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Skill-Based Contextual Sorting: How Parental Cognition and Residential Mobility Produce Unequal Environments for Children

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Abstract
Highly skilled parents deploy distinct strategies to cultivate their children's development, but little is known about how parental cognitive skills interact with metropolitan opportunity structures and residential mobility to shape a major domain of inequality in children's lives: the neighborhood. We integrate multiple literatures to develop hypotheses on parental skill-based sorting by neighborhood socioeconomic status and public school test scores, which we test using an original follow-up of the Los Angeles Family and Neighborhood Survey. These data include more than a decade's worth of residential histories for households with children that are linked to census, geographic information system, and educational administrative data. We construct discrete-choice models of neighborhood selection that account for heterogeneity among household types, incorporate the unique spatial structure of Los Angeles County, and include a wide range of neighborhood factors. The results show that parents' cognitive skills interact with neighborhood socioeconomic status to predict residential selection after accounting for, and confirming, the expected influences of race, income, education, housing market conditions, and spatial proximity. Among parents in the upper/upper-middle class, cognitive skills predict sorting on average public school test scores rather than neighborhood socioeconomic status. Overall, we reveal skill-based contextual sorting as an overlooked driver of urban stratification.

Keywords Residential mobility · Cognitive skills · Neighborhood inequality · Contextual sorting · Discrete choice

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Introduction

Influential scholarship on socioeconomic stratification has increasingly examined how individual skills shape one's life chances. Cognitive skills, which are neither fixed nor genetically predetermined, have been linked to income levels, education, occupational attainment, and criminal behavior, independent of race and class (Duncan and Magnuson 2011; Farkas 2003; Heckman and Mosso 2014; Heckman et al. 2006; Jencks 1979). Combined with strong parent-child skill correlations (Anger and Heineck 2010; Sastry and Pebley 2010), this body of research has solidified cognitive skills as a key mechanism linking parents' and children's circumstances and fueled a burgeoning economic literature on the intergenerational process of skill development (Heckman 2006). Important sociological research has further shown how it is not genetics but the deployment of particular parenting tactics and investments by socio-economically advantaged and highly skilled parents that enhance children's cognitive skill development, a process dubbed "concerted cultivation" (Bianchi et al. 2006; Lareau 2011; McLanahan 2004; Schneider et al. 2018).

Parenting tactics constitute only one part of the intergenerational transmission of skills, however. The quality of children's environmental conditions—childcare, schools, and neighborhoods—is arguably just as important. Yet in contrast to parenting tactics, the link between parental skills and environmental selection is often treated as a background factor to be controlled rather than as a sorting process worthy of direct examination. Existing studies on neighborhood and school sorting, for example, have implicated parents' race and class characteristics and rarely disentangle the role of parents' cognitive skills from these correlates. But just as cognitively skilled parents of all race and class backgrounds more frequently engage their children in enrichment activities, we argue that cognitively skilled parents disproportionately sort their children into neighborhood, school, and childcare environments they perceive as offering skills-promoting features and higher status.

Concretely, we hypothesize that in an era of changing housing market and school enrollment dynamics, parents with higher cognitive skill levels, proxied by acquired knowledge, are more likely to sort into neighborhoods that are societally defined as high in status and desirability, even after accounting for the wide range of individual-, household-, and neighborhood-level characteristics emphasized in prior studies. We also propose that among socioeconomically advantaged parents, the highly skilled disproportionately sort not on neighborhood socioeconomic status specifically but instead on a correlated neighborhood amenity they perceive—rightly or wrongly—to shape children's skill development: K–12 public school test scores.

We test these ideas by linking a dozen years of residential histories from an original third-wave follow-up of the Los Angeles Family and Neighborhood Survey (L.A.FANS). Combining census, geographic information system (GIS), and educational administrative data, we construct discrete-choice models of neighborhood selection that account for heterogeneity among household types, incorporate Los Angeles County's unique spatial structure, and include a wide range of neighborhood factors beyond race and class composition: notably, average public school test scores. Analogous to the way highly skilled parents propel children's skill development through parenting tactics and investments, we find that parental cognitive skills interact with opportunity structures to determine the quality of their children's residential environments. These micro-level processes plausibly ripple more broadly, constraining the set of residential and educational options available to less advantaged and less skilled city residents. By linking research on demography, education, and neighborhood stratification processes, our study reveals skill-based contextual sorting as an overlooked driver of urban inequality, with direct implications for the intergenerational transmission of status.

Parents' Cognitive Skills and Children's Environments

Recent scholarship on the mechanisms driving socioeconomic stratification has taken an analytic turn toward the intergenerational transmission of skill development. Skills encompass "capacities to act … [shaping] expectations, constraints, and information" (Heckman and Mosso 2014:691). The conceptual model connecting skills to socioeconomic inequality suggests that cognitive, linguistic, social, and emotional skills shape individuals' socioeconomic outcomes; genetic endowments, parenting tactics, and environmental conditions interact to form children's skills; and skill acquisition occurs in a cumulative and complementary fashion, rendering early childhood experiences especially important (Cunha and Heckman 2007; Heckman 2006).

Cognitive skills can be conceived of as either *fluid intelligence* (i.e., individuals' rate of learning growth) or *crystallized knowledge* (i.e., individuals' amount of acquired knowledge). These skills have received disproportionate scholarly interest among stratification scholars given their prediction of income, educational attainment, teen pregnancy, smoking, and crime (Duncan and Magnuson 2011; Farkas 2003; Heckman et al. 2006; Kautz et al. 2014). Moreover, strong correlations between parent and child cognitive skills (Anger and Heineck 2010; Sastry and Pebley 2010) implicate a key mechanism linking parents' and children's circumstances. Recent analyses suggest that two channels of intergenerational transmission are important: parents' (1) engagement in particular child-rearing tactics and investments and (2) selection of environments (e.g., childcare, schools, neighborhoods) conducive to cognitive skill development. Many studies have explored the first channel, documenting cognitively skilled parents' propensity to devote more time to child-rearing and particular child enrichment activities, such as reading and high-quality conversations. These practices support learning and exploration, bolstering children's skill development—part of the process that sociologists call *concerted cultivation* (Bianchi et al. 2006; Lareau 2011; McLanahan 2004; Schneider et al. 2018).

