high-opportunity areas, as in the first phase.

The first treatment arm, "Incentivized Information," provided families with the full set of financial assistance and information about high-opportunity areas provided to families in the original CMTO treatment but did not provide any search assistance

[12] From February to May 2018, KCHA and SHA piloted the CMTO program. During this pilot phase, all families with at least one child aged 15 or younger were invited to participate in this pilot, and 41 families enrolled.

[13] Enrollment rates were approximately 90 percent across all the subgroups we examine, except that households who do not speak English as a primary language enrolled at a 77 percent rate.

or landlord engagement. Information about high-opportunity areas was provided via an information session that informed families about opportunity neighborhoods and their impacts on children's long-run outcomes and through email reminders during their housing searches. As in the original treatment, financial assistance was conditioned on moving to a high-opportunity area, providing families incentives to pay attention to the information on which areas had been designated as "high opportunity."

The second treatment arm, "Reduced Services," was designed to evaluate the dose response to treatment service intensity by providing families a subset of the search assistance offered in the original CMTO treatment (on top of the same information and financial assistance offered in the first treatment arm). Families had only one in-person meeting with the navigator (rather than at least two meetings in Phase 1) and a more limited set of interactions via text or phone compared to those in the original CMTO treatment. The reduction in service dosage was accomplished by increasing navigator caseloads and providing guidance on limiting time spent with families to manage those caseloads. Families in this group also did not receive direct referrals to landlords unless they had vouchers for units with three or more bedrooms.

The third treatment arm replicated the original comprehensive set of CMTO services and resources—in particular, providing customized, family-specific supports and connections to landlords in addition to the services offered in the second treatment arm.

The direct up-front costs of the Phase 2 treatment arms were $340 per voucher issuance for the financial assistance and information, $630 for the reduced support services, and $2,690 for the full treatment.

III. Data

This section describes the data we use for the experimental analysis and the quasi-experimental analysis of changes in payment standards. We draw information from several sources: the administrative records of SHA and KCHA, a baseline survey, a service delivery process management system, tract-level and housing unit–level data from external sources, and postmove follow-up surveys and interviews that form the basis for our qualitative analysis. After describing these data sources and key variable definitions, we provide descriptive statistics and test for balance across the treatment and control groups.

A. *Data Sources*

Housing Authority Administrative Records.—The core data we use come from the PHAs' internal administrative records (KCHA 2022; SHA 2022). We obtained data on all families issued vouchers from 2015 to 2022, including post–voucher issuance outcomes and family characteristics. The key outcomes we study include whether a household issued a voucher successfully leases a unit using the voucher, in what census tract this lease-up occurred, and at what rent. Family characteristics obtained from voucher application forms include gender, race, ethnicity, homeless and disability status, household size, income, and address at time of application. Data on

lease-ups were obtained up through February 7, 2022, by which point vouchers had either been taken up or had expired for all families who participated in the experiment.

Baseline Survey.—We conducted a baseline survey for all families who enrolled in each phase of the experiment after providing informed consent. We collected information on characteristics including the head of household's primary language, birth country, years in the United States, tenure in the Seattle area, education, current housing status, employment status, employment location and commute length, moving and eviction history, receipt of social services, and childcare utilization. In addition, we asked about self-reported assessments of current neighborhood satisfaction, motivations to move, opinions of various neighborhoods, and overall happiness. The baseline survey also included information on children, such as their ages, grade levels, school name, special education participation, school satisfaction, and participation in extracurricular activities. The full baseline survey instrument is available at https://opportunityinsights.org/wp-content/uploads/2019/08/CMTOBaselineSurvey.pdf.

Service Delivery.—The service providers used a case management system built by MDRC to record data on interactions with households and landlords in real time (MDRC 2021). For households, the database includes information on the housing search process, contact with the navigators, and take-up of financial assistance. Data on the housing search process include information on whether the household made goals and completed several tasks: visiting neighborhoods, looking for housing, contacting property owners, completing rental applications, and preparing to move. Data on contact with navigators include the date of each contact, the method of contact, who initiated the contact, the location of the contact, the reason for the contact, whether the contact included rental application coaching or visiting a prospective unit, and how long the meeting lasted. Records of financial assistance include the amount and type of financial assistance requested and received. Finally, we also collected information on credit, rental, and criminal histories, savings, childcare availability, smoking status, pet ownership, and neighborhood preferences and priorities.

For landlords, the database contains information on landlord characteristics, outreach efforts, and unit availability. We recorded information about each unit referred to a household by a housing locator, including the outcome of any such referrals.

Housing Unit and Tract Characteristics.—We obtain information about the characteristics of the units that families rented from rent reasonableness reports (for KCHA), and Zillow, Redfin, Apartments.com, and King County property records (for SHA) (KCHA 2022; SHA 2022). These data on unit characteristics were linked to CMTO households using a unique household identifier. We were able to obtain information on unit characteristics for 81 percent of the units rented by families in our sample. These data include information on unit size, year built, and appliance availability.

We obtain data on the characteristics of the census tracts to characterize the origin and destination neighborhoods for each family from several sources. We predict the

effect of the treatment on children's outcomes in adulthood using three sets of outcome variables from the Opportunity Atlas (Chetty et al. 2018a) for children with parents at the twenty-fifth percentile of the income distribution: mean household income rank, the incarceration rate, and (for women) the teen birth rate. We measure other census characteristics such as the poverty rate and racial demographics using the 2013–2017 American Community Survey. Tract-level transit and environmental health indexes are drawn from publicly available HUD Affirmatively Furthering Fair Housing (AFFH) data. Test score data by school district are obtained from the Stanford Education Data Archive (Fahle et al. 2017).

Follow-Up Survey and Qualitative Interviews.—We conducted in-person interviews with families from Phase 1 between June 3, 2019 and February 25, 2020 (MDRC 2020). We contacted a randomly selected subset of participants in the first phase of the experiment, stratifying by housing authority (SHA, KCHA), treatment status (treatment, control), and lease-up status (leased up, still searching). We overweighted families in the treatment group and those still searching for housing to maximize power to learn about mechanisms through which the treatment works during the search process (see online Appendix C for details and further information on the design of the qualitative study). At the end of each interview, we asked families two questions about their satisfaction with their current neighborhood.

We conducted the Phase 2 interviews between September 21, 2020 and June 30, 2021. Because of COVID-19 restrictions, these interviews were conducted by Zoom, FaceTime, or phone. We first contacted a random stratified subset of Phase 2 participants in the incentivized information and reduced services treatment arms to maximize power in comparisons of mechanisms with the Phase 1 full services treatment. We then contacted an additional set of Black families, including those in the Phase 2 full services treatment arm, motivated by the fact that Black families moved to high-opportunity areas at slightly lower rates in Phase 1.

We interviewed 161 Phase 1 families, out of 202 who were targeted for inclusion in the qualitative study, for an 80 percent response rate (online Appendix Table 2). Of these 161 families, 130 had leased up at the point of interview and thus have postmove neighborhood satisfaction data. Among the families interviewed postmove, 97 are in the treatment group and 33 are in the control group. We interviewed 90 Phase 2 families out of the 130 we targeted across the 3 treatment arms, a 70 percent response rate.[14]

B. *Baseline Characteristics and Balance Tests*

Table 1 presents summary statistics on the baseline characteristics of the 425 participants in the first phase of the experiment and their origin neighborhoods for the pooled sample and separately for the control and treatment groups. Analogous statistics for the second phase of the experiment, which exhibit very similar patterns to those discussed below, are shown in online Appendix Table 3.

[14] Phase 2 response rates were lower due to challenges associated with the COVID-19 pandemic.

Table 1—Summary Statistics and Balance Tests for Households in Experimental Sample: Phase 1

	Pooled	Control			Treatment			p-value of T − C difference
	Mean	Mean	SD	N	Mean	SD	N	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel A. Head of household demographics								
Age (years)	34.2	34.2	8.8	204	34.2	7.7	221	0.989
Annual household income ($)	20,009	19,823	13,058	203	20,181	13,541	221	0.851
% speak English (w/o translator)	81.4	79.9	40.2	204	82.8	37.8	221	0.468
% born outside the United States	35.1	35.0	47.8	203	35.3	47.9	221	0.908
% Black non-Hispanic	49.1	49.8	50.1	203	48.4	50.1	219	0.852
% White non-Hispanic	24.4	22.7	42.0	203	26.0	44.0	219	0.442
% Hispanic	8.3	8.9	28.5	203	7.8	26.8	219	0.739
% Asian non-Hispanic	6.9	6.9	25.4	203	6.8	25.3	219	0.962
% female head of household	81.8	78.3	41.3	203	85.0	35.8	220	0.082
% married head of household	2.8	3.0	17.0	203	2.7	16.3	220	0.774
% less than high school grad	21.6	27.9	44.9	201	15.9	36.7	220	0.004
% high school degree	31.8	32.8	47.1	201	30.9	46.3	220	0.587
% attended some college	41.6	32.8	47.1	201	49.5	50.1	220	0.000
% BA or more	5.0	6.5	24.7	201	3.6	18.8	220	0.172
% homeless	13.4	14.8	35.6	203	12.2	32.8	221	0.458
% currently working	56.6	60.6	49.0	203	52.9	50.0	221	0.100
% works full-time (over 35 hours/week)	28.3	31.0	46.4	203	25.8	43.8	221	0.193
% commute $>$ 30 min to work	34.0	35.0	47.9	123	33.0	47.2	115	0.725
% with car and driver's license	63.4	59.1	49.3	203	67.3	47.0	220	0.079
Number of children	2.2	2.3	1.4	204	2.2	1.4	221	0.715
Children's average age	6.6	6.6	3.9	196	6.7	3.8	216	0.692
Panel B. Neighborhood-related questions								
% starting in high-opportunity tract	12.6	12.4	33.1	161	12.7	33.4	173	0.932
% satisfied with current neighborhood	50.8	47.9	50.1	190	53.4	50.0	206	0.280
% would leave neighborhood if got voucher	53.2	56.6	49.7	189	50.0	50.1	206	0.214
% feel they could find place in new neighborhood	54.8	57.5	49.6	181	52.3	50.1	197	0.324
% could pay for a move	28.8	32.5	47.0	203	25.3	43.6	221	0.121
% good with moving to racially diff. neighborhood	78.4	83.2	37.5	202	74.1	43.9	220	0.020
% good with moving to specific neighborhood in opportunity area	71.7	72.4	44.8	203	71.0	45.5	221	0.673
% considering different school for any child	58.4	60.9	49.0	156	56.1	49.8	173	0.433
% unsatisfied with any child's current school	14.6	15.4	36.2	156	13.9	34.7	173	0.736
% primary motivation to move is schools	42.5	42.4	49.5	203	42.5	49.6	221	0.971
% primary motivation to move is safety	21.5	20.2	40.2	203	22.6	41.9	221	0.509
% primary motivation to move is bigger/better home	15.8	15.3	36.1	203	16.3	37.0	221	0.779

(*continued*)

Baseline Characteristics.—Families participating in the CMTO experiment are quite economically disadvantaged (Table 1, panel A). The median household income of CMTO participants of around $19,000 falls just below the fifteenth percentile of the national household income distribution (based on data from the 2017 Current Population Survey) and less than one-quarter of King County's median household income in 2017 of over $86,700. Only 5 percent of the CMTO household heads have a 4-year college degree, and 13 percent were homeless or living in a group shelter at baseline. The vast majority (82 percent) of the household heads are female, and 3 percent were married at baseline. About half of the CMTO participants (49 percent) are Black (non-Hispanic), 24 percent are White (non-Hispanic), about 8 percent are Hispanic, and 7 percent are Asian. A little more than a third (35 percent) of the household heads are immigrants, and about a fifth of the participants required a translator for the baseline survey and intake services. At baseline, 57 percent of

TABLE 1—SUMMARY STATISTICS AND BALANCE TESTS FOR HOUSEHOLDS IN EXPERIMENTAL SAMPLE: PHASE 1 (*continued*)

	Pooled	Control			Treatment			*p*-value of T − C difference
	Mean	Mean	SD	*N*	Mean	SD	*N*	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Panel C. Characteristics of origin neighborhood (census tract)								
Predicted mean household income rank ($p = 25$)	43.9	44.1	4.0	201	43.7	4.2	218	0.354
Incarceration rate ($p = 25$)	2.1	2.1	1.4	201	2.2	1.4	218	0.225
Teen birth rate (women; $p = 25$)	23.1	23.1	8.1	201	23.1	7.8	218	0.944
% in poverty (2016 ACS)	16.6	15.9	10.2	201	17.2	9.8	218	0.156
% Black (ACS 2013–2017)	11.4	11.3	9.5	201	11.5	10.1	218	0.778
% low-inc. third-graders proficient in math (2015)	41.4	41.8	11.4	197	41.0	11.9	213	0.481
% in extreme poverty (rate > 40%) tract (2016 ACS)	2.6	3.0	17.1	201	2.3	15.0	218	0.728
F-test		*F*-statistic	*p*-value	*N*				
		1.156	0.245	425				

Notes: This table presents baseline summary statistics for the 425 households who were issued a voucher in Phase 1 of the CMTO experiment and are included in our analysis. We present means for the full sample and means, standard deviations, and counts for the treatment and control groups separately. In column 8, we show the *p*-value for a test of the difference between treatment and control group means, estimated by regressing the relevant outcome variable on the treatment group indicator and an indicator for being in the Seattle or King County housing authority (since randomization was within PHA). The outcomes in panels A and B come from the baseline survey administered as part of this study, complemented with administrative data from the PHAs at the time of voucher issuance (in particular, annual household income, race and ethnicity, head of household marital status and gender come from PHA administrative data); see online Appendix Table 4 for definitions of these variables. The first three variables of panel C show census tract–level measures of mean household income rank, incarceration rates, and teen birth rates for children whose parents were at the twenty-fifth percentile of the national household income distribution drawn from the Opportunity Atlas (Chetty et al. 2018a). The remaining rows of panel C are obtained from publicly available ACS data and the Stanford Education Data Archive (for the math proficiency variable). The number of observations varies across outcomes because of nonresponse. We report an omnibus test of balance by regressing treatment status on all baseline variables in the table, controlling for PHA, and compute the *F*-statistic from a test of the variables' joint significance. To preserve the full sample in that regression, we replace missing values in each variable with a constant and add an indicator variable for an outcome being missing. The resulting *F*-statistic and *p*-value are shown at the bottom of the table. We exclude five households whose voucher was transferred to a different PHA in this table. All regressions use robust standard errors.

participants were employed, and only 28 percent were working full-time (35 or more hours a week).[15]

Table 1, panel B provides information on CMTO participants' attitudes toward moves to higher-opportunity neighborhoods.[16] At baseline, CMTO participants expressed interest in moving to higher-opportunity neighborhoods but were worried about the feasibility of making such moves. Around 80 percent of households indicated they were comfortable moving to a racially different neighborhood. Over 70 percent of families indicated that they were willing to move to at least one of three areas we named (northwest Seattle, northeast Seattle, and south of Ship Canal for SHA; north King County, east King County, and East Hill Kent for KCHA) that have many high-opportunity neighborhoods. However, only 29 percent of the

[15] Although CMTO participants have low incomes relative to the median family, they are significantly better off than participants in the Moving to Opportunity experiment (Sanbonmatsu et al. 2011). For example, only 28 percent of MTO household heads were employed at baseline as compared to 57 percent of CMTO household heads. Only 3 percent of CMTO families were living in extremely high-poverty tracts (40 percent or higher poverty rate) at baseline, as compared to 100 percent of MTO families.

[16] See online Appendix Table 4 for the exact questions used to assess these attitudes and the way in which responses were coded.

CMTO families felt they would find it easy to pay moving expenses to move to a different neighborhood. The primary motivation expressed by CMTO participants for moving to a new neighborhood was better schools (42 percent), safer neighborhood (21 percent), and better or bigger home (16 percent).[17] Few CMTO participants list employment-related motivations for moving to a new neighborhood.

Table 1, panel C shows that CMTO families were living at baseline in relatively disadvantaged neighborhoods within King County on several dimensions. The mean poverty rate of the census tracts in which CMTO families lived was 17 percent in 2016, as compared to 10.9 percent for King County. The mean predicted income rank in adulthood of children growing up in a low-income (twenty-fifth percentile) family was 43.9 (about $35,000) in the baseline neighborhoods of CMTO families, which falls at approximately the thirty-first percentile of tracts across King County.

Balance Tests.—The final column of Table 1 reports *p*-values for tests of the difference in the mean of each variable between the treatment and control groups.[18] The baseline characteristics are generally balanced between the treatment and control groups, as would be expected given random assignment. An *F*-test for balance across all the baseline variables shown in Table 1 yields a statistically insignificant *p*-value of 0.24. Analogous comparisons show that the four arms of the second phase of the experiment are balanced as well (online Appendix Table 3).

The Phase 1 qualitative sample (the subset of households for whom we analyze postmove neighborhood satisfaction data) is representative of the full quantitative sample (online Appendix Table 5), consistent with the sampling design. There is also no evidence of selective attrition from the qualitative sample: rates of response to the follow-up survey do not vary with treatment status, and families who responded to the survey are balanced on observable baseline characteristics (online Appendix Tables 2 and 6).

IV. Phase 1 Experimental Results

This section presents the experimental results from the first phase of the experiment. We divide our analysis into four parts. First, we analyze how the CMTO treatment affected the rate of moves to high-opportunity areas, the primary outcome specified in our pre-analysis plan, as well as various measures of neighborhood and unit quality. Second, we examine heterogeneity in treatment effects across subgroups. Third, we analyze rates of persistence in new neighborhoods and neighborhood satisfaction based on postmove surveys. Finally, we use our estimates to predict the impacts of the treatment on rates of upward income mobility and compare the earnings impacts of the intervention to its costs.

[17] These motivations contrast with the MTO families, where concerns about gangs and violence were the primary motivation to move for most families and better schools were the primary motivation for a much smaller group.

[18] Since randomization was stratified by PHA (Seattle versus King County), we compute these *p*-values by regressing the outcome on indicators for treatment status and PHA and report the *p*-value on the treatment indicator. In practice, since randomization rates were essentially identical in the two PHAs, the resulting difference is very similar to the raw difference in means between the treatment and control group.

A. *Impacts on Neighborhood Choice*

We estimate the treatment effect of the bundled CMTO intervention on an outcome y_i (e.g., an indicator for moving to a high-opportunity area) using an OLS regression specification of the form

$$y_i = \alpha + \beta Treat_i + \delta KCHA_i + \gamma \mathbf{X}_i + \epsilon_i, \tag{1}$$

where *Treat* is an indicator variable for being randomly assigned to the treatment group, *KCHA* is an indicator for receiving a voucher from the King County Housing Authority (as opposed to the Seattle Housing Authority), and $\mathbf{X}$ is a vector of baseline covariates.

In our baseline specifications, we include the *KCHA* indicator (since randomization occurred within each housing authority) but no additional covariates $\mathbf{X}$. In supplemental specifications, we evaluate the sensitivity of our estimates to the inclusion of the baseline covariates listed in Table 1. Including these additional covariates has little impact on the estimates, as expected given that the covariates are balanced across the treatment and control groups.

Figure 3, panel A shows the effect of the CMTO program on the fraction of families who rent units in high-opportunity areas using their housing vouchers. To facilitate visualization, we plot the control group mean (pooling all control group families across the two housing authorities) and the control group mean plus the estimated treatment effect β from equation (1).

The CMTO intervention increased the share of families moving to high–upward mobility (opportunity) areas by 37.8 percentage points (SE $=$ 4.2, $p < 0.001$), from 15.4 percent in the control group to 53.2 percent in the treatment group.[19] The 15.4 percent rate of moves to high-opportunity areas in the control group is similar to historical rates (Figure 3, panel A), suggesting that the high rate of opportunity moves in the treatment group did not crowd out moves to opportunity areas that control group families would have made.[20]

Figure 3, panel B replicates Figure 3, panel A, changing the outcome to an indicator for leasing up anywhere (not just in a high-opportunity area). Lease-up rates are very similar across the treatment group (87.3 percent) and control group (86.8 percent).[21] The fact that lease-up rates were quite high even in the control group shows that CMTO's impacts are not simply driven by providing services that enable families to use their vouchers (e.g., landlord referrals) and steering them to certain

[19] We find very similar treatment effects across the two housing authorities: 35.1 pp (SE $=$ 6.0) for families receiving vouchers from KCHA and 40.9 pp (SE $=$ 6.0) for those receiving vouchers from SHA.

[20] In particular, if there are a small number of units available in high-opportunity neighborhoods, the increased success of CMTO treatment group families in leasing those units could come at the expense of other voucher holders who would have gotten the units. This does not appear to occur in practice, presumably because the marginal family competing for housing in a high-opportunity neighborhood is typically not a voucher holder.

[21] The lease-up rate in the control group in Seattle and King County is considerably higher than in other areas of the United States, perhaps because of the efforts these housing authorities make to help households use their vouchers even in the absence of CMTO. For example, roughly half of voucher recipients in Chicago use their vouchers (Jacob, Kapustin, and Ludwig 2015). In such settings, the CMTO intervention may increase overall lease-up rates as well. Indeed, we find that even in the Seattle area, the CMTO intervention increased overall lease-up rates in the second phase of the experiment, which occurred during the pandemic, when housing search became more challenging (online Appendix Figure 10, panel A).

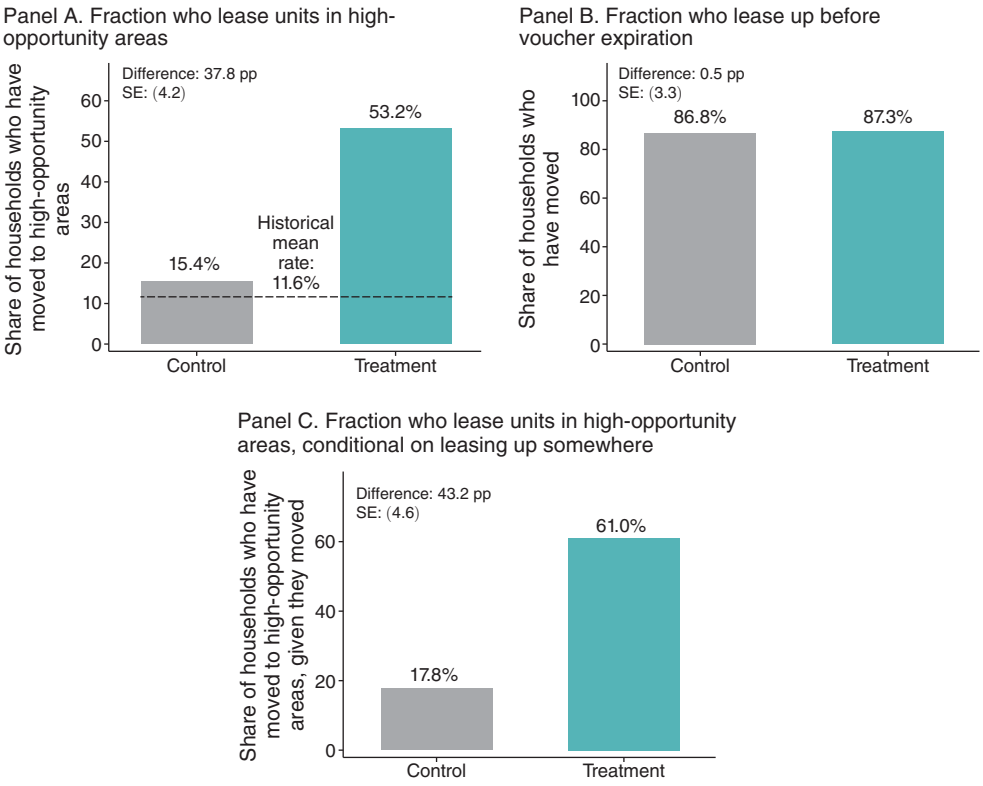


FIGURE 3. TREATMENT EFFECTS OF BUNDLED CMTO PROGRAM ON NEIGHBORHOOD CHOICE

Notes: This figure shows the treatment effects of the bundled CMTO program on families' neighborhood choices using data from the Phase 1 experimental sample. Panel A presents the treatment effect on the fraction who lease up a unit in a high-opportunity tract, as defined in Figure 1, panel B. The dashed line in panel A shows the fraction of voucher recipients who leased units in high-opportunity areas between 2015 and 2017. Panel B presents the treatment effect on leasing up in any area prior to voucher expiration. Panel C presents the treatment effect on leasing up in a high-opportunity area conditional on leasing up somewhere. In all panels, the control mean is calculated as the mean within households in the control group. Treatment effects are estimated using an OLS regression of the outcome on a treatment indicator and an indicator for being in KCHA/SHA (since randomization occurred within each housing authority). The treatment mean plotted is calculated as the control mean plus the estimated treatment effect. Standard errors reported are robust standard errors. Panels A and B use the full Phase 1 experimental sample, excluding five households whose voucher was transferred to a different public housing authority (other than KCHA/SHA). Panel C further restricts the sample to the 370 households who leased up somewhere using their voucher before it expired. All panels focus on the first lease-up after voucher issuance.

areas as a condition for receiving these services. Rather, CMTO changed *where* families chose to live. This result implies that moves to high-opportunity areas are inhibited by informational limitations and/or barriers specific to high-opportunity areas—which the bundle of CMTO services were expressly designed to address—rather than barriers associated with finding *any* place to lease up.

Conditional on leasing up, 61 percent of families leased units in high-opportunity areas in the treatment group, compared with 17.8 percent in the control group (Figure 3, panel C). Hence, if all families were to receive CMTO services and treatment effects remained stable, we would expect 61 percent (rather than the current 17.8 percent) of families using vouchers to live in high-opportunity areas in steady state.

Figure 4, panel A maps the neighborhoods to which treatment and control families moved (among those who leased a unit using their voucher). Control group families remain concentrated in lower-opportunity neighborhoods in the southern and western parts of the metro area, which is where most families lived at the point of voucher application (online Appendix Figure 4). In contrast, treatment group families are widely dispersed across high-opportunity neighborhoods across the metro area. The 118 treatment group families in our sample who moved to an opportunity area spread out across 46 distinct census tracts. The dispersion of treatment group families shows that the program did not simply enable families to move to a specific set of apartment buildings or neighborhoods but rather facilitated moves to a variety of different areas that may have best suited families' heterogeneous tastes and constraints.

The average distance between families' new neighborhoods and prior neighborhoods is similar for treatment and control families who leased up (Table 2). This finding suggests that the CMTO program helped families overcome barriers unique to moving to high-opportunity areas in particular, rather than simply enabling them to move farther away from their current locations.

Figure 4, panel B plots the distribution of levels of upward mobility (the mean household income rank of children who grew up in low-income families) in the neighborhoods to which families moved for the treatment and control groups. The distributions for the treatment group are shifted significantly to the right relative to that for the control group. Families who moved to opportunity did not simply gravitate to lower-opportunity areas within the set of neighborhoods designated as "high opportunity." Some treatment group families moved to the highest–upward mobility neighborhoods in the county—areas where no one would have moved absent the services (as shown by the near-zero density in the control group in the upper right tail).

Impacts on Other Measures of Neighborhood Quality.—Having established that the treatment induced families to move to areas that we designated as high opportunity, we now turn to examine treatment effects on other measures of neighborhood quality to characterize the types of areas to which families moved. Table 2 reports estimates of treatment effects on several traditional measures of neighborhood quality. We estimate these treatment effects using a specification analogous to (1), replacing the dependent variable with a characteristic of the census tract to which the family moves (e.g., poverty rate). Treatment group families move to neighborhoods that have $12,919 higher median household incomes on average (based on the 2017 ACS), a 9.7 pp higher fraction of college graduates, and 3.75 pp more two-parent families (all significantly different from 0 with $p < 0.01$). In addition, treatment group families move to areas with lower rates of incarceration for children who grow up there. Treatment group families also move to areas that score higher on other neighborhood-level indexes of opportunity that have been used in prior work, such as Kirwan indexes (Acevedo-Garcia et al. 2014).