Scholars have much less frequently probed the second channel: whether and how parents' cognitive skills shape selection into various environmental contexts that influence children's skill development. Unlike parenting tactics, the input of the neighborhood is often treated by skills scholars as "a statistical nuisance" (Sampson and Sharkey 2008:1) to be controlled away, rather than as determined through a sociological sorting process worthy of examination. As a result, our growing understanding of how parents' cognitive skills yield skills-promoting parenting tactics and investments is not matched by comparable knowledge of how parental skills facilitate children's access to skills-promoting contexts.

Skills and Neighborhood Attainment in an Evolving Housing Market

Demographic and urban sociological research has taken the neighborhood sorting process as its object of analysis and thus serves as a useful framework in illuminating the skills-neighborhood link. Just as the classic status attainment model predicts the payoffs and penalties of individuals' race, social origins, and life cycle stage to their income or occupational prestige, neighborhood attainment models estimate similar individual- and household-level factors' effects on neighborhood status, proxied by race and/or class composition (e.g., Alba and Logan 1993; Logan and Alba 1993; Pais 2017; Sampson 2012; Sampson and Sharkey 2008; South et al. 2011; South et al. 2016). Neighborhood attainment models assume all households aim to sort into the highest-status neighborhoods, typically perceived as the richest (e.g., Sampson and Sharkey 2008) and often Whitest (e.g., South et al. 2011), that they can. Realizing this preference, however, is contingent on the constraints imposed by individual- and household-level characteristics and by the degree of race and class discrimination within the housing market (see Bruch and Mare 2012; Krysan and Crowder 2017; Quillian 2015).

This structural orientation has generated a vigorous debate on whether and why race- and class-based gaps in neighborhood sociodemographics remain after individuals' socioeconomic circumstances are accounted for. Generally speaking, the spatial assimilation perspective attributes race and class disparities in neighborhood sociodemographics to group gaps in status attainment markers, such as wages, wealth, and education. Accounting for these factors should substantially attenuate group-based differences (Massey and Denton 1985). The alternative perspective, place stratification, holds that sizable residual gaps in race and class groups' neighborhood sociodemographics will remain, net of these characteristics. Stratification scholars frequently implicate discriminatory barriers erected by real estate agent and broker steering, zoning regulations, or other institutional mechanisms in preserving these gaps (Logan and Molotch 1987; Trounstine 2018).

Cognitive skills rarely factor into this important debate. Yet the context of inequality is changing in ways that may amplify their effects. Although persistently high levels of residential segregation underscore the enduring racial and class stratification of housing markets, we argue that evolving opportunity structures create avenues along which cognitive skills shape the sorting of individuals into the highest-status neighborhoods they can afford. Large public housing developments that historically concentrated poor, minority households in the inner city have been demolished (Goetz 2011), and the ascendant housing strategy at both the federal and local level—housing vouchers—empower low-income households with more residential choices. Moreover, the real estate industry has shifted from predominately small-scale operations relying on word-of-mouth referrals and covering narrow submarkets—conditions that facilitated discrimination—to large agencies that encompass broader geographies, employ Internet-based marketing, and participate in fair housing training and minority recruitment (Anderson et al. 2000; Ross and Turner 2005).

A simultaneous information explosion has saturated urban housing markets and transformed how Americans navigate them (Zumpano et al. 2003). Cognitive processing is increasingly incentivized or rewarded, especially in sprawling and fragmented metropolises, a dynamic that few neighborhood attainment studies have explored.

Cognitive skills conceivably shape both the intensity of individuals' preferences for neighborhoods with "ideal" conditions and their ability to overcome constraints to realize these preferences, given the advent of real-time, publicly available data on neighborhood quality and housing unit openings; the proliferation of digital tools facilitating connections with real estate brokers, financial institutions, and local authorities; and the link between cognitive skills and digital engagement (Tun and Lachman 2010).

With regard to preferences, the Information Age renders the benefits of affluent neighborhoods more tangible by linking them to measurable quality indicators (e.g., school quality, crime, and housing value appreciation) via websites such as NeighborhoodScout, Zillow, and Redfin. Those who more frequently, quickly, and efficiently process large amounts of often-complex information are likely most motivated to access these perceived amenities. Even if preferences for neighborhood status varied minimally by skills, cognitive skills plausibly enable individuals to overcome constraints to accessing units within highly coveted communities. The highly skilled may more consistently track fluid neighborhood conditions, exhibit less difficulty finding high-value deals and navigating numerous institutional hurdles (e.g., housing applications, credit checks), and enjoy a first-mover advantage in acquiring dwellings in high-status neighborhoods—especially neighborhoods on the rise (see also Özüekren and van Kempen 2002). Social dynamics may also be implicated. Just as real estate agents and landlords have long engaged in race- and class-based steering, they may also reward perceived market knowledge and deft communication skills with access to desirable dwellings and neighborhoods—*cognitive-based steering*, as it were.

In short, we argue that although deeply stratified by race and class, contemporary housing markets increasingly reward—and perhaps even discriminate based on—information processing as well. These dynamics amplify cognitive skills' role in shaping neighborhood attainment and reinforce inequality. Exploring the link between skills and residential sorting is particularly important as urban stratification scholarship expands to encompass the mechanisms driving the persistence of not only concentrated disadvantage but also of concentrated affluence (Howell 2019; Owens 2016; Reardon and Bischoff 2011). A concrete hypothesis follows:

- *Hypothesis 1:* In contemporary housing markets, parents with higher cognitive skill levels are more likely to sort into neighborhoods that are societally defined as high in status/desirability, even after parents' and neighborhoods' sociodemographic characteristics are accounted for.

Social Class, Parents' Cognitive Skills, and Neighborhood Public Schools

Although revealing *whether* parents' skills predict neighborhood socioeconomic status would enrich contemporary accounts of residential sorting, it would not clarify precisely *how* parents' skills, household sociodemographics, and opportunity structures interact to reproduce spatial inequality. The traditional neighborhood attainment model obscures these finer-grained dynamics by assuming homogenous household preferences for neighborhood status, conceptualized primarily in sociodemographic terms, and implicating structural constraints. The model cannot readily distinguish whether skills—or other individual-level and household-level factors—generate variation in the strength of parental preferences for a general notion of neighborhood desirability/quality, neighborhood race or class composition specifically, or correlated neighborhood amenities perceived as central to children's development, such as school quality (for similar critiques, see Bruch and Mare 2012; Goyette et al. 2014; Harris 1999; Owens 2016; Quillian 2015).