These results show that families in the treatment group did not sort based on particular characteristics of high-opportunity neighborhoods as we defined them but rather moved to neighborhoods that would be judged to be "higher quality" across many different dimensions. The treatment leads families to move to neighborhoods

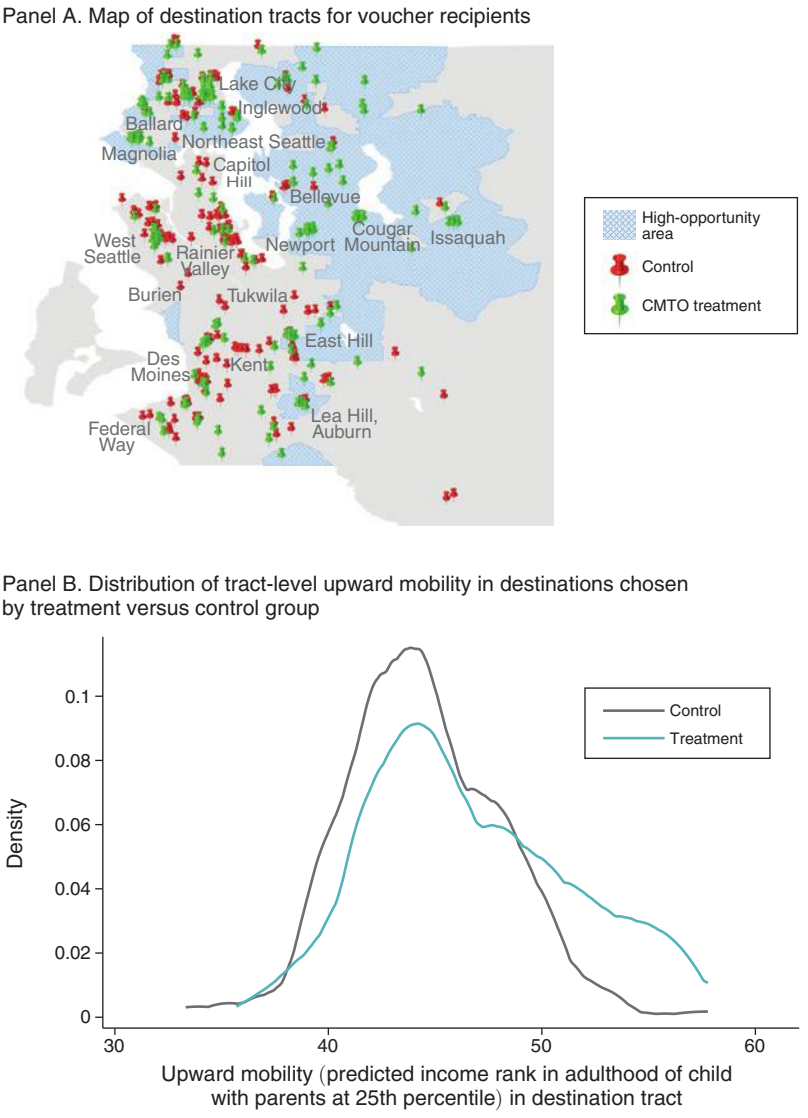


FIGURE 4. NEIGHBORHOODS CHOSEN BY HOUSEHOLDS IN TREATMENT VERSUS CONTROL GROUP

Notes: Panel A presents a map of the destination tracts for families in the CMTO treatment and control groups who moved using their vouchers in the first-phase experiment. High-opportunity areas are highlighted in blue cross-hatch. We focus on the destination tract of the first lease-up after voucher issuance. We exclude five households whose vouchers were transferred to different public housing authorities (three households) or who used their vouchers to lease up units outside of King County (two households). To protect confidentiality, we add a small amount of random noise to the destination tract centroids shown in the maps. Panel B plots the distribution of upward mobility (based on the Opportunity Atlas estimates shown in Figure 1, panel A) in the tracts to which families in the control and CMTO treatment groups move using their vouchers. We focus on upward mobility in the tract of first lease-up after voucher issuance, restricting the sample to households who leased up. Bandwidths for the kernel densities are calculated to minimize integrated square error assuming the data are Gaussian and a Gaussian kernel is used.

scoring higher on these dimensions because areas with higher levels of upward income mobility tend to have higher average income levels, more two-parent families, college graduates, etc. (online Appendix Table 7; Chetty et al. 2018b).

Table 2—Treatment Effects on Neighborhood and Housing Unit Characteristics: Phase 1

	Control mean	Control standard deviation	Treatment mean	Treatment effect	Standard error of treatment effect	Treatment effect in standard deviations	Standard error of treatment effect in standard deviations
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Panel A. Neighborhood characteristics							
Tract income and other characteristics							
Median HH income (2017)	66,970.06	22,121.28	79,889.38	12,919.32	2,679.76	0.58	0.12
% labor force participation (2010)	0.70	0.06	0.70	0.00	0.01	−0.03	0.10
% poverty (2017)	14.87	8.00	13.39	−1.48	0.80	−0.19	0.10
Median home value (2010)	342,428.50	103,755.15	403,180.34	60,751.84	12,352.30	0.59	0.12
Census mail response rate	76.33	4.53	77.28	0.95	0.44	0.21	0.10
Theil index of racial segregation	0.12	0.05	0.12	−0.01	0.00	−0.16	0.09
# jobs for no HS degree, 1-mile radius	164.25	384.23	185.39	21.14	34.46	0.06	0.09
Mean commute time in 2000 (minutes)	29.58	3.31	28.34	−1.24	0.32	−0.38	0.10
% commute $<$ 15 minutes	16.28	5.87	17.52	1.24	0.61	0.21	0.10
Distance to city hall of largest city in CZ (miles)	11.59	7.47	10.69	−0.89	0.53	−0.12	0.07
Distance from origin neighborhood (miles)	10.77	11.89	11.36	0.59	1.16	0.05	0.10
Resident demographics							
% White (2017)	49.06	18.42	56.15	7.10	1.70	0.39	0.09
% Black (2017)	11.40	9.21	8.28	−3.12	0.80	−0.34	0.09
% foreign-born (2016)	24.79	10.18	24.46	−0.34	0.97	−0.03	0.10
% married (2010)	46.26	9.56	49.08	2.83	0.95	0.30	0.10
% of children with single parents (2013–2017)	33.37	12.74	29.62	−3.75	1.32	−0.29	0.10
% $\geq$ college education (2017)	36.72	17.50	46.41	9.70	1.76	0.55	0.10
Population density (2010, No. people per square mile)	2,496.17	1,298.80	2,388.31	−107.86	126.16	−0.08	0.10
Children's long-term outcomes							
Predicted mean individual income rank ($p = 25$)	46.51	3.04	47.75	1.24	0.34	0.41	0.11
Predicted mean household income rank ($p = 25$)	44.55	3.62	46.14	1.59	0.39	0.44	0.11
Predicted mean household income rank for White children ($p = 25$)	47.04	4.46	47.83	0.79	0.49	0.18	0.11
Teenage birth rate for women ($p = 25$)	21.02	7.79	16.51	−4.51	0.79	−0.58	0.10
Incarceration rate ($p = 25$)	2.06	1.30	1.61	−0.45	0.13	−0.35	0.10
Other indexes of opportunity							
Kirwan overall child opportunity score	−0.13	0.39	0.10	0.22	0.04	0.57	0.10
Kirwan educational subscore	−0.24	0.57	0.11	0.35	0.06	0.61	0.11
Kirwan health/environment subscore	0.00	0.32	0.10	0.10	0.03	0.31	0.09
Kirwan social/economic opportunity subscore	−0.14	0.55	0.07	0.22	0.05	0.39	0.10
HUD transit index	82.34	8.62	82.01	−0.33	0.77	−0.04	0.09
Environmental health index	9.68	12.94	11.26	1.58	1.27	0.12	0.10

(*continued*)

Unit Quality.—Families' outcomes and well-being may be affected not only by the quality of the neighborhoods to which they move but also the quality of the specific apartment or house they lease. This raises the question of whether families induced to move to higher-opportunity areas by the CMTO program had to make sacrifices on the quality of the units they leased. To answer this question, we estimate treatment effects on a variety of unit-level characteristics.

Table 2 shows that the treatment did not induce families to move to smaller housing units; if anything, families in the treatment group lease slightly larger units than

Table 2—Treatment Effects on Neighborhood and Housing Unit Characteristics: Phase 1 (*continued*)

	Control mean (1)	Control standard deviation (2)	Treatment mean (3)	Treatment effect (4)	Standard error of treatment effect (5)	Treatment effect in standard deviations (6)	Standard error of treatment effect in standard deviations (7)
Panel B. Unit characteristics							
Square feet	1,257.17	651.88	1,298.99	41.82	80.75	0.06	0.12
Year built	1,985.18	22.71	1,980.99	−4.19	3.17	−0.18	0.14
Household appliance index	0.63	0.36	0.63	0.00	0.03	0.00	0.09
Baths	1.97	0.71	2.04	0.07	0.09	0.10	0.13
Share with air conditioning	9.38	29.30	7.38	−2.00	3.04	−0.07	0.10
Total rent paid to owner	1,828.31	546.90	2,013.14	184.84	56.55	0.34	0.10
Rent paid by PHA	1,429.41	617.03	1,659.19	229.78	60.25	0.37	0.10
Utilities paid (estimate by PHAs)	138.98	89.34	170.47	31.49	8.55	0.35	0.10
Total out-of-pocket expenditures (tenant)	536.20	362.16	512.81	−23.39	39.13	−0.06	0.11

Notes: This table shows the effect of the CMTO treatment on a variety of neighborhood and unit characteristics. Each row of the table reports the mean and standard deviation of the relevant outcome in the treatment and control groups as well as an estimate from a separate OLS regression of neighborhood and housing unit characteristics on an indicator for treatment status. All regressions include a PHA indicator and use robust standard errors. The control group mean is a raw mean, while the treatment group mean is constructed as the control mean plus the treatment effect estimate. Panel A shows treatment effects on neighborhood characteristics unconditional on lease-up. Panel B shows treatment effects on unit characteristics for the subsample who leased up because these characteristics are only available for those who leased up. The share of workers with a short commute to work and mean commute time are constructed using tract-level data from table NP031B of the 2000 decennial census or tract-level data from table B08303 of the 2006–2010 American Community Survey, both obtained from the NHGIS database. Fraction with a short commute to work is computed by taking the share of people who commute less than 15 minutes to work over all workers 16 years and over who did not work at home. Mean commute time is constructed using the share of workers commuting to work in specific bins (<5 minutes, 5–9 minutes, 10–14 minutes, etc.), imputing the mean time commuted in a given bin (i.e., for 5–9 minutes, imputing mean commute time of 7 minutes), and then calculating a sum of imputed mean commute times within each bin weighted by the share commuting. The Household appliance index is the sum of six indicators for common appliances observed in the rental listings: microwaves, refrigerators, washers, dryers, dishwashers, and garbage disposal. We exclude five households whose voucher was transferred to a different PHA in this table.

those in the control group (though the difference is not statistically significant). Housing units rented by treatment group families are also quite similar to those of the control group in terms of age, household appliances, and access to air conditioning (Table 2). In short, the moves to opportunity induced by the CMTO treatment did not require families to make sacrifices in terms of housing quality.[22]

B. *Subgroup Heterogeneity*

The effectiveness of programs that seek to reduce barriers to moving could potentially vary significantly across subgroups that face different types of barriers (e.g., racial/ethnic minorities who may face discrimination). In Figure 5, we evaluate

[22] One reason this might be the case is that Seattle and King County offer higher payments for more expensive neighborhoods, allowing families to access more expensive units in high-opportunity areas. Understanding the trade-offs that would be induced by CMTO-type programs in a setting without tiered payment structures is an interesting direction for further work.

whether this is a concern by analyzing the heterogeneity in the CMTO treatment effect on the rate of moves to high-opportunity areas across subgroups.

Figure 5, panel A replicates Figure 3, panel A separately for non-Hispanic Black heads of household, non-Hispanic Whites, and all other racial and ethnic groups. The CMTO treatment generated large increases in moves to higher-opportunity areas of at least 30 percentage points across all of these groups.[23] The significant gains among Black families show that the CMTO treatment has substantial effects even in the presence of any racial discrimination that may exist in the housing market (Kain and Quigley 1975). Conversely, the large treatment effects among White families show that the low rate of opportunity moves among voucher holders is not due solely to racial discrimination.

Figure 5, panel B splits the sample into families with household incomes below versus above $19,000 per year (the median in the CMTO experimental sample). We find substantial treatment effects in both of these groups, demonstrating that the program yields benefits even for the most disadvantaged households.

In Table 3, we estimate analogous treatment effects for several other subgroups of the population by cutting the data on various baseline characteristics. In every one of the 36 subgroups considered in the table, we find a highly statistically significant treatment effect on the rate of opportunity moves of at least 25 percentage points. These groups include immigrants versus US natives, those with or without English as their primary language, and families with more or less optimistic views at baseline of moving to an opportunity area. There are no significant changes in overall lease-up rates in any of the subgroups (online Appendix Table 8), consistent with the patterns in Figure 3, panel B for the full sample.

In sum, the CMTO intervention generates highly robust increases in moves to high opportunity across subgroups of the population.

C. *Persistence and Neighborhood Satisfaction*

A key concern with housing mobility programs is that the moves they induce to higher-opportunity areas may be short-lived, especially since many families have not experienced these areas before and could revise their preferences after living there. Given prior evidence that neighborhoods' impacts on children's outcomes depend upon the number of years for which children are exposed to the area (e.g., Chetty and Hendren 2018a; Deutscher 2020), it is important to understand whether CMTO led to long-lasting moves. In this section, we analyze whether families choose to stay in high-opportunity areas after moving and use survey data to directly assess neighborhood satisfaction after moving.

[23] These changes in neighborhood choice are likely to improve long-term outcomes for all of these subgroups as well: for instance, Chetty et al. (2018b) show that Black children who move to areas with higher levels of upward mobility on average have higher earnings in adulthood, even if the neighborhoods to which they move have relatively few Black families.

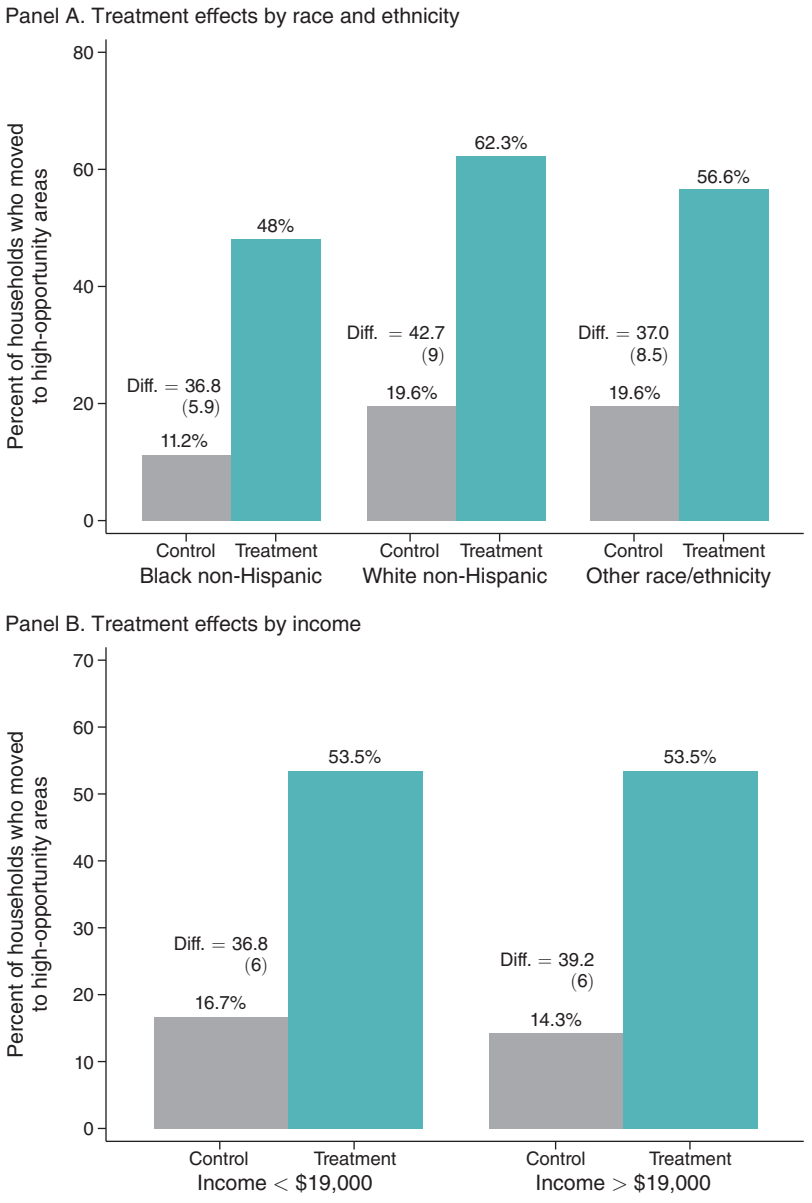


FIGURE 5. HETEROGENEITY IN TREATMENT EFFECTS

Notes: This figure presents estimates of treatment effects on the share of households moving to high-opportunity areas by race/ethnicity (panel A) and baseline income level (panel B) of the voucher recipient using the Phase 1 experimental sample. Treatment and control means are estimated separately within each subgroup following exactly the same method used to construct the pooled estimates reported in Figure 3, panel A; see notes to that figure for further details. Panel A uses the 98 percent of participants who report their race, and panel B uses the 99 percent who report their income. The cutoff used in panel B ($19,000) to divide the two groups corresponds to the median income of the participants in the experiment.

Persistence in New Neighborhoods.—We begin by evaluating whether families who moved to high-opportunity neighborhoods in the first phase of the experiment stay there when their lease comes up for renewal. We have data on where families live up through February 7, 2022, roughly three years after participants in the first

Table 3—Heterogeneity of Treatment Effects on Fraction Who Move to High-Opportunity Areas: Phase 1

	Share moving to high-opportunity area (%), unconditional on lease-up					
	Control mean (1)	Treatment mean (2)	Treatment effect (3)	SE (4)	*N* (5)	*p*-value (6)
Panel A. Pooled						
All families	15.4	53.3	37.8	4.2	422	0.000
All families (controls)	15.4	52.8	37.4	4.5	422	0.000
Panel B. By head of household demographic characteristics						
Black non-Hispanic	11.2	48.0	36.8	5.9	204	0.000
White non-Hispanic	19.6	62.3	42.7	9.0	103	0.000
Other race/ethnicity	19.6	56.7	37.0	8.5	112	0.000
Born outside the United States	12.9	51.3	38.5	6.8	148	0.000
Born in the United States	16.9	55.8	38.9	5.3	273	0.000
English isn't primary language	13.5	56.9	43.3	9.7	78	0.000
20 years or more in Seattle/King County	15.7	51.4	35.7	6.5	180	0.000
Less than 20 years in Seattle/King County	15.4	54.8	39.4	5.6	241	0.000
Started in high-opportunity tract	25.0	72.6	47.6	13.5	42	0.000
Didn't start in high-opportunity tract	13.0	45.7	32.6	5.0	289	0.000
Income $\leq$ \$19,000 (sample median)	16.7	53.5	36.8	6.0	218	0.000
Income $>$ \$19,000 (sample median)	14.3	53.5	39.2	6.0	203	0.000
No college	9.9	53.2	43.3	5.7	224	0.000
Some college or more	24.7	52.8	28.1	6.8	194	0.000
Currently working	13.1	45.5	32.4	5.6	239	0.000
Currently not working	19.2	61.5	42.3	6.6	182	0.000
Uses childcare	19.4	45.2	25.8	6.3	207	0.000
Doesn't use childcare	11.8	60.8	49.1	5.6	214	0.000
Panel C. By perceptions about moving at baseline						
Feels good about moving to an opportunity area	17.9	53.4	35.4	5.2	302	0.000
Doesn't feel good about moving to an opportunity area	9.1	53.4	44.4	7.4	119	0.000
Satisfied with current neighborhood	14.4	55.7	41.3	5.9	200	0.000
Unsatisfied/indifferent with current neighborhood	17.3	50.8	33.4	6.4	194	0.000
Sure wants to leave current neighborhood	17.9	56.5	38.6	6.2	209	0.000
Sure wants to stay in current neighborhood or indifferent	13.6	49.3	35.7	6.2	184	0.000
Feels good about moving to racially different neighborhood	15.2	55.1	39.9	4.8	328	0.000
Feels bad/indifferent about moving to racially different neighborhood	17.6	49.0	31.3	9.5	91	0.001
Sure could pay for moving expenses	15.4	63.1	47.7	7.7	121	0.000
Not sure could pay for moving expenses	15.6	50.4	34.8	5.0	300	0.000
Sure could find a new place	16.3	51.5	35.1	6.2	207	0.000
Not sure could find a new place	17.3	55.3	37.9	6.8	169	0.000
Panel D. By children characteristics						
Mean children age at or above median (6.3 years)	15.6	51.9	36.3	6.1	204	0.000
Mean children age below median (6.3 years)	15.5	53.1	37.6	6.1	205	0.000
More than 2 children	13.4	44.2	30.7	7.1	137	0.000
2 children or fewer	16.4	58.8	42.4	5.2	285	0.000
Considering different schools	12.9	52.5	39.6	6.2	190	0.000
Not considering different schools	16.7	52.5	35.9	7.6	136	0.000

Notes: This table reports treatment effects by subgroup, estimated using a regression of an indicator for leasing up in a high-opportunity area on the treatment group indicator and a PHA fixed effect. In row 2, we additionally control for the baseline characteristics shown in Table 1. We exclude five households whose voucher was transferred to a different PHA in this table. See online Appendix Table 4 for definitions of the variables used to construct the subgroups. All regressions use robust standard errors. All of the effects shown are statistically significant, with $p < 0.01$.

phase of the experiment received their vouchers. When analyzing persistence, we restrict attention to the 84 percent of families who continue to hold vouchers over

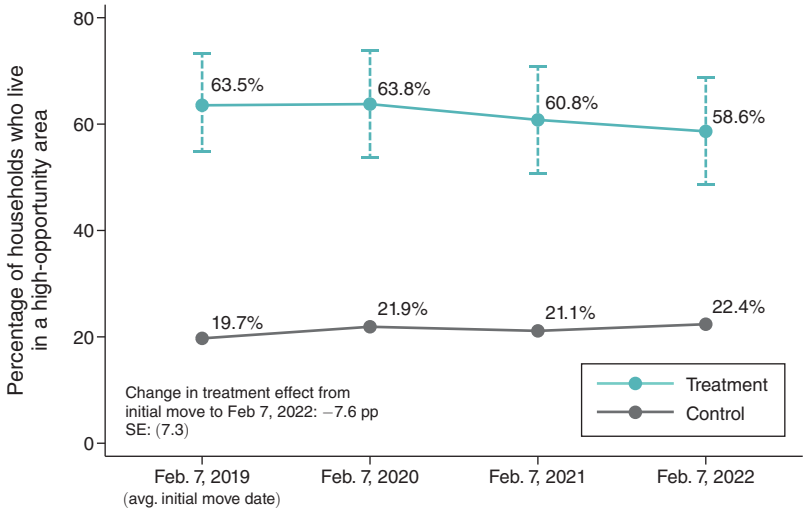


FIGURE 6. PERSISTENCE OF TREATMENT EFFECTS ON NEIGHBORHOOD CHOICE

Notes: This figure examines whether the CMTO treatment has persistent effects on the share of families who live in high-opportunity areas. It plots the fraction of families in the first-phase experimental sample who initially leased a unit in a high-opportunity area (whose average lease-up date was February 7, 2019) alongside the fraction who live in a high-opportunity area as of February 7, 2020, February 7, 2021, and February 7, 2022. The figure also shows 95 percent confidence intervals for each of the treatment effect estimates. Treatment and control means are estimated among the subsample of households who leased up following exactly the same method used to construct the pooled estimates reported in Figure 3, panel C; see notes to that figure for further details. We exclude households whose location we cannot track as of February 7, 2022 because their voucher was transferred to another public housing authority or because they ended their participation in the voucher program entirely. We find no significant differences in the likelihood of voucher transfer or termination of program participation between the treatment and control groups.

the 3 years we analyze; we find no significant difference in the fraction of families who retain their vouchers over 3 years.

Figure 6 plots the fraction of families within this sample who initially leased a unit in a high-opportunity area (replicating Figure 3, panel C) along with the fraction who live in a high-opportunity area in the three subsequent years (measured on February 7 of each year). The treatment effect of CMTO is highly persistent: families in the treatment group are 36 percentage points more likely to be living in a high-opportunity area after 3 years, as compared with 44 pp when they first leased up. Families induced to move to opportunity by the CMTO intervention do not exhibit a strong propensity to move back to the lower-opportunity neighborhoods they would otherwise have chosen.[24]

Neighborhood Satisfaction.—To gauge the preferences of inframarginal households (i.e., those who are not close to the margin of moving again), we supplement the persistence measures with survey data on neighborhood satisfaction. We asked

[24] These high rates of persistence may be driven by the fact that the families who moved to high-opportunity areas in CMTO chose such neighborhoods without being required to do so to use their vouchers (and hence are a selected subsample who exhibit a preference for such areas). In contrast, the families in the Moving to Opportunity experimental group were required to move to low-poverty areas to use their vouchers.

all individuals in the random sample used for the qualitative analysis to rate their levels of satisfaction with their new neighborhoods at the end of their interviews. On average, these surveys were conducted six months after families had moved. As discussed in Section VI, families who responded to these surveys are representative of the full sample on observable characteristics, and there is no evidence of selective attrition by treatment status. Inferences drawn from this smaller subgroup of respondents are therefore likely to yield unbiased estimates of treatment effects in our broader experimental sample.

Families in the treatment group express much greater satisfaction with their new neighborhoods than control group families. At the end of their qualitative interviews, families were asked, "Which of the following statements best describes how satisfied you are with your current neighborhood?" with five potential answers ranging from "very satisfied" to "very dissatisfied." Figure 7, panel A shows that the treatment increased the share of families who reported being "very satisfied" with their new neighborhoods by 18.7 percentage points (SE $=$ 10.1, $p = 0.066$), from 45.5 percent in the control group to 64.2 percent in the treatment group (see online Appendix Figure 6 for the full distribution of responses).[25]

Families were also asked, "Which of the following statements best describes how you feel about staying in your current neighborhood?" with five potential answers ranging from "very sure I want to stay" to "very sure I want to move to a different neighborhood." Treatment group families are 17.4 percentage points (SE $=$ 9.8, $p = 0.076$) more likely to say they are "very sure" about wanting to stay in their new neighborhood (Figure 7, panel B).

To further explore the mechanism underlying these improvements in neighborhood satisfaction, in online Appendix Figure 7, we disaggregate the measures of satisfaction (panel A) and likelihood of staying (panel B) by whether families moved to high-opportunity areas. In both the treatment and control groups, families who moved to high-opportunity areas report much higher levels of satisfaction and likelihoods of staying.[26] These differences emerge only postmove: families in all four groups report similarly low levels of satisfaction (panel C) and low probabilities of staying (panel D) in their neighborhoods at the point of the baseline survey prior to randomization. Although the comparisons in online Appendix Figure 7 are based on endogenous choices rather than experimental variation, they suggest that the key determinant of satisfaction is the neighborhoods in which families live rather than a direct effect of the CMTO services themselves. In particular, the treatment effect on the fraction of families who report being very satisfied (18.7 percent) is similar to what one would predict based on the difference in satisfaction between families who moved to high- versus low-opportunity areas within the control group

[25] These treatment effects on satisfaction persist well after the initial move, mitigating potential concerns about a transitory "warm glow" effect right after moving. Among the 25 percent of families interviewed at least 280 days after their initial move, 71 percent of treated families reported being "very satisfied" with their new neighborhoods, compared with 42 percent of the control group.

[26] The gains in satisfaction associated with moving to a high-opportunity area are slightly larger in the control group than the treatment group, perhaps reflecting the fact that the few families who moved to high-opportunity areas in the control group strongly preferred them to begin with, whereas the CMTO treatment induced families with slightly weaker preferences to move as well.

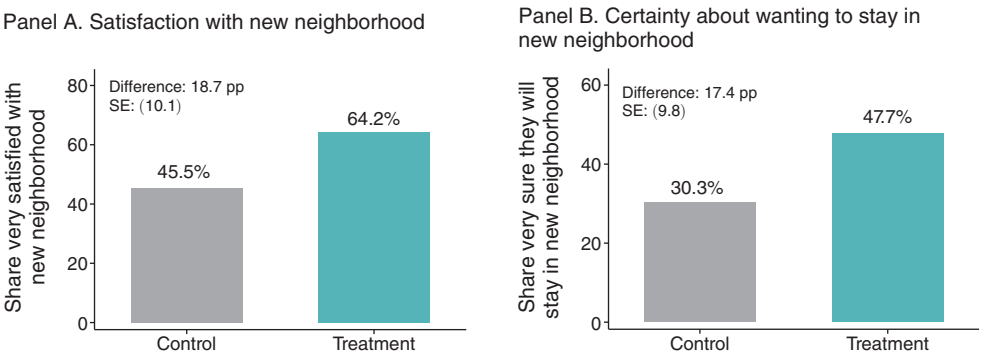


FIGURE 7. TREATMENT EFFECTS ON POSTMOVE NEIGHBORHOOD SATISFACTION

Notes: This figure shows treatment effects using data from a follow-up qualitative survey administered to a random sample of participants in the Phase 1 experiment. Panel A shows treatment effects on measures of neighborhood satisfaction. Participants were asked, "Which of the following statements best describes how satisfied you are with your current neighborhood? 1. Very Satisfied - 2. Somewhat satisfied - 3. In the middle - 4. Somewhat dissatisfied - 5. Very dissatisfied - 6. (No Answer)." Panel B presents measures of the certainty with which participants want to stay in their new neighborhood. Participants were asked, "Which of the following statements best describes how you feel about staying in your current neighborhood? - 1. Very sure I want to stay - 2. Somewhat sure I want to stay - 3. In the middle - 4. Somewhat sure I want to move to a different neighborhood - 5. Very sure I want to move to a different neighborhood - 6. (No Answer)." The outcomes in each panel are the fraction of respondents who give an answer of "1" to the relevant question. Treatment and control means are estimated among the subsample of households who leased up and were surveyed post-lease-up, following exactly the same method used to construct the pooled estimates reported in Figure 3, panel C; see notes to that figure for further details. For the full distribution of responses to these two questions, see online Appendix Figure 6.

multiplied by the treatment effect on the fraction who move to high-opportunity areas $(58.5\% \times 43.2\% = 25.3\%)$.[27]

In sum, the sharp increases in neighborhood satisfaction and high levels of persistence in the new neighborhoods allay the concern that the CMTO treatment may have steered families into new neighborhoods that end up being a poor fit after they arrive. Instead, these findings suggest that a lack of information about high-opportunity areas or barriers during the housing search process prevent low-income families with vouchers from moving to higher-opportunity areas that they actually prefer ex post. We investigate the nature of the barriers that families face using a second phase of experiments in Section V.