We argue that highly skilled parents with the economic means may disproportionately optimize for socially salient indicators of school quality, specifically, rather than neighborhood socioeconomic status, generally. Many studies suggest that highly educated and upper/upper-middle class parents use school test scores as proxies for neighborhoods' suitability for their children (e.g., Johnson 2015; Lareau and Goyette 2014). Further, the intergenerational skills literature reveals that cognitive skills predict knowledge of, and emphasis on, child-centered parenting tactics and investments, net of socioeconomic conditions (e.g., Bornstein et al. 1998). It follows that the most highly skilled group of advantaged parents may give greater weight to perceived child-optimizing neighborhood amenities, such as school test scores, over other neighborhood amenities desirable to high-income households (e.g., housing stock characteristics) than do their less skilled peers. This disparity in prioritization could reflect, in part, a greater awareness among the most highly skilled parents that cognitive skill boosts in early ages foster an increased rate of skill growth later on (Cunha et al. 2010). Although school test scores do not necessarily equate with learning environments' quality (Schneider 2017), highly skilled parents—who themselves are likely to have high test scores—may be particularly likely to perceive a strong link between the two. In this way, skill-based sorting on the basis of neighborhood public school test scores may reflect socially shaped and self-fulfilling expectations.

Even if all advantaged parents exhibited comparable preferences for neighborhoods with high public school test scores, skill-based constraints could stratify their residential outcomes. The highly skilled may more deftly overcome informational and institutional barriers to accessing neighborhoods with the highest-scoring schools (e.g., by finding, interpreting, and tracking information on school catchment zones and school test scores). Advantaged parents who are less cognitively skilled may infer school quality from correlated proxies, such as neighborhood and school sociodemographic composition, or rely on word of mouth, rather than research school test scores. The highly skilled may also more readily identify, and elicit support from, key residential and institutional gatekeepers who plausibly reward the most knowledgeable and engaged parents—again, a sort of cognitive steering.

Among disadvantaged parents, however, class-based constraints, rather than skill-based constraints or preferences, likely stymie their efforts to foster skill development via the housing market (Rhodes and DeLuca 2014). Lower-income parents' strongly held preferences for school quality, for example, are often trumped by housing affordability and quality needs (see Johnson 2015; Lareau and Goyette 2014; Rich and Jennings 2015 for in-depth discussions of how race and class stratify parents' school quality evaluations).

We thus argue that it is not just social class but instead skills interacting with class that predict which parents access neighborhoods with the highest-scoring public schools. Regardless of whether test scores accurately measure the most developmentally enriching environmental contexts for their children, highly skilled and advantaged parents' propensity to sort on this basis yields a process of attempted "opportunity hoarding" (Reeves 2017; Trounstine 2018).

- *Hypothesis 2:* Among socioeconomically advantaged parents, those with higher cognitive skill levels are more likely to sort into neighborhoods with higher public school test scores, even after parents' and neighborhoods' sociodemographic characteristics are accounted for.

We test our theoretical framework's two main hypotheses by employing a novel data set of Angelenos' residential histories spanning a dozen years. Los Angeles County is a theoretically important but relatively underexplored urban ecology that is spatially distinct from and more racially and ethnically diverse than geographies examined in prior residential mobility analyses (Sampson et al. 2017). This diversity permits analysis of neighborhood sorting patterns among two rapidly growing but less frequently studied groups: Latinos and Asians. We also take seriously the unique spatial structure of Los Angeles by incorporating a network-based measure of spatial proximity into our models and, following Bruch and Swait (2019), by constructing more realistic choice sets that oversample neighborhood options from meaningful county subregions.

Importantly, we incorporate a well-validated measure of cognitive skills and time-varying neighborhood-level measures of housing market conditions and public school test scores. Moreover, our discrete-choice framework captures heterogeneity in subgroups' residential patterns and disentangles sorting on multiple neighborhood features simultaneously. In contrast to many similar studies, we model both movers and stayers in our discrete-choice analyses, providing a more nuanced portrait of residential decisions (Bruch and Mare 2012; Huang et al. 2017; Sampson and Sharkey 2008). The time frame of our data, 2001–2012, spans an era of change in the region, including just before and after the Great Recession.

Research Design and Measures

This study is part of the Mixed Income Project (MIP), a data collection effort aimed at examining neighborhood context, residential mobility, and income mixing in Los Angeles and Chicago. MIP evolved from two anchor studies, L.A.FANS and the Project on Human Development in Chicago Neighborhoods (PHDCN). L.A.FANS Wave 1 data collection was conducted in 2000–2002, with a probability sample design that selected 65 Los Angeles County neighborhoods (census tracts) and, within each tract, a sample of randomly selected households. Within the 3,085 households that completed household rosters, researchers attempted to interview one randomly selected adult (RSA) and, if present, one randomly selected child (RSC), the child's primary caregiver (who could, or could not be, the RSA), and a randomly selected sibling of the RSC. The RSC's mother was designated as the primary caregiver unless she was not in the household or could not answer questions about the child. In these cases, the child's actual primary caregiver received the primary caregiver designation. Ultimately, 1,957 primary caregivers completed a Wave 1 interview, of whom 21% were White, 60% were Latino, 8% were Black, and 7% were Asian American/Pacific Islander. The remainder were Native American or multiracial.

Wave 1 respondents received follow-up interviews between 2006 and 2008 (response rate 63%) if they still resided within Los Angeles County (85% of the contacted sample). Approximately 2,000 RSA and RSC respondents completed interviews during Wave 2 of L.A.FANS, rendering them eligible for MIP between 2011–2013. A randomly selected subset of eligible respondents was contacted for a Wave 3 interview. After excluding those selected respondents who left Los Angeles County or who were institutionalized, incapacitated, or deceased, 1,032 Wave 3 interviews were ultimately completed (response rate 75%). Three-hundred MIP respondents were primary caregivers at Wave 1. Crucially, each data collection wave tracked a continuous record of respondents' residential locations over the interim years, enabling residential histories spanning approximately 2000 through 2013. For more details on L.A.FANS and MIP, see Sampson et al. (2017) and Sastry et al. (2006).

Because this study centers on skill-based residential sorting among parents, we examine neighborhood selection among respondents who were designated as primary caregivers at Wave 1, confirmed to have completed a survey and to have been Los Angeles County residents at all three data collection efforts, and for whom cognitive skill measures and network distance calculations between their origin and potential destination neighborhoods were available. Nearly all the primary (284) caregivers fit these specifications, and most have continuous census tract-coded residential history data from 2001 through 2012. See the online appendix (Analytic Sample section) for more details.