D. *Impacts on Upward Mobility*

How do the changes in neighborhood choices induced by CMTO affect children's future outcomes? While children's earnings outcomes will not be directly observed for many years, the upward mobility measures from the Opportunity Atlas provide a

[27] These findings also help address the concern that survey responses may be driven by social desirability bias, whereby families in the treatment group might feel obliged to say positive things about the program and their neighborhoods to the interviewers, especially right after moving. To mitigate such biases, interviewers stressed that they were independent from the PHAs and would not share their responses with the PHAs and sought to develop rapport with families at the beginning of the interviews—starting with an open invitation to "Tell us the story of your life"—before asking CMTO-specific questions.

way to assess the potential impacts of the CMTO treatment on children's subsequent earnings outcomes.

Impacts on Neighborhood-Level Upward Mobility.—We begin by estimating treatment effects on average levels of upward mobility in the neighborhoods to which families move. We measure upward mobility in each census tract as the predicted adult household income rank for children with parents at the twenty-fifth percentile, drawn directly from the publicly available Opportunity Atlas data (Chetty et al. 2018a).[28] The treatment effect on this measure of upward mobility is an increase of 1.6 percentile ranks (SE $= 0.4$, $p < 0.001$), from 44.6 (roughly an income of \$36,000 at age 34) in the control group to 46.2 (\$37,800) in the treatment group (Table 2).[29]

The 1.6 estimated treatment effect on upward mobility might overstate the intervention's actual impact because of sampling error in the Opportunity Atlas estimates of upward mobility used to define high-opportunity areas (Andrews, Kitagawa, and McCloskey 2024). In particular, the tracts that have the highest *estimated* rates of upward mobility in the Opportunity Atlas may not in fact have the highest *true* levels of upward mobility because of noise in the estimates. Because tracts that got a positive noise draw as a result of sampling variation are more likely to be defined as "high opportunity," their true levels of upward mobility will generally be lower on average than estimated. We address these concerns using two approaches.

First, we construct optimal forecasts of upward mobility by shrinking the raw Opportunity Atlas estimates, as in the literature on selection of teachers based on value-added estimates (e.g., Chetty, Friedman, and Rockoff 2014). We use the same shrinkage procedure that we used to construct the forecasts we used to define high-opportunity areas (see online Appendix A). Under the assumption that upward mobility across tracts is normally distributed (conditional on the covariates), the shrunk forecasts yield an unbiased estimate of the gain from the intervention (see online Appendix H of Andrews, Kitagawa, and McCloskey 2024). The treatment effect on the forecasts of upward mobility is 1.6 percentiles, similar to what we obtain with the raw estimates.[30]

Second, we use a split-sample approach, estimating impacts on upward mobility using separate data from that used to define high-opportunity neighborhoods. Sample splitting directly eliminates the upward bias caused by sampling error insofar as the errors in the two samples are independent. We estimate a treatment effect of 1.2 percentiles (SE $= 0.34$) using tract-level data on mean income ranks in

[28] We use the final, publicly available version of the Opportunity Atlas when constructing these predictions rather than the preliminary measures that were used to define "high-opportunity" areas to maximize precision. However, results are similar if we use the preliminary measures because they are highly correlated with the final measures (online Appendix Figure 2).

[29] For families who did not lease up using their vouchers, we use upward mobility in their origin census tract as the outcome. A survey of these households suggests that most stay in their origin tract and those that do move on average move to areas with lower upward mobility.

[30] The estimates do not change significantly because our designation of high-opportunity areas was not based directly on the Opportunity Atlas measures themselves but rather a forecast of those estimates based on covariates, as discussed in online Appendix A. Some of the tracts to which families in the treatment group moved have lower estimates in the raw Opportunity Atlas data than one would predict based on covariates. As a result, even though shrinkage reduces the predicted gains from moving to most high-opportunity tracts, it ends up not affecting the overall mean significantly.

2014–2015 from the 1984–1989 cohorts, which were not directly used in defining high-opportunity areas.[31] This split-sample approach does not rely on any distributional assumptions but evaluates a slightly different hypothesis than the shrinkage approach discussed above because it tests for differences in upward mobility among more recent cohorts and thus measures income at earlier ages than in our baseline analysis (which may explain why it yields a slightly smaller point estimate).

Together, these two approaches confirm that the tracts to which families in the treatment group move are not merely classified as "high opportunity" due to sampling error and do in fact have higher levels of upward mobility on average—consistent with the systematic differences in other neighborhood-level characteristics documented above.[32]

Predicted Impacts on Earnings.—Next, we translate the treatment effect estimate of 1.6 percentiles on household income ranks at the neighborhood level into a forecast of the causal impact on income for a given child whose family is induced to move to a high-opportunity area by CMTO. We caution that this forecasting exercise relies on certain strong assumptions that we discuss below; we assess the sensitivity of our estimates to these assumptions after presenting a set of baseline results.

To begin, we need to account for the fact that not all of the observational variation in upward mobility across areas is driven by the causal effects of place; some of it reflects selection that would not be captured by a child who moves. Chetty et al. (2018b) estimate that 62 percent of the variation in upward mobility across the United States is due to causal effects; i.e., moving at birth to an area with 1 percentile higher predicted outcomes would increase a given child's rank in adulthood by 0.62 percentiles on average.[33] Assuming this 0.62 scaling factor applies to the moves induced by our treatment within Seattle, the causal effect of the

[31] The shrinkage algorithm we used to define high-opportunity areas uses some predictors from the 1984–1989 cohorts, which could potentially be correlated with the 1984–1989 earnings outcomes and create scope for upward bias. As an alternative approach that does not suffer from this concern, consider defining census tracts as "high opportunity" based purely on estimates of upward mobility for the 1978–1983 birth cohorts, the sample used to construct the baseline Opportunity Atlas estimates. Defining high-opportunity areas as the top 20 percent of the distribution within Seattle Housing Authority tracts or top 40 percent of the distribution within King County Housing Authority tracts (the same thresholds used in online Appendix A), we find that high-opportunity tracts have 3.2 (SE $=$ 0.004) percentile higher levels of upward mobility in the 1984–1989 cohorts. Recalling that the CMTO treatment increased the share of families who moved to high-opportunity areas by 37.8 percentage points. This 3.2 percentile difference aligns with the 1.2 percentile point estimated treatment effect on earnings ranks for the 1984–1989 cohorts: $37.8\% \times 3.2 = 1.2$.

[32] A distinct concern arises if one wishes to guarantee that *every* tract classified as "high opportunity" has higher upward mobility than every tract that is not classified as high opportunity. Mogstad et al. (2024) develop methods to generate confidence intervals for such comparisons, which require making many comparisons across tracts. They apply their approach to Opportunity Atlas data for Seattle and show that one cannot reliably guarantee that every neighborhood with an upward mobility estimate in the top third of the distribution has higher mobility than, say, every neighborhood estimated to be in the bottom third of the distribution. We focus on a different question: whether tracts classified as "high opportunity" have higher rates of upward mobility *on average* than those that are not. Answering this question requires testing a single hypothesis (comparing two means) and hence does not require adjustments for multiple comparisons. Our results show that we can be confident that families in the CMTO treatment group moved to higher-opportunity areas on average, even if we cannot guarantee that every neighborhood to which they were induced to move has a higher level of upward mobility than the counterfactual neighborhood to which they would otherwise have moved.

[33] Chetty, Hendren, and Katz (2016) obtain a very similar estimate when focusing on the subset of families induced to move to low-poverty areas by receiving a housing voucher in the Moving to Opportunity experiment, supporting the application of this 62 percent figure in our study population. However, there is no guarantee that the 62 percent applies to moves within Seattle in particular. Online Appendix Table 10 therefore reports the estimated effect on earnings using alternative values of 50 percent and 75 percent, yielding lifetime earnings impacts of $48,200 and $72,700.

moves induced by the CMTO treatment on household income ranks in adulthood is $1.6 \times 62/37.8 \approx 2.6$ percentiles for a child who moves at birth and stays in their new neighborhood throughout their childhood. For context, note that children growing up in seventy-fifth percentile families in Seattle end up 13.6 percentiles higher in the income distribution as adults than those growing up in twenty-fifth percentile families in Seattle. Moving to a high-opportunity area reduces this 13.6 percentile gap in outcomes by $2.6/13.6 = 19.1\%$.

The $1.6 \times 62/37.8 \approx 2.6$ percentile increase in incomes corresponds to an increase in annual household income of approximately $3,000 when children are in their mid-thirties, which is approximately 8.3 percent of the mean income of children growing up in families at the twenty-fifth percentile of the national income distribution in low-opportunity areas in Seattle and King County.[34] Assuming that individuals obtain an 8.3 percent income gain throughout their lives and an annual income growth rate of 1 percent per year, this translates to an undiscounted total lifetime income gain of $212,000. This is equivalent to $84,000 in present value at birth with a 2 percent discount rate (online Appendix Table 9, row 15).

The preceding calculation measures the impact of CMTO for a single child who moves at birth and stays in their new neighborhood for their entire childhood (23 years). In practice, not all children move at birth, families have more than one child, and families may not stay indefinitely in their new neighborhoods. To obtain an estimate that aligns with the actual experiences of families in our sample, we consider a family that has 2.2 children who are on average 7 years old (i.e., our sample averages) and stays in an opportunity area for 7 years (the average length of time for which voucher holders use their vouchers in Seattle and King County). Under these baseline assumptions, we obtain a present discounted value of lifetime earnings impacts of approximately $60,000 (online Appendix Table 10, row 1). Alternative assumptions about family size, the income level of parents, the degree of persistence in new neighborhoods (e.g., based on the estimates in Figure 6), and the causal effects of place yield estimates ranging from $27,000 to $82,000 (online Appendix Table 10, rows 2–9).

Finally, our forecasting exercise also assumes that the causal effects of places on mobility will remain stable over time and in particular, will not change as a result of voucher holders moving into new neighborhoods. The fact that the CMTO treatment induces families to move to a very diffuse set of high-opportunity areas (Figure 4) may reduce the risk that the gains from moving to a higher-opportunity neighborhood will be diminished by changes in neighborhood composition in this particular case. However, further work is required to understand the impacts of such interventions in general equilibrium, particularly when they are scaled up. On the one hand, an influx of lower-income residents could diminish the positive causal impacts of what are currently high–upward mobility areas for a given low-income child by reducing her exposure to and interaction with higher-income peers (Chetty et al. 2022) or by generating reductions in public goods provision (Derenoncourt 2022). Families leaving underinvested, low-opportunity neighborhoods could also potentially further undermine opportunities in those areas. On

[34] The corresponding estimates for individual earnings (excluding spousal income) are a 2 percentile gain, translating to approximately $1,700 (6.8 percent) per year in earnings.

the other hand, enabling families to make choices more freely by removing barriers to moving may lead to more efficient provision of public goods and improved outcomes in equilibrium across all areas via the mechanism of Tiebout competition across jurisdictions. In future work, it would be useful to analyze the impacts of CMTO-style policies using equilibrium models (as in, e.g., Davis et al. 2021), incorporating a behavioral model of neighborhood choice that matches our empirical findings here (see Section VII).

Comparison to Program Costs.—How does the lifetime earnings impact of the CMTO intervention compare to its cost? We estimate that the treatment effect of the program on the present value of income tax revenue for children who move at birth is $6,000 (discounted at 2 percent). This is larger than the average program service cost of $2,670 (Table 4). However, it is smaller than the present value of the downstream cost of higher voucher payments generated by families in the treatment group moving to more expensive neighborhoods that have higher voucher payment standards. Table 2 estimates that treatment group families move to units with monthly rents that are $185 higher on average than families in the control group. Given the structure of payment standards in Seattle and King County, this marginal increase in rents is entirely borne by the housing authority rather than the families themselves; the treatment had no significant impact on families' out-of-pocket rent payments (Table 2). Assuming that families use their vouchers for 7 years (the average duration for which vouchers are used in Seattle and King County), the average increase in voucher payments costs the government $17,633 per lease (Table 4).

Taking both forms of costs into account, every $1 of government spending induced by the CMTO program leads to an income increase of $1.35. Conservatively assuming that the increases in children's earnings are the only benefits of CMTO, this implies that the program has a marginal value of public funds (MVPF) of 1.35. If participants additionally value the CMTO services at their costs, the MVPF would rise to 2.68, comparing favorably to most other government programs (Hendren and Sprung-Keyser 2022).

The downstream costs of higher voucher payments could vary substantially across settings, depending upon the level of rents and the degree to which payment standards are increased in higher-rent neighborhoods. While we do not have experimental evidence on the treatment effects of CMTO in the absence of tiered payment standards, we find that 46 percent of the treatment group families who moved to high-opportunity areas rented units that they would have been able to afford even in the absence of the higher payment standards provided in certain neighborhoods. This finding suggests that CMTO mobility services would have substantial impacts even in the absence of differential payment standards across areas.[35] The cost-effectiveness of CMTO-style programs could therefore potentially

[35] This 46 percent figure should be interpreted as a lower bound on the fraction of families one would observe moving to a high-opportunity area with the CMTO treatment in the absence of the higher payment standards since at least some families would presumably still move to high-opportunity areas but choose less expensive units than the ones they chose given current policies.

Table 4—Creating Moves to Opportunity Program Costs

	Average cost
Panel A. Total costs	
Cost of CMTO services per issuance	$2,668
Cost of CMTO services per lease/average 7-year HAP costs per lease	2.5%
Panel B. Costs by service category	
Cost of CMTO financial assistance per issuance	$1,057
Cost of CMTO program services per issuance	$1,500
Cost of PHA CMTO administration per issuance	$392
Cost savings of PHA services paid by CMTO	($281)
Panel C. Housing assistance payment costs	
Average incremental HAP costs per lease per year	$2,519
Average incremental HAP costs per leased family over 7 years	$17,633
(Incremental HAP + CMTO services per lease)/average 7-year HAP costs per lease	17.2%
Panel D. Phase 2 treatment arms	
T1 (Financial assistance + info) cost per issuance	$338
T2 (Reduced services) cost per issuance	$634
T3 (CMTO) cost per issuance	$2,692

Notes: This table reports average cost metrics for the CMTO program. Panel A reports two measures of average total CMTO service costs: per voucher issued and per family leased as a percentage of seven-year housing assistance payment (HAP) voucher costs for one leased family. The second measure is defined as the cost of CMTO services per lease-up divided by the average HAP cost for the control group over seven years (a conservative estimate of the average voucher duration for families with children) in KCHA and SHA. Panel B reports average costs by category. Financial assistance costs include security deposits, adminstrative fees, holding fees, prorated rent, renter's insurance, damage mitigation insurance claims, and screening fees. Program services include costs paid to the navigator service providers, which include costs for staff, management, administrative assistance, mileage, overhead, and materials. PHA administration costs per issuance consist of a project manager at each PHA spending 50 percent time managing CMTO service implementation. In panel A, Cost of CMTO services per issuance is the sum of all CMTO programmatic costs listed in panel B, including subtracting the average control group additional security deposit assistance that would have been provided by the PHAs as part of existing PHA policy regardless of CMTO net of security deposits paid for nonopportunity treatment group moves. Panel C reports the incremental HAP expenditure for the treatment group relative to the control group per family that leased up, driven by the fact that treatment group families leased units in more expensive areas on average, which had higher HAP payments because of the tiered payment standards used in KCHA and SHA. Average incremental HAP costs per leased family over seven years is the expected present value of the annual incremental HAP expenditure for treatment over control summed over the typical lifetime of a voucher (seven years) under the assumption that the growth rate of rents within tenancy is the same as the discount rate. The last row of panel C reports the sum of the incremental HAP costs per lease over seven years and the up-front CMTO services per lease as a share of the average expected lifetime HAP costs per family leased in the control group. Panel D repeats the measure of average total CMTO service costs from panel A separately for each of the three Phase 2 treatment arms.

be increased going forward by limiting the degree to which voucher payment standards are increased in higher-rent neighborhoods.[36]

V. Mechanisms: Phase 2 Experimental Results

Having established that the CMTO program significantly changed where low-income families chose to live, we now turn to examine the mechanisms underlying this treatment effect. The bundled CMTO program included many

[36] As another way to see this point, note that the estimates in Table 4 imply that one could implement the CMTO program while maintaining a balanced budget by reducing the total number of vouchers offered by 2.5 percent if one takes only the up-front program costs into account versus 17.2 percent if one takes the increase in downstream voucher payment costs resulting from the current tiered payment standards into account.

elements that could have influenced families' choices, including information about high-opportunity areas, financial assistance, and various forms of support during the housing search process itself. In this section, we present results from a multiarm randomized trial designed to distinguish between these mechanisms (Bergman et al. 2020). The goals of this follow-up trial were to understand the factors that shape the neighborhood choices made by low-income families at present and how one can most effectively reduce the barriers that families face when seeking to move to opportunity.

As discussed in greater detail in Section IIC, the second-phase experiment consisted of four groups: (i) control, which received the housing voucher but no additional information or support; (ii) *Incentivized Information* (Treatment Arm 1), which received information about high-opportunity areas along with essentially the same financial assistance provided to families in the first-phase bundled intervention; (iii) *Reduced Services* (Treatment Arm 2), which provided information and financial assistance along with a lower-dosage version of the original treatment with a more limited set of housing search services (with less one-on-one assistance from navigators); and (iv) *Full Customized Services* (Treatment Arm 3), which received the full bundle of resources and services provided to the treatment group in the first phase.

Main Estimates.—We estimate the effects of the three treatments relative to the control group using specifications analogous to (1), estimated using three separate regressions. Figure 8 shows the effect of the treatments on the fraction of families who moved to high-opportunity areas, plotting the control group mean and the control group mean plus each of the estimated treatment effects. In the control group, 12.5 percent of families move to high-opportunity areas, similar to the share observed in the first phase. In the full customized services group, 53.3 percent of families move to high-opportunity areas. This rate is also very similar to the impacts of the bundled intervention in the first phase of the experiment, showing that those results replicate in a second trial.[37]

Turning to the two new arms introduced in the second-phase trial, the incentivized information treatment increased the share of families who moved to high-opportunity areas by 8.9 pp—an effect that is not statistically distinguishable from 0 but is significantly smaller than the 40.8 pp treatment effect of the full customized services with $p < 0.001$. Because the financial support (worth \$1,090 for the average opportunity move, equivalent to nearly one month of income for the typical family in our sample) was available only if one moved to a high-opportunity area, there was a significant incentive for individuals to pay attention to the information being

[37] While the treatment had no effect on lease-up rates in Phase 1 of the experiment (Figure 3, panel B), the treatments significantly increased overall lease-up rates relative to the control group in Phase 2 (online Appendix Figure 10, panel A). The impacts on lease-up rates were driven by the subset of families who received their vouchers toward the end of the Phase 2 experiment (early 2020), who were searching for housing after the pandemic began in March 2020. We find no statistically significant effect on lease-up rates in the months prior to the onset of the pandemic. We also find no significant heterogeneity in the treatment effects on rates of moves to high-opportunity areas pre- versus postpandemic. These findings suggest that the effect of mobility services on total lease-up rates may differ by economic and housing market conditions (even if their impacts on the share of high-opportunity moves do not); receiving additional support and financial assistance may be especially valuable for leasing a unit in a time of economic instability.

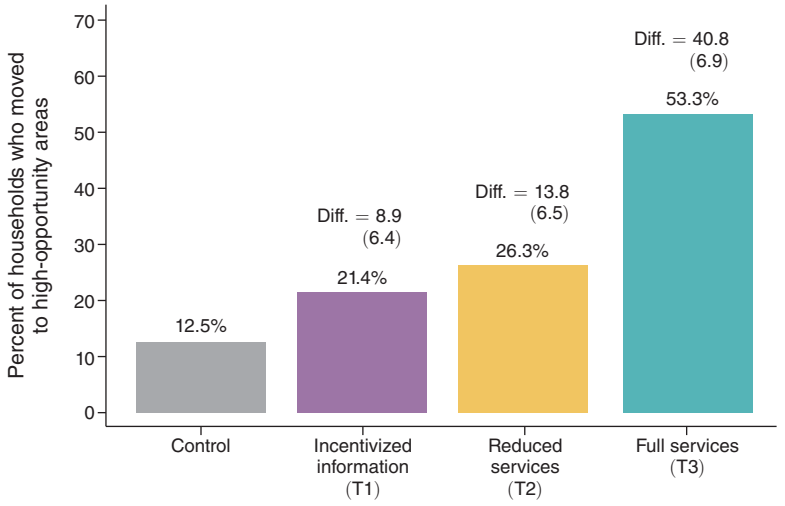


FIGURE 8. TREATMENT EFFECTS OF PHASE 2 INTERVENTIONS ON SHARE OF FAMILIES WHO MOVE TO HIGH-OPPORTUNITY AREAS

Notes: This figure shows the treatment effects of the Phase 2 interventions on the fraction who lease up a unit in a high-opportunity area, as defined in Figure 1. The control mean is calculated as the mean within households in the control group. Treatment effects are estimated using an OLS regression of the outcome on a treatment indicator and an indicator for being in KCHA/SHA (since randomization occurred within each housing authority). Each of the three treatment effects is estimated using a separate regression, and each treatment mean plotted is calculated as the control mean plus the estimated treatment effect. Standard errors reported are robust standard errors. This figure uses the full Phase 2 experimental sample and focuses on the first lease-up after voucher issuance.

provided about where the high-opportunity areas are. Despite having these incentives and the information in hand, most families in the first treatment arm did not end up moving to high-opportunity areas. This result indicates that the reason many low-income families do not currently live in high-opportunity areas is not purely a lack of information about such neighborhoods. Indeed, the areas we designate as high opportunity based on the new Opportunity Atlas data on upward mobility tend to have characteristics that families already identify with "good neighborhoods," such as lower poverty rates and better educational outcomes (as shown in Table 2).

The small impacts of the first treatment arm also show that simply providing up-front financial assistance to families to help them move to higher-opportunity neighborhoods does not change their neighborhoods choices substantially. Hence, credit constraints are also unlikely to explain the segregation of low-income families in lower-opportunity areas.

The reduced support services treatment arm increased the share of families who moved to high-opportunity areas by 13.8 pp, an effect that is significantly different from 0 but is only one-third as large as the treatment effect of the full intervention. This result points to a dose-response relationship in the amount of services families receive: lower-intensity services that do not provide as much family-specific support (e.g., customized landlord referrals) appear to have a positive but smaller impact

on rates of moves to high-opportunity areas than higher-intensity, fully customized services.[38]

Subgroup Heterogeneity and Neighborhood Quality.—We examine heterogeneity in the treatment effects of the three Phase 2 interventions across subgroups in online Appendix Table 11, which replicates Table 3 for the Phase 2 treatments. Although the estimates are imprecise in some subgroups due to small cell sizes, in nearly every subsample, the full customized services treatment has larger effects on the rate of moves to high-opportunity areas than the reduced support services treatment. The treatment effects of the reduced support services arm are in turn larger than those of the incentivized information treatment arm, mirroring the ordering of size of the treatment effects for the entire population.

We also examine the impacts of the three Phase 2 treatment arms on measures of neighborhood quality in online Appendix Table 12, which replicates Table 2 for Phase 2. The incentivized information and reduced services treatments both had little impact on key measures of neighborhood quality, such as median household incomes, Kirwan neighborhood quality indices, or measures of upward mobility. In contrast, the full intervention led to substantial improvements on all of these measures, mirroring the findings for Phase 1. Examining the distribution of upward mobility in the neighborhoods to which families moved (online Appendix Figure 11), we find that some families in the full services treatment group moved to the highest–upward mobility neighborhoods in the county (as in Phase 1), but virtually none of the families in the other treatment arms did so (as shown by the near-zero density for those group in the upper right tail).

Evidence from Other Housing Mobility Programs.—Our findings on the limited impacts of information and the dose response to counseling support intensity are consistent with the findings of other recent interventions to help families move to higher-opportunity areas. Bergman, Chan, and Kapor (2020) randomized the provision of information to families about the quality of schools associated with rental units on GoSection8.com, a housing search platform widely used by voucher holders. Families who received the information treatment moved to neighborhoods with schools scoring 0.1 standard deviations (SD) better on state tests on average, considerably smaller than the 0.5 SD impact induced by the full CMTO intervention. Bergman, Chan, and Kapor (2020) also report that the effect of the information on upward mobility is 16 percent as large as the CMTO impact on upward mobility shown in Table 2.

Schwartz, Mihaly, and Gala (2017) report results from a randomized trial in Chicago in which families receiving housing vouchers were given $500 of financial assistance and light-touch mobility counseling services to move to a high-opportunity area (defined based on an index of poverty rates, job access, and other characteristics). The counseling services were client initiated, with families opting in to specific

[38] The comprehensive services cost about four times as much as the reduced support services ($2,692 versus $634 of up-front program service costs) and have three times as large an impact on the fraction of families who move to high-opportunity areas, suggesting a roughly linear dose response to service intensity over the range we study.

mobility services they wanted to use, whereas the CMTO service model was more collaborative and higher intensity, with the program staff determining which services to emphasize based on the needs of the family. They find that these light-touch incentives and supports had no impact on the rate of high-opportunity moves: less than 12 percent of families in the treatment group moved to high-opportunity neighborhoods.

Another increasingly common approach to help families move to higher-opportunity neighborhoods is to offer higher voucher payments in higher-rent or higher-opportunity neighborhoods within a metro area. Collinson and Ganong (2018) analyze the impacts of such tiered payment standards on the fraction of families who move to higher-opportunity neighborhoods in Dallas using quasi-experimental difference-in-difference designs. In online Appendix E, we implement analogous difference-in-difference designs in the Seattle metro area, exploiting differential changes in payment standards between the Seattle (SHA) and King County (KCHA) housing authorities. In particular, KCHA increased payment standards in neighborhoods that had higher rents and scored higher in Kirwan indexes of opportunity in 2016. In April 2018, SHA increased payment standards in exactly the same areas we designate as "high opportunity" in CMTO. Using observational data obtained from the housing authorities, we find that both reforms increased the share of families who moved to high-opportunity areas, consistent with the findings of Collinson and Ganong (2018). However, they had significantly smaller effects than the CMTO program. For example, the financial subsidy to move to high-opportunity neighborhoods provided by SHA—which costs the housing authority about $12,100 in present value per household that moved to a high-opportunity area—increased the share of families who moved to high-opportunity areas by at most 13.8 pp, one-third the impact of the full CMTO intervention.

Finally, consistent with our own experimental findings, nonexperimental evidence from the high-touch Baltimore Housing Mobility Program shows that the combination of one-on-one staff support and a strong landlord relationship component helped many Black families in Baltimore overcome housing search barriers and move to low-poverty areas (DeLuca and Rosenblatt 2017).

Based on the Phase 2 experimental findings and these related analyses, we conclude that the concentration of low-income housing voucher recipients in lower-opportunity neighborhoods is not driven solely by information about the benefits and locations of opportunity neighborhoods or financial barriers to such moves. Rather, the key factor limiting moves to high-opportunity areas appears to be barriers in the process of finding and securing housing in those areas itself—barriers that can evidently be overcome through support provided by housing navigators at a sufficiently high dosage. To be clear, these results do not imply that information or financial assistance are unnecessary to make such moves; they simply show that they are not sufficient to do so. An intervention that provides support services to overcome barriers without information about high-opportunity areas or financial support might also be insufficient to induce families to move to opportunity.

Having established the importance of barriers in housing search, in the next section, we dig deeper into exactly what specific barriers families face by investigating which types of support services had the greatest impact on families' neighborhood choices.