Neighborhood-Level Measures

Our outcome of interest is a binary measure indicating whether a given census tract within a choice set of plausible options was selected by a given household in a given year: 1 indicates that the tract was selected, and 0 indicates that it was not. We predict this outcome as a function of neighborhood-level covariates and their interactions with both household-level and individual-level characteristics. We include an annually estimated *tract status index*, constructed as the mean of a tract's standardized (1) median family income (logged) and (2) bachelor's degree or higher (%)—two common proxies for neighborhood status or desirability broadly defined.[1] We also include tract *racial composition* to test whether racial homophily confounds sorting by neighborhood socioeconomic status (Quillian 2015).

Our other core neighborhood-level measure is an annual estimate of *K–12 public school test scores*. Consensus on calculating school quality at the neighborhood level remains elusive. Given our focus on how parents' neighborhood perceptions shape residential decisions, we start with a parsimonious, widely disseminated measure—average public school test scores—that is available via the Internet and local newspapers. To generate a neighborhood-level estimate, we use GIS to overlay county-provided school catchment boundaries from 2002 with 2000 census tract boundaries and weight each school's test scores based on the proportion of the tract's area that is

[1] By combining the highly correlated measures (~.8) together into one index, we mitigate multicollinearity concerns that would arise from including both variables in our models. The index is correlated at .96 with each component variable, suggesting it is a strong neighborhood status proxy. The measure's construction also renders it easily interpreted, with a mean around 0 and a standard deviation of approximately 1.

covered by its catchment zone. We run this merge separately for elementary, middle, and high schools and then average the three tract measures to create a yearly estimate (see the online appendix, Calculating Tract-level Estimates of K-12 Test Scores). Although some children attend magnet, charter, or private/parochial schools instead of their local catchment school, approximately 90% of L.A.FANS panel children attended traditional public schools at Waves 1 or 2, based on parent reports. Catchment school quality is likely salient to the vast majority of parent respondents.[2]

We employ several neighborhood-level controls. A binary variable indicates whether the selected tract in a given year is the respondent's *origin tract*, the neighborhood of residence at $t - 1$ (1 indicates stayer in a given year, 0 indicates mover), enabling us to capture both movers' and stayers' residential decisions (see Bruch and Mare 2012). We interact this control with K–12 test scores, measured during the year in question, to test whether higher scores not only attract certain households but dissuade them from leaving. We also track *network distance* (i.e., road length in miles, rather than point-to-point distance) between neighborhood destination options and the origin tract using ArcGIS, given that familiarity and networks shape residential choices (Krysan and Crowder 2017). Traditional neighborhood-level controls used by prior sorting studies—*owner occupancy rate* (%) and *number of housing units* (logged)—are also included. The latter proxies housing availability (Bruch and Mare 2012; Gabriel and Spring 2019; Spring et al. 2017). For our discrete-choice models, we convert all tract variables, except for origin tract and network distance, into standardized measures to facilitate comparisons of their effects with that of the *tract status index* variable.[3,4]

Parental Cognitive Skills and Individual/Household-Level Measures

Our primary individual-level characteristic of interest is parents' cognitive skills, typically conceptualized in the skills and stratification literature as acquired knowledge, rather than fluid intelligence (Heckman et al. 2006; Kautz et al. 2014). L.A.FANS collected skill measures only for primary caregivers and child respondents. We use primary caregivers' Wave 1 results from the Woodcock-Johnson Passage Comprehension assessment, conducted in either English or Spanish. The test captures individuals' ability to process written information (a theoretically important skill for evaluating neighborhood options) by asking test-takers to identify missing key words from short passages of increasing complexity. We convert the age-adjusted national percentile rankings generated by the test into sample-based tercile rankings to capture nonlinear effects. Wave 1 skill terciles are applied across all years because the data are

[2] Even parents of children who do not attend their catchment-assigned school likely consider metrics of quality in the local public schools given their impact on shared perceptions of neighborhood desirability, which influences housing price appreciation and sales potential.

[3] Yearly estimates for all ACS-derived tract-level variables are based on the middle year of each ACS time frame (e.g., ACS 2005–2009 is used for 2007 estimates). We linearly interpolate values from decennial census 2000 and ACS 2005–2009 data for 2001–2006 estimates, given tract-level data availability gaps.

[4] Tract-level variables' missing data rates are trivial, except for network distance between origin and potential destination tracts (~1%) and K–12 test scores (~7%). Network distance missing values are imputed based on the mean distance between a tract within the respondent's Los Angeles County region of origin and a tract within the choice set tract's county region. Missing tract-level measures of K–12 test scores are imputed based on predicted values from a regression including tracts' housing and sociodemographic characteristics and year fixed effects. Model results are robust to excluding imputed values.

considerably more complete, and cognitive skills tend to stabilize in adulthood (Roberts et al. 2006; Rönnlund et al. 2015). Passage comprehension scores are highly correlated with scores generated by Woodcock-Johnson tests gauging other cognitive skill types.[5]

We include commonly employed predictors of neighborhood sorting as controls: *race/ethnicity*, *household income quintile*, and *bachelor's degree* or higher. The latter two are annually interpolated based on estimates from the three data collection efforts. Household income is standardized to year 1999 dollars and converted into a quintile ranking. To test our argument linking skills to neighborhood K–12 test scores among advantaged parents (Hypothesis 2), we use the time-varying bachelor's degree and household income quintile variables to stratify the sample. The upper/upper-middle class sample includes primary caregivers who hold a bachelor's degree or reside within a household in the fourth or fifth income quintiles within a given year. The middle/working class sample includes all other primary caregivers.[6]

Analytic Strategy

We employ discrete-choice models to evaluate whether parents' cognitive skills interact with neighborhood status to produce residential sorting outcomes for the full sample, and whether these skills interact with neighborhood K–12 test scores, specifically, rather than neighborhood status to predict sorting among advantaged parents. These models conceptualize selection as a process in which individuals examine a specific set of available options and select one with characteristics that most closely match their preferences and constraints. Interactions between characteristics of the choosers and of the choice options reveal heterogeneity among subgroups in preferences and/or constraints *vis-à-vis* particular option characteristics.[7]

Our study's choice of interest is the tract destination at time *t*, a binary outcome modeled as a function of multiple neighborhood-level characteristics and interactions of these characteristics with individual- and household-level characteristics. The data structure consists of various person-period-tract options, which capture a sample of neighborhood choices available to the individual in a given period; the tract actually chosen is marked as 1, and all other choice set options are marked as 0.

Consensus on two data structure features remains elusive: (1) whether the choice set should include the tract chosen in the prior period (i.e., the origin tract), and (2) how the

[5] Among L.A.FANS panel respondents who were children at Wave 1 but aged into adulthood by Wave 2 and retook Woodcock-Johnson tests at that time, passage comprehension module percentile rankings correlate at .6–.8 with broad reading, math reasoning, applied problems, and letter-word identification rankings. Ideally, we would replicate our core results using these others skill measures and a composite skill measure that averages scores across modules. However, L.A.FANS fielded only the passage comprehension module to primary caregiver respondents. Nonetheless, we believe this module captures important dimensions of the contemporary housing search, such as the accuracy and perhaps frequency of processing and contextualizing written information.

[6] All individual- and household-level measures contain complete data for the analytic sample except for household income (~15% of the sample is missing data for one or more waves). To estimate missing values, we use the imputed Wave 3 household income values calculated by Sampson et al. (2017), which employ a wide range of covariates.

[7] For recent examples of discrete-choice models of neighborhood sorting, see Bruch and Swait (2019), Gabriel and Spring (2019), Logan and Shin (2016), Quillian (2015), Spring et al. (2017), and van Ham et al. (2018).

neighborhood choice set should be conceptualized and constructed. Following Bruch and Mare (2012), we include both stayers and movers in our analytic sample and use the binary origin tract indicator to gauge whether the household is mobile within a given year. As for the neighborhood choice set, residential mobility studies typically use a random sample of all tracts in a metropolitan area (Bruch and Mare 2012; Quillian 2015; Spring et al. 2017; van Ham et al. 2018), but we opt for a different tack that takes into account the unique spatial structure of Los Angeles County. We first assign all county tracts to one of eight geographic regions—Central Los Angeles, San Fernando Valley, San Gabriel Valley, Gateway Cities, South Bay, Westside Cities, Santa Clarita Valley, and Antelope Valley—which, based on our analysis, tend to retain high proportions of residents over time (Fig. 1). Similar to Bruch and Swait (2019), who examined "cognitively plausible" neighborhood choices among Angelenos, we use these regions to shape respondents' choice sets. For each person-year combination, we construct a choice set of tract options, consisting of the tract selected; the person's tract of residence during the prior year (i.e., the origin tract); and 49 to 50 randomly sampled tracts, drawing about half from the respondent's county region of residence in the prior year and about half from the entire county. This approach yields a choice set of 50 to 51 tracts for all 3,317 person-periods and 284 unique primary caregivers, generating a total core analytic sample of 167,342 person-period-tract alternatives. See the online appendix, Modeling the Choice Set section.

We follow Quillian (2015) in translating this data structure into a formal discrete-choice model of neighborhood selection consisting of two core components. The first, Eq. (1), estimates $\widehat{U}_{ijt}$, which represents neighborhood j's attractiveness to individual i, in year t based on residential history data. If we consider just two household characteristics (X_1,X_2) and two neighborhood features (Z_1,Z_2), and assume a probability distribution of the unobserved neighborhood characteristics influencing attractiveness, then the neighborhood attractiveness model's nonrandom portion is represented by the following equation:

$$\widehat{U}_{ijt} = \beta_1 Z_{1it} + \beta_2 Z_{2it} + \delta_{11} Z_{1it} X_{1it} + \delta_{21} Z_{2it} X_{1it} + \delta_{12} Z_{1it} X_{2it} + \delta_{22} Z_{2it} X_{2it}, \quad (1)$$

where β_k represents the attractiveness of neighborhood j's characteristic k at time t (Z_{kjt}), and δ_{km} represents the interaction effect of neighborhood j's characteristic k at time t and individual i's characteristic m (X_{mit}) on neighborhood attractiveness at time t.[8] Individuals' characteristics influence neighborhood attractiveness only through their interactions with neighborhood features. Assuming the errors follow an extreme value (Gumbel) distribution, a discrete-choice conditional logit model generates a predicted probability of individual i selecting neighborhood j at time t:

$$p_{ijt}\left(Z_{kjt}, X_{mit}, C_{(i)}\right) = \frac{\exp\left(\widehat{U}_{ijt} - q_{ijt}\right)}{\sum_{w=1}^{C(i)} \exp\left(\widehat{U}_{iwt} - q_{iwt}\right)}. \quad (2)$$

[8] We use the term "effect" to remain consistent with the discrete-choice literature's language, while recognizing the limitations of our data and empirical strategy in identifying causal parameters.