VI. Qualitative Evidence on Barriers in Neighborhood Choice

What are the difficulties faced by families seeking to move to opportunity, and how do the housing navigators help to address them? In this section, we present qualitative evidence on these questions based on interviews with a randomly selected set of families who are representative of the overall sample, as discussed in Section IIIA. We interviewed participants using an in-depth narrative approach, following Darrah and DeLuca (2014) and DeLuca, Clampet-Lundquist, and Edin (2016). We asked families about their lives broadly, such as their residential history, family dynamics, and children's schooling. We also elicited information about the barriers that families faced in moving to high-opportunity areas and the components of CMTO that were most useful in addressing those barriers. We then systematically coded the interview transcripts to measure the prevalence of various themes and identify recurring patterns. Details on the methods used to collect and code the data are given in online Appendix C. We begin by characterizing the families in the sample to shed light on the challenges they face in searching for housing. We then describe five key mechanisms that emerge in families' descriptions of how CMTO helped them overcome these challenges. Finally, we show how the combination of these mechanisms and the ability to customize the treatment to each family's needs was central to the program's success.

A. *Who Are the Families Applying for Housing Vouchers?*

Interviews with families revealed several dimensions of economic disadvantage and barriers to housing search beyond the measures in the baseline survey data summarized in Table 1. A substantial share of the families (46 percent) reported struggling with a major health problem, including children with significant physical, mental, or emotional needs, and 29 percent had experienced domestic violence. Perhaps as a result of such factors, the families had histories of significant housing instability. Around 19 percent of the families we interviewed had been evicted, and 50 percent had been homeless at some point. Approximately 78 percent of household heads had been previously "doubled up," living in the homes of family members or friends.

Many families described repeated denials when applying for housing, largely arising from credit problems. For example, Sandra, a White mother, had not received her voucher when we first interviewed her and told us she felt despondent about ever finding housing in Seattle because of her poor credit history. She was frustrated and said, "I wish they'd do a *criminal* background check instead of a *credit* [check]—I have no crimes."[39] As a result of their history of challenges in finding housing, many families began the CMTO program anxious about their prospects for finding housing in the tight Seattle area housing market. Parents were generally interested in moves to high-opportunity areas and believed such moves would benefit their

[39] This and other quotes included below were selected because they are representative of the modal experience reported by treatment group families who leased up in opportunity areas with the program. To protect families' identities, all names are pseudonyms chosen by respondents.

families. However, they were pessimistic about the prospect of landlords in such areas being willing to rent to them.

Overall, the interviews paint a picture of families that have little time and resources to devote to housing searches. Many families had also experienced a history of making "reactive moves" (Carrillo et al. 2016; DeLuca, Wood, and Rosenblatt 2019) in response to shocks such as evictions, family conflicts, or violence, resulting in rushed relocations to seek shelter and, thus, had little or no experience in searching for housing deliberately, particularly in less familiar high-opportunity areas. These factors amplify the scope for seemingly small barriers to affect families' choices.

B. *Five Mechanisms Underlying the CMTO Treatment Effects*

We identify the mechanisms through which CMTO helped families move to high-opportunity areas by first reading the entire corpus of Phase 1 interview transcripts for families who moved to high-opportunity areas and observing which aspects of the CMTO program emerged as most salient from families' accounts of their experiences with CMTO. We then coded all Phase 1 transcripts for these mechanisms and recorded the frequency with which families mentioned various themes, following the systematic coding protocol described in online Appendix C.

Based on this analysis of the Phase 1 data, we identified five mechanisms through which navigators helped families move to high-opportunity areas. After establishing these mechanisms, we then used the Phase 2 interview data to conduct an out-of-sample test of these hypotheses by quantifying the prevalence with which the mechanisms were mentioned by families in the three different treatment arms. Here, we first describe the five mechanisms by presenting examples from Phase 1 interviews and then discuss the Phase 2 validation analysis.

Mechanism 1: Emotional Support and Communication.—To learn about families' experiences with CMTO, we asked an open-ended question in our interviews ("Tell me about CMTO…") before probing about any of the program-specific details. Many families responded by describing how emotionally supported they felt by the navigators; 61 percent of Phase 1 treatment group families who leased up in opportunity areas reported that they felt supported by CMTO navigators.

For example, Katie, a Black mother living in north Seattle, told us that CMTO helped her "get a voice" and feel more confident dealing with property managers and negotiating her needs. She said, "I kind of got to start speaking up and not being so scared … you can't lose your Section 8 for speaking out." Deanne, another Black mother in Seattle, explained that without CMTO she would not have had "the courage to even apply for this house" she was living in when we met her given her credit history, and that "[the navigator] broke down the neighborhoods in ways that I never would have looked at." Similarly, Jackie, a White mother in Issaquah, told us how she felt when she realized what the CMTO program would provide: "it was this whole flood of relief … just the supportive nature of having lots of conversations with [housing navigator], that they could call the landlords. That saved me … personally, mentally, emotionally, and financially, in every way, they were supportive."

Given how unpredictable and reactive their previous housing searches had been, this was the first time many families had the bandwidth and guidance to think

through neighborhood choices deliberately. Ashley, a Black mother who was homeless before finding housing with CMTO, explained:

> It was good because it gave you a breakdown of what you needed to do, questions you need to ask, things you need to think about like school district, grocery stores, public transportation … after that, I'm like, "Well, these are things that are really important to me." And you didn't think about—you don't think about how something so simple is so important … So, now, when I came into this [move], I knew what I wanted. I wanted something close for all these things and something for my daughter.

Many families noted that the CMTO navigators' consistent communication and support were critical for keeping them motivated throughout the search process. Mona, a Hispanic mother who moved to Bellevue, said "[the navigator] was on top of everything [for] me. If it wasn't for her, I honestly think I would have lost my Section 8 because nobody was willing to give us an opportunity." Tina, a Samoan American mother who moved to north Seattle, noted excitedly, "wow this program, like they're with you at all times, they help you they're there to guide you."

These accounts differed starkly from what we heard from control group members, like Arya, a White mother who wished she had more support during her housing search. Arya described the help she wished she had during a recent visit to an apartment leasing office: "could I get somebody to meet me there that might just sit there with me … to explain the paperwork to me more or to be a second ear also. Because … I have communication issues like understanding the person and I feel rushed … So, I wanted somebody to come with me and [the PHA] emailed me back that they don't provide that service."

Mechanism 2: Increased Motivation to Move to Opportunity.—In addition to the support they felt from the CMTO navigators, some families reported that they became more motivated to move to a high-opportunity area as a result of the program because it made such a move seem more attainable. Families recalled learning about the benefits for their children's long-term success during the initial study intake process and throughout their meetings with CMTO navigators. Many reported feeling "excited" that they might be able to live somewhere that, as Heba, a Black mother in Seattle, told us, "they say there is research… [there] are more opportunities, there are more graduations from school … That is what we are looking for." Melinda, a Black mother in King County, told us that she was "tired of living around chaos" and became quite emotional when she heard that the program was about more than just providing housing assistance. She explained, "She [navigator] made me cry when she kind of explained to me what the program does, like it's not just we pay your rent … it's for to make sure that not only you are in a good area but your kid can grow up in a good area and be successful... it made me so happy to think that my son is going to be in a area that can just help him be a good part of society." Among treated families who moved to high-opportunity areas, 31 percent reported that their motivation to move to a higher-opportunity area was amplified by the CMTO program.

While many families spoke of a motivation to move to high-opportunity areas—starting to realize that this might be an attainable goal—very few (<3 percent)

framed their CMTO experience in terms of receiving more information about the existence of such areas, consistent with our experimental results that simply providing information has little impact on families' neighborhood choices. Indeed, several families pointed out that they were already well aware that some neighborhoods offered much better opportunities for their kids. Sami, a mixed-race mother in King County, told us, "I always heard like [Bellevue] school is better than Seattle area … so I always wish to move here if I can afford it, so that's when I get the voucher and when CMTO told me that you have to do that [to get the additional assistance], that was my wish I was like, yeah."

Mechanism 3: Streamlining the Search Process.—The complexity of the search process—from online searches to landlord calls, apartment visits, security deposit paperwork, background checks, applications, inspections, and voucher payment paperwork—was overwhelming for many parents who were facing many other challenges. As Lisa, a mixed-race mother who moved to the Lake City area of Seattle, said, "it was like me staring at my phone [to do online housing searches] like while he [her son] is playing around and the less I have … to do that takes away from like me focusing on him or the other things that I need to do is the better."

The CMTO navigators were able to reduce this stress and streamline the search process by giving families clear guidance on what to do. Among Phase 1 treatment group families who moved to opportunity areas, 73 percent mentioned that their housing search and lease-up processes were made simpler, quicker, and less overwhelming by the assistance they received from CMTO navigators. Stive, a Russian immigrant who moved to Bellevue, explained that CMTO was helpful because "every time it's hard to communicate with many different organizations and explain to them what I need and working on paperwork and everything, and [CMTO] resources which will help me manage big circle of issues."

The program also reduced the tax of fruitless and demoralizing housing searches by directly providing listings of rental units that were owned by landlords and property management companies with whom the navigators had built relationships. Navigators built trust with property owners and managers and increased the information these housing providers had about families, thus reducing the influence of "Section 8" stereotypes (see online Appendix D for details on the strategies used by navigators to do this). Melinda, a Black mother in King County, summarized how the referrals she received from her housing locator made it easier to find the place she moved into as follows:

> She gave me a list of apartments that CMTO worked with and I just based my search off of that list, so, cuz I was nervous about my credit and I just didn't wanna go through a whole bunch of denials if, you know, they're familiar with this program, then it'll be easier for me to get in … I don't think I would've tried out here honestly without them giving me like the areas that they feel like are more opportunities.

Mechanism 4: Landlord Brokering.—To address the challenges in finding a unit in a high-opportunity neighborhood—where the supply of affordable housing is often particularly limited—housing navigators connected tenants directly to landlords. Of

those who moved to a high-opportunity neighborhood, 47 percent were referred to the unit they leased by CMTO navigators. In addition to providing initial referrals, the navigators helped form relationships between prospective tenants and landlords, both in preparing the tenants before they met landlords and in participating in conversations with landlords themselves. Among Phase 1 treatment group families who moved to high-opportunity areas, 61 percent reported that navigators helped negotiate directly with landlords on their behalf during some part of the process.

One key element of housing search preparation was the creation of a "rental résumé," a document that families could use to present themselves to landlords. These essays helped families explain the circumstances surrounding barriers to housing, like poor credit histories, evictions, or unemployment. Some families felt empowered by creating their rental résumés to help move beyond past barriers and achieve their hoped-for future through opportunity moves. The résumés also allowed the navigators to better describe families in their conversations with prospective landlords.

Nicole, a Black mother, described how the rental résumé made a big difference to the leasing company she ended up working with in Seattle, despite her spotty credit history:

> Some landlords, you know, your credit could get denied like here like mine did... [but] because I had that credit resume explaining the four derogatory marks on my credit, how they got there, how long they've been there, what I'm doing to dispute them, how I'm getting them off if I'm on a payment plan like … because of that, staff was just like, "Well, I mean, you seem smart, you seem like you're prepared, these things on your credit don't seem like a big deal …" And sure enough, she was like, "Just give her a chance, just higher deposit. " So, that, it helped.

Other families mentioned how valuable it was to have the navigators directly speak with landlords on their behalf. The navigators lent families additional credibility during difficult conversations or when landlords seemed reluctant to accept families. Lakeisha, a Black mother in Seattle, noted that having the CMTO navigator represent her when talking with landlords "felt like it's a reference." Deanne's navigator helped her move into a unit with a landlord who had never rented to a voucher holder before. She recounted the sales pitch the navigator used to explain how the program worked and ended up benefiting both the landlord and the family:

> She did the inspection, she did a lot of talking to the landlord and getting them to understand the program helping him figure out how to get started with the program or Section 8 and all, that was her. She … did very good with helping a first time ever landlord, this is his first time even hearing about Section 8 … an opportunity for him to help us in a sideline kind of way, he doesn't really have to do anything except for say yes and we're glad that we can help with this people move into this neighborhood to better resources and stuff for their kids, that was his contribution to my kids' future.

Although we did not conduct a systematic qualitative study of landlords themselves, we were able to glean some insight into landlords' perspectives on the benefits of the CMTO program from conversations with the housing navigators and

selected landlords (see online Appendix D for further details). In general, landlords appreciated that the CMTO navigators were easy to contact (compared to other housing agencies they previously dealt with), quickly answered their questions, or directed them to an appropriate contact at the housing authority to complete the leasing process. Some landlords became more open to the CMTO program after the navigators explained benefits such as direct rent payments and expedited inspections. The recruitment and relationship building the CMTO navigators did also led landlords to relax traditional tenant screening criteria (e.g., credit scores, source of income) that often prevented families from leasing up in high-opportunity areas. As with families, CMTO's success with landlords appears to have stemmed not primarily from financial incentives but from one-on-one relationship building, clearer communication, and the provision of relevant resources when needed on a case-by-case basis (Aliprantis, Martin, and Phillips 2022).

Mechanism 5: Short-Term Financial Assistance.—Finally, many families remarked that the customized financial assistance they received from CMTO mattered for removing up-front roadblocks; 81 percent of the families we interviewed mentioned receiving financial assistance as part of the CMTO program. Lu, a white father in King County, explained how CMTO financial assistance simplified things by covering up-front expenses: "CMTO, they help with the deposit, and you know, moving costs, if you have to bring stuff out of storage and things like that, and Section 8 pays for your first and last month rent … You can move in without any hassle, so it really makes, makes it a lot easier to just focus on finding a place."

Importantly, the interviews suggest that it is not just providing uniform lump-sum short-term financial assistance—as in a more standardized program—that makes the program effective. Instead, interviewees emphasize the value of navigators deploying funds strategically at key junctures of the search process. Such timely financial assistance included paying rental application fees, paying "holding" fees so families don't lose their units while applications are being processed, clearing up old utility bills or paying for new ones, and providing more generous security deposits for families with a past eviction or poor credit record. For example, Stive, mentioned above, explained,

> She [the CMTO navigator] paid security deposit, I gave her the access to my personal page in the [website] of the home, of this apartment complex. And yes, it was really helpful it was quick, because I was so afraid [of losing the place] when I find it out that I have to make a decision about [taking the apartment], and in the same time I have to pay security deposits and a couple fees [when] I don't have resources.