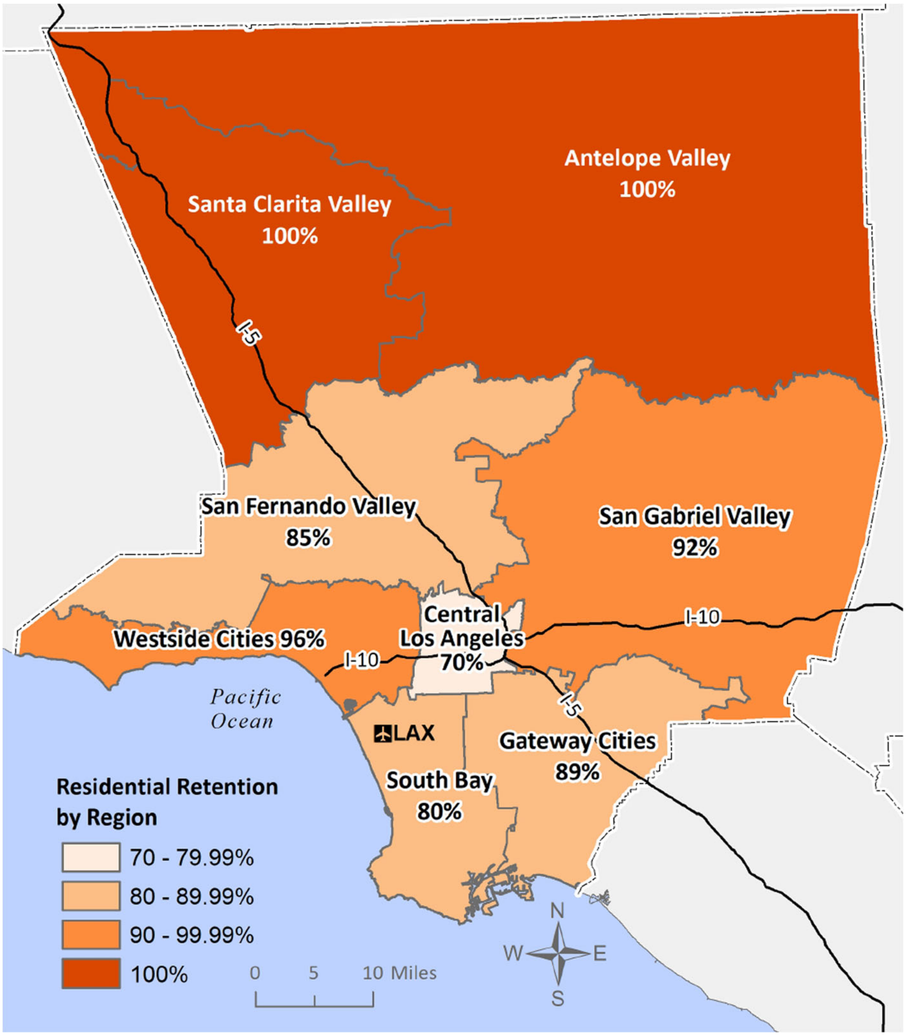

Fig. 1 Residential retention rate by Los Angeles County region: L.A.FANS/MIP Longitudinal Study, randomly selected adults. The numbers indicate the percentage of randomly selected adult respondents who resided within the same region of Los Angeles County during both Waves 1 and 3 of the L.A.FANS/MIP Longitudinal Study ($N = 612$), regardless of whether they moved residences. For more details on this analytic sample of randomly selected adults, see Sampson et al. (2017). *Source:* Authors' calculations using L.A.FANS/MIP Longitudinal Study, as well as schematic maps from various Los Angeles County governmental agencies and the *Los Angeles Times*' Mapping L.A. Project.

$C_{(i)}$ represents the neighborhood choice set for individual i, and w is an index used to sum over elements of this set for the ith individual. We follow prior analyses in incorporating an offset term (q_{ijt}) into our models to differentially weight tract options based on the probability of the tract entering the choice set for a given person-year via the sampling procedures described earlier (see the online appendix, Modeling the Choice Set section).

The model's maximum likelihood procedures yield a predicted probability that each neighborhood within the individual's choice set will be selected based on a set of estimated coefficients indicating neighborhood characteristics' positive or negative effects on a neighborhood's attractiveness (main effects) and whether these effects are strengthened or attenuated by the individual/household characteristics (interaction effects). We convert these coefficients into odds ratios to facilitate interpretation. Odds ratios greater than 1 suggest the neighborhood characteristic increases the likelihood of residence directly or in interaction with an individual/household characteristic; odds ratios less than 1 indicate a depressive effect. We discuss a common concern regarding the accuracy and interpretation of conditional logit models' results in the online appendix section, The Independence of Irrelevant Alternatives.

Descriptive Results

Table 1 reveals that Whites and Latinos constitute 28% and 47% of the weighted analytic sample, respectively; Asians constitute 13%, and Blacks account for 9%. This mix enables us to examine sorting patterns among all four major racial/ethnic groups—a key benefit compared with prior neighborhood sorting analyses. The categorical classification of Woodcock-Johnson passage comprehension scores indicates a low skew compared with the national distribution: the sample's middle tercile spans national percentile ranks 10–30.

A simple correlation matrix (Table 2) presents unconditional associations between primary caregivers' individual-level and household-level attributes measured at baseline and operationalized in continuous, rather than categorical, terms for passage comprehension and household income to maximize specificity. One might expect classic indicators of adult socioeconomic attainment—household income and bachelor's degree—to correlate strongly with cognitive skill levels, indicating that skill effects on neighborhood outcomes are likely absorbed by socioeconomic effects. In fact, this is not the case. Passage comprehension score (measured in continuous terms) is correlated at only about .30 with household income (logged) and .38 with possession of a bachelor's degree, meaning that substantial residual variation in skill levels remains net of these factors.

Chosen and nonchosen tract attributes (Table 3) reveal that, on average, 94% of the sample remained within their origin tract during a given year. Chosen neighborhoods' racial/ethnic distribution confirms Los Angeles County's distinctiveness relative to the rest of the country. The average share of Asian and especially Latino residents—approximately 13% and 50%, respectively—is strikingly high relative to other U.S. urban areas. Whites and Blacks constitute an average of about 28% and 7% of chosen tracts, respectively.

Unconditional associations between individual-/household-level and chosen tract-level attributes, as well as chosen tract-level attributes associations with each other, provide preliminary clues about the skills-neighborhood link (Table 4). Comparing the correlation between cognitive skills and *neighborhood*, rather than *household*, socioeconomic characteristics suggests that cognitive skills may influence neighborhood

Table 1 Descriptive statistics: L.A.FANS/MIP Longitudinal Study, primary caregivers (N = 284)

Variable	Mean	SD	Min.	Max.
Age	35.19	7.86	19	67
Race/Ethnicity				
White	0.28	0.45	0	1
Latino	0.47	0.50	0	1
African American/Black	0.09	0.28	0	1
Asian/Pacific Islander	0.13	0.34	0	1
Other	0.03	0.18	0	1
Socioeconomic Status/Education				
Household income (1999 constant $)				
<$16,000	0.18	0.39	0	1
$16,000–27,999	0.21	0.41	0	1
$28,000–41,999	0.21	0.41	0	1
$42,000–$65,999	0.20	0.40	0	1
$66,000+	0.20	0.40	0	1
Bachelor's degree or higher	0.19	0.39	0	1
Cognitive Skills				
W-J passage comprehension national rank				
<10th percentile	0.34	0.47	0	1
10th–30th percentile	0.34	0.47	0	1
>30th percentile	0.32	0.47	0	1

Notes: Means are weighted, reflective of all nonmissing observations, and measured at Wave 1. Baseline values of bachelor's degree or higher and household income represent educational attainment and estimated annual income for the earliest year available, usually 2000 or 2001.

Table 2 Correlation matrix of person-level attributes (measured at baseline) (N = 284)

	Passage Comprehension	Household Income (log)	Bachelor's Degree+
Passage Comprehension	—	.3032	.3811
Household Income (log)	.3032	—	.3788
Bachelor's Degree+	.3811	.3788	—
White	.3491	.1769	.1362
Latino	–.2545	–.3392	–.3019
African American/Black	–.0098	.0335	.0020
Asian/Pacific Islander	–.1388	.2018	.2479

Notes: Correlation values capture weighted unconditional correlations based on continuous rather than categorical values of observations without missing data and/or with imputed data on the two variables in question. However, correlation values are similar when categorical values of passage comprehension and household income variables are applied (results available upon request).

outcomes directly and perhaps shape neighborhood attainment more than socioeconomic attainment. Passage comprehension scores are correlated at .47 with the time-varying neighborhood status index but only .30 with baseline household income (logged).

Discrete-Choice Models

Congruent with the focus of previous neighborhood attainment studies, our first core analysis (Table 5, Model 1) gauges racial differences in tract status sorting while accounting for controls, including the origin tract indicator, network-based spatial proximity between the origin tract and choice set options, housing availability, and homeownership rates. As expected, households are far more likely than not to remain in place in a given year (OR = 2,089.19, $p < .01$). When they do move, network distance is important; the farther the neighborhood option is from the origin neighborhood, the less likely it is to be selected (OR = 0.80, $p < .01$). Housing markets also matter. Neighborhoods with more housing units are more likely to be selected by parents (OR = 1.67, $p < .01$), as are those with a higher owner occupancy rate (OR = 1.36, $p < .01$). Confirming the urban stratification literature's long-standing findings, Latino and Black race/ethnicity interact with the tract status index to reduce the likelihood of sorting (OR = 0.4, $p < .01$) net of nonracial tract-level controls and an age–tract status interaction control.

These racial interaction effects are only modestly attenuated after household income differences across racial groups are controlled for (Table 5, Model 2: ORs = 0.5 – 0.6, $p < .01$). Also, in line with prior urban stratification analyses, class-based neighborhood sorting appears important, net of race. The second highest and highest income quintiles interact with tract status to increase the likelihood of selection, generating ORs of 2.23

Table 3 Descriptive statistics: Time-varying tract attributes of analytic sample (*N* = 167,342)

	Chosen Tracts		Nonchosen Tracts	
Variable	Mean	SD	Mean	SD
Origin Tract	0.94	0.24	0.001	0.04
Network Distance From Origin (miles)	0.41	2.60	19.22	16.58
Number of Housing Units (logged)	7.55	0.39	7.29	0.52
% Owner-Occupied	52.02	24.06	51.16	26.42
% White (ref.)	27.74	24.70	29.98	27.16
% Black	6.85	8.79	8.76	14.23
% Latino	50.12	28.04	46.15	29.31
% Asian	12.75	13.03	12.44	15.16
Tract Status Index	–0.12	0.84	–0.02	0.92
Tract K–12 Test Scores	701.29	89.74	699.58	95.31
N (person-year tracts)	3,317		164,025	

Notes: Means are weighted and reflective of all nonmissing observations from 2001 through 2012.

Table 4 Correlation matrices: Person, person-year, and chosen tract attributes

Person and Person-Year Attributes	Tract Status Index	Tract K–12 Test Scores
A. Correlation Matrix of Person, Person-Year, and Chosen Tract Attributes (*N* = 3,317)		
Passage comprehension	.4723	.3777
Household income (log) (time-varying)	.6185	.5110
Bachelor's degree+ (time-varying)	.4179	.3351
White	.3864	.3122
Latino	–.4687	–.4172
African American/Black	–.0932	–.1057
Asian/Pacific Islander	.2547	.2686
B. Correlation Matrix of Chosen Tract Attributes (time-varying) (*N* = 3,317)		
Tract status index	—	.7792
Tract K–12 test scores	.7792	—
% Owner-occupied	.5006	.3917
% White	.8725	.7024
% Black	–.2475	–.3602
% Latino	–.8568	–.7115
% Asian	.2996	.3860

Notes: Correlation values capture weighted unconditional correlations based on continuous rather than categorical values of observations without missing data and/or with imputed data.

and 3.26 ($p < .01$), respectively. Interestingly, educational background, proxied by bachelor's degree attainment, does not significantly predict sorting when race, income, and age are controlled for.

Cognitive Skills and Neighborhood Status

After structural sorting patterns are accounted for, do parents' cognitive skills also predict neighborhood attainment? Indeed they do, especially at the top end of the skills distribution. Model 3 in Table 5 preserves all covariates from the traditional neighborhood attainment model (Model 2) but adds interaction terms capturing heterogeneous sorting on neighborhood status by passage comprehension tercile. The top tercile passage comprehension–tract status interaction term is strongly significant, net of race-, class-, and education-based sorting patterns (OR = 1.86, $p < .01$). The racial and income quintile interaction terms' odds ratios attenuate very slightly when compared with the previous model, suggesting that skills play, at best, a modest role in mediating race- and class-based neighborhood sorting patterns.

Model 4 extends beyond the traditional neighborhood attainment model by incorporating neighborhood-level racial composition controls and racial homophily interaction terms. A recent study employing discrete-choice models documented significant racial homophily patterns that may partially account for the observed propensity of Blacks, in particular, to sort into lower-status neighborhoods (see Quillian 2015). Our results reinforce this possibility. When racial homophily terms are included, they are

Table 5 Sorting effects of respondent attributes and structural tract characteristics on residential choice, conditional logit models (person $N = 284$; person-years $N = 3,317$; person-year-tract alternatives $N = 167,342$)