Out-of-Sample Tests Using Phase 2 Data.—Given the relatively small sample of interviews used to identify the mechanisms in Phase 1, one may be concerned about overfitting (i.e., identifying spurious mechanisms by chance). An additional concern is that interview coders must sometimes make subjective judgments when classifying statements. To address these concerns, we use the Phase 2 data to conduct an out-of-sample test of the prevalence of the five mechanisms (which were reported

Table 5—Prevalence of Qualitative Mechanisms in CMTO Phase 1 and Phase 2

	Number of observations	Mechanism 1: Emotional support and communication	Mechanism 2: Opportunity area motivation	Mechanism 3: Streamlining	Mechanism 4: Landlord brokering	Mechanism 5: Short-term financial assistance
Phase 1						
Treated families who moved to high-opportunity nbhds.	74	60.8%	31.1%	73.0%	60.8%	81.1%
All treated families	117	50.4%	25.6%	53.8%	47.0%	59.8%
Phase 2						
Treatment Arm 1 (incentivized information)	37	5.4%	24.3%	2.7%	5.4%	27.0%
Treatment Arm 2 (reduced support services)	34	38.2%	32.4%	52.9%	14.7%	50.0%
Treatment Arm 3 (full customized services)	19	68.4%	26.3%	52.6%	31.6%	68.4%

Notes: This table describes the count and prevalence of five qualitative mechanisms for treatment group families in Phase 1 and Phase 2. Phase 1 interviews were conducted with families who did and did not move to opportunity neighborhoods; Phase 2 interviews only focused on those who had leased up in an opportunity area. The five qualitative mechanisms were identified by reading transcripts and coding the 117 treatment group interviews in Phase 1. Each cell lists the prevalence of the mechanism listed in the relevant column for the corresponding group, defined as the number of cases who reported that mechanism as a percentage of the total number of cases in the group. See online Appendix C for details on the coding protocol used to identify these mechanisms. Of the 90 families interviewed in Phase 2, 2 families (one in Treatment Arm 1 and one in Treatment Arm 2) did not complete the baseline survey and so are not included in the Phase 2 analyses.

in our working paper before the Phase 2 interview data were collected). The Phase 2 interviews were coded based on the same protocol used to code the Phase 1 interviews (described in online Appendix C) but by a different team of reviewers in a blinded manner (i.e., without ex ante knowledge of treatment group assignment). We first examine the frequency with which the five mechanisms are mentioned by Phase 2 families who received the full CMTO services, as in Phase 1. We find that this independent set of families frequently mentions all five mechanisms, with high prevalence rates similar to those observed in the Phase 1 sample used to identify the mechanisms (Table 5). For example, 68 percent of Phase 2 families report receiving emotional support and communication, similar to the 61 percent who report receiving such support in the Phase 1 sample.[40]

Second, we find a gradation in the prevalence of these mechanisms across the three treatment arms in Phase 2 that is consistent with their importance in explaining why the full bundled intervention is effective. In particular, families assigned to the incentivized information and reduced services arms identify these mechanisms as helpful features of the CMTO program with much lower frequency than those in the other groups. For example, only 5 percent of the families in the incentivized information group discussed receiving emotional support and communication when asked about CMTO. Families in the reduced services group discussed the 5 mechanisms

[40] The one exception to this is the prevalence with which landlord brokering was mentioned in Phase 2, which may be partly driven by the challenges of such brokering during the COVID-19 pandemic.

at higher rates on average than those in the information group (e.g., 38 percent mention receiving emotional support) but at lower rates than the full services group.[41]

What is perhaps most telling from the Phase 2 interviews are discussions with families in the first and second treatment arms about why the version of the program they received did *not* work for them. When asked, "What do you feel like was missing or might have been helpful [in your housing search]?" the features families identify as being lacking often coincided with what the full CMTO intervention provided. For example, Sara, a White mother in Seattle also assigned to the incentivized information arm, responded, "Guidance, support, help with the process. They just throw you out there, give you a bunch of information to begin with, and see if you can swim within the timeframe that you're given." Claire, a Black mother in King County also assigned to the incentivized information arm told us, "It would be nice if there was a middle connection between the people who are accepting it [landlords] with the CMTO neighborhoods … Because searching for those area codes and stuff was sometimes hard."

Families in the reduced services arm reported receiving some support and guidance but ultimately felt overwhelmed being left on their own. Tasha, a Black mother in Shoreline, said she would have liked it if the information she received in the "huge packet" was better connected for her: "I did look through all of it … so it would be like one page would have a map and then the other page would have the amount of the number and then the next page would have the properties or something like that. So, I guess there was a lot of flipping back and forth through things to connect it all together." Similarly, Joquin and Jolene, a Black couple, described "searching probably five months … I mean we've dumped between $300 and $500, just in application fees so far … not even to mention the time and gas and everything to do to look." When asked if their CMTO navigator was able to help, Joquin said, "She sent me some like informational things about that and talked about how people have written letters and this and this … [but landlords] just don't seem to want to budge." They had still not found a unit to lease up when we last spoke to them.

C. *Customization of Services to Families' Needs*

The customization of CMTO services—with nonprofit staff being able to flexibly respond to each family's specific situation and needs—appears to be crucial to its success. Although many families mentioned several of the five mechanisms described above in their interviews, the intensity with which they used each component of the CMTO program varied greatly. This is borne out by data on service utilization from our case management system, which tracked the duration and nature of each of the contacts between CMTO navigators and families.

We report statistics on rates of service utilization in online Appendix Table 13, panel A. CMTO treatment group families who moved to a high-opportunity area received 7.1 hours of staff time on average, but there was substantial heterogeneity in the utilization of these services, with an interquartile range of about 4 hours

[41] The one exception to this pattern is that families mention the motivation to move to high-opportunity areas at equal rates in all three treatment arms. We believe this is because that motivation was instilled partly during the initial briefing about high-opportunity areas that families in all three treatment arms received.

to 9 hours. Similarly, mean financial assistance for treatment group families using financial assistance and leasing up in opportunity areas was $1,992 dollars, with an interquartile range of $967 to $3,018. Forty-seven percent of these families found the unit they moved into through a direct referral to a landlord found by navigators. Different families also used different subsets of these services: for instance, the correlation between the number of hours of staff time used and the amount of financial assistance used is 0.19 (online Appendix Table 13, panel D).

Consistent with these data as well as accounts from the navigators themselves (Bigelow 2021), several families reported that the CMTO program was about finding out what families wanted for themselves from the moves rather than following fixed protocols. For instance, Jennifer, a Black mother, noted that the CMTO navigators "understood the situation that I was in" and helped her accordingly.

In contrast, virtually none of the families in the control group mentioned such customized assistance, although several mentioned that they wished they had it. As Christina, a Black mother in Seattle, describes, she wished she had had personalized help during her search:

> Nobody really helps you find an apartment... I found this place [on my own]. I have sent emails back and forth begging to get in here … my application was sitting downstairs approved for like two days while I'm still [living in] cars and outside with my daughter trying to figure it out... [Local nonprofit housing provider] ended up paying for the move in fees and stuff like that which was a blessing but I feel like maybe if they could be more personal with their clients that they're accepting and taking on that I feel like that would help with the homeless situation a lot.

In sum, the CMTO program appears to have had large impacts through navigator staff who customized a combination of resources to address each family's specific challenges while also negotiating with landlords who might not otherwise rent to a family with a voucher. In light of the findings on scarcity of bandwidth and initial pessimism about the feasibility of moving to high-opportunity areas reported in Section VIA, one way to summarize the program's theory of change is that it provides support to enable highly bandwidth-constrained families to optimize over neighborhood choice and updates their beliefs about the feasibility of moving to high-opportunity areas, ultimately allowing them to realize their inherent preferences for living in such areas (Harvey et al. 2020; DeLuca and Jang 2020).

That the intervention cannot be easily codified into a standardized set of protocols applied to all families, but must be administered through high-quality customized interactions with navigators, seems to underlie its efficacy. The customization of services may also have been beneficial in reducing program costs, as families who did not need certain components of the services (e.g., help with landlords or security deposit assistance) relied less on navigators for those resources. The general lesson may be that having a highly motivated case worker support each family in overcoming the barriers they face can help them make much more effective use of housing assistance programs (and perhaps other public programs).

VII. Implications for Models of Neighborhood Choice

Our findings have several implications for models of neighborhood choice and spatial equilibrium. At the simplest level, our findings are inconsistent with canonical economic models used to describe neighborhood choices in steady state (e.g., Rosen 1979; Roback 1982), in which residential sorting patterns are determined primarily by families' preferences and budget constraints. To rationalize our experimental findings, such models would require that a large mass of families happen to be nearly indifferent between high- and low-opportunity neighborhoods (even when fully informed about these areas) and end up being tipped into high-opportunity areas when they get assistance from the CMTO program (see online Appendix F for a model formalizing this argument). But such a distribution of tastes is inconsistent with the evidence that financial incentives to move to high-opportunity areas have small impacts on the share of families who move to such areas, as well as our finding that the marginal families induced to move to high-opportunity areas by the full CMTO intervention report much higher levels of neighborhood satisfaction after moving.

Our experimental results thus imply that even in steady state, many low-income families may be segregated into higher-poverty, lower-opportunity neighborhoods because of barriers that prevent them from moving to higher-opportunity neighborhoods rather than preferences to live in such areas. This conclusion contrasts with results obtained from structural models of neighborhood choice that do not directly incorporate such barriers, which imply that low–socioeconomic status families have strong preferences to live in lower–socioeconomic status areas (e.g., Bayer, Ferreira, and McMillan 2007).

The modern economics literature on neighborhood choice and migration (e.g., Wheaton 1990; Kennan and Walker 2011; Galiani, Murphy, and Pantano 2015; Bayer et al. 2016) has moved beyond the static Rosen-Roback framework by incorporating search frictions and moving costs to explain empirical regularities such as the limited response of households to neighborhood characteristics or wage changes across areas. Our empirical findings shed further light on the nature of search frictions needed to fit the data. First, the search costs needed to rationalize our results must be quite large—large enough to explain why households forgo substantial gains for their children from moving to different neighborhoods. Second, they must also be neighborhood specific (i.e., larger in high-opportunity areas). Otherwise, given that lowering search frictions through CMTO services significantly changed the distribution of destinations, it would have to be the case that an implausibly large fraction of families were nearly indifferent about the neighborhood they live in (see online Appendix F)—at odds with the survey results on improvements in ex post neighborhood satisfaction reported in Figure 7. Third, search costs must persist over time as opposed to falling to zero in certain time periods, as in a Calvo (1983) style model. Finally, distance-dependent search costs cannot explain the tendency of families using vouchers to live in lower-opportunity neighborhoods given that there were many high-opportunity areas no farther from families' original locations than the low-opportunity areas to which control group families gravitate. Moreover, the fact that families in the CMTO treatment group moved roughly the same distance as families in the control group challenges the view that the CMTO program helped

families overcome distance-dependent search costs. These features differ from common parameterizations of search frictions in economic models of housing choice.[42]

Our finding that the provision of liquidity or financial incentives is insufficient to induce many families to move to high-opportunity areas suggests that the search costs that families faces in moving to high-opportunity areas are not pure monetary costs. Uncertain or biased beliefs about neighborhood quality are also unlikely to explain why families do not move to high-opportunity areas, as providing information about these areas has modest impacts on families' choices. Instead, the qualitative evidence points to other types of barriers—such as scarcity of mental bandwidth, costs of engaging with landlords, pessimism about the likelihood of succeeding in finding housing in desirable neighborhoods, and the lack of a network of contacts to provide the support and confidence needed to find housing in unfamiliar areas. Developing economic models that explicitly incorporate such factors—which are more common in some sociological models (e.g., Charles 2000; Sampson and Sharkey 2008; Havekes, Bader, and Krysan 2016; Rosen 2020)—may yield a richer understanding of neighborhood choice. For example, models featuring search frictions in neighborhood choice could allow frictions to depend upon individuals' social networks, self-efficacy, and mental health as well as the availability of support services to address these factors (e.g., DeLuca et al. 2021). If such variables cannot be measured directly, models could allow for unobservable, heterogeneous frictions that reflect psychological costs. Developing such models would allow researchers and policymakers to go beyond the partial-equilibrium evidence presented here and better understand the impacts of policies like CMTO and other affordable housing initiatives in general equilibrium.[43]

VIII. Conclusion

Low-income families tend to live in neighborhoods that offer limited prospects for upward income mobility, amplifying the persistence of poverty across generations. This paper has shown that this pattern of segregation is not simply driven by deep-rooted preferences among tenants or landlords. Rather, many low-income families live in such areas because of housing search barriers that prevent them from moving to higher-opportunity neighborhoods.

The primary barriers families face are not a lack of liquidity or information about high-opportunity areas but rather challenges in the housing search process itself that make it difficult to locate suitable units, negotiate with landlords, and navigate the complexities of leasing up a unit with scarce bandwidth. High-intensity, customized support from housing navigators appears to be adequate to overcome these

[42] For example, Kennan and Walker (2011) emphasize the role of distance in interstate moving costs, while Bayer et al. (2016) emphasize psychological moving costs that vary with income, wealth, and race. Our results imply that moving costs are higher specifically when moving to a high-opportunity neighborhood because of barriers in moving to such areas.

[43] These conclusions echo those of Krysan and Crowder (2017) regarding the interaction between preferences and structural barriers and potential policies to break the cycle of segregation. The finding that families tend to stay in lower-opportunity neighborhoods in the absence of support to move elsewhere is also consistent with choice inertia observed in other domains, such as health insurance (Handel 2013; Abaluck and Adams-Prassl 2021). Insights from choice models in those domains may be applicable to neighborhood choice as well.

barriers for many families and results in many families moving to (and staying in) higher-opportunity areas.

The importance of interpersonal support provided by case workers for increasing moves to opportunity is consistent with recent research showing the effectiveness of high-touch support interventions in other settings, ranging from job training programs to outcomes at community colleges (Scrivener et al. 2015; Evans et al. 2020; Katz et al. 2022). Together, these findings call for greater focus on programs that go beyond providing financial resources and offer personalized social support to promote economic mobility.

One challenge with such programs is replicability and scalability: it is unclear whether CMTO-like programs will have similar impacts when implemented in other settings, with a different set of housing navigator staff under different market conditions.[44] The recently established Community Choice Demonstration (https://www.congress.gov/bill/115th-congress/house-bill/5793/text), which was motivated in part to evaluate the generalizability of the results reported here, promises to shed light on this important issue by replicating CMTO-style mobility programs in nine other cities. In parallel, recognizing that not all families can or wish to move to opportunity, it would also be valuable to identify place-based investments that can improve outcomes for families who remain in lower-opportunity areas.

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[44] On one hand, Seattle and King County are tight housing markets in which high-opportunity areas have little affordable housing, which may permit even larger treatment effects elsewhere. On the other hand, Seattle bans source-of-payment discrimination, has housing authorities that achieve higher-than-average lease-up rates even absent CMTO, and offers high payment standards in many neighborhoods—factors that may make it easier for lower-income families to find housing in higher-opportunity areas.

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