	Model 1		Model 2		Model 3		Model 4	
Variables	Odds Ratio	SE	Odds Ratio	SE	Odds Ratio	SE	Odds Ratio	SE
Destination Tract Attributes								
Origin tract	2,089.187**	544.022	2,037.944**	532.409	2,023.873**	533.073	1,914.149**	496.557
Network distance in miles from origin	0.798**	0.030	0.799**	0.030	0.799**	0.030	0.801**	0.030
Number of housing units (log)	1.671**	0.196	1.749**	0.209	1.757**	0.211	1.891**	0.233
% Owner-occupied	1.359**	0.155	1.402**	0.157	1.411**	0.157	1.433**	0.169
Tract status index	1.404	0.636	0.899	0.438	0.829	0.394	0.572	0.353
% Latino							0.871	0.217
% Black							0.845	0.092
% Asian							1.112	0.104
Interaction of Individual and Tract Attributes								
Age × tract status index	0.998	0.010	0.988	0.011	0.981	0.011	0.987	0.011
Latino × tract status index	0.409**	0.058	0.557**	0.080	0.623**	0.096	1.071	0.285
Black × tract status index	0.448**	0.102	0.505**	0.118	0.605*	0.154	0.653	0.162
Asian × tract status index	1.609	0.545	1.406	0.415	1.897*	0.573	1.901	0.682
Latino × tract % Latino							1.923**	0.470
Black × tract % Black							1.449*	0.251
Asian × tract % Asian							1.138	0.312
Household income Q2 × tract status index			1.157	0.234	1.208	0.237	1.229	0.255
Household income Q3 × tract status index			1.306	0.276	1.208	0.263	1.269	0.298
Household income Q4 × tract status index			2.232**	0.505	2.040**	0.463	2.111**	0.494
Household income Q5 × tract status index			3.258**	1.005	2.775**	0.832	2.979**	0.977

Table 5 (continued)

Variables	Model 1		Model 2		Model 3		Model 4	
	Odds Ratio	SE	Odds Ratio	SE	Odds Ratio	SE	Odds Ratio	SE
Bachelor's degree × tract status index			1.157	0.292	1.079	0.264	1.056	0.306
Medium passage comprehension × tract status index					1.275	0.224	1.208	0.220
High passage comprehension × tract status index					1.856**	0.420	1.702*	0.357

Notes: Models include standardized measures of all census-derived tract-level variables, analytic weights based on L.A.FANS/MIP sampling procedures and attrition, and the offset term, $-\ln(q_{ijt})$, for sampling the choice set. Standard errors are clustered by persons.

$*p < .05$; $**p < .01$ (two-tailed tests) significant among Latinos (OR = 1.92, $p < .01$) and among Blacks (OR = 1.45, $p < .05$). Moreover, the racial interaction terms with tract status become nonsignificant. However, importantly, the top tercile passage comprehension–tract status interaction term attenuates only slightly, remaining significant net of race-, class-, and education-based status sorting and racial homophily patterns (OR = 1.70, $p < .05$).[9]

We illustrate the magnitude of cognitive skill–neighborhood status interaction terms for the full analytic sample (Table 5, Model 4) by stratifying parents in the top and bottom skill terciles and comparing each subgroup's (1) predicted conditional probability of residing within tracts at various points in the neighborhood status distribution with (2) the probability of selecting a random tract from their choice sets. Higher ratios indicate a disproportionate likelihood of selecting a certain tract type over other options (for more detail on this type of simulation, see Logan and Shin 2016). Figure 2 suggests that all else being equal, respondents in the top skill tercile are 0.5 to 0.7 times as likely to select a tract within the two lowest neighborhood status quintiles as they are to select a random tract in their choice sets. This ratio approaches 1 within the middle tract status quintile and then ascends toward 1.5 between the fourth and fifth quintiles, indicating that high scorers are nearly 50% more likely to select a tract within the highest status quintile as they are to select any given tract in their choice set. Conversely, parents in the bottom tercile are much more likely to select a neighborhood within the two lowest quintiles and much less likely to select a neighborhood within the two highest affluence quintiles than they are to select a random tract within their choice sets.[10]

Similar results are generated using models that are nearly identical to Model 4 of Table 5 but specified on a sample excluding long-term stationary residents (i.e., 10+ years in the same tract) or on a sample of person-years in which parents moved tracts. In both samples, the tract status–top skill tercile interaction odds ratio attenuates slightly compared with Table 5, Model 4. In the former model, the interaction reduces to 1.60 (from 1.70). In the mover-only model, the same interaction reduces from 1.70 to 1.67 (online appendix, Table A1). Employing the full analytic sample (movers and stayers) and operationalizing parents' cognitive skill scores in continuous rather than categorical terms yields a significant skill–tract status index interaction exceeding 1 (OR = 1.19, $p < .01$) (online appendix, Table A2). Overall, our findings support Hypothesis 1: parents' cognitive skills influence neighborhood attainment processes, net of age-, race-, class-, and education-based neighborhood status sorting and racial homophily.[11]

Falsification checks based on theoretical expectations reinforce these findings. The parental skills–neighborhood status link is *not* significant among parents who still reside with their own parents as of Waves 1 or 2 or among parents who no longer have children under 18 in their household by Wave 2. By contrast, among parents

[9] By comparing Model 4 with an identical model that excludes skill interactions with tract status, we find that racial homophily interaction terms are virtually identical in odds ratios and significance (results available upon request), suggesting that skill-based status sorting does not mediate racial residential homophily patterns.

[10] Large relative differences in predicted versus random selection probabilities reflect small absolute differences, given the tendency of residents to remain stationary—another dimension of how inequality is reproduced (Huang et al. 2017; Sampson and Sharkey 2008). Yet simulation models suggest that even small group-based divergences in mobility and location propensities can generate major group-based disparities at the population level (Bruch and Mare 2006; Schelling 1971).

[11] Additional robustness check models include omitting the offset term and incorporating interactions for origin tract with household income, skills, and neighborhood status. Model results are not substantively changed compared with Table 5, Model 4.

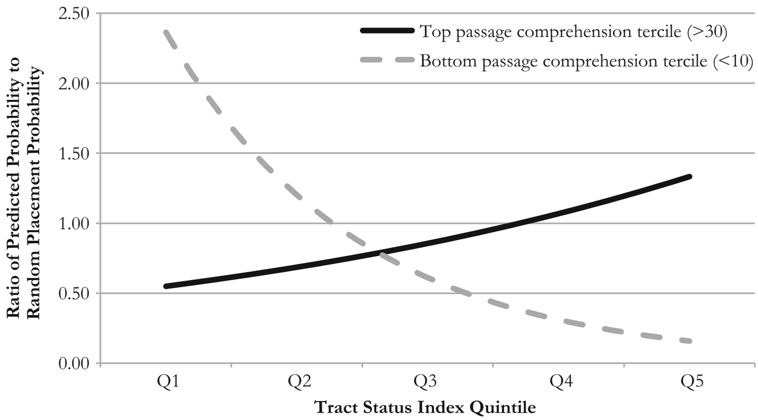

Fig. 2 Conditional predicted probability of living in a given neighborhood (ratio to a random placement) by tract status index and individual-level passage comprehension tercile with exponentially smoothed curves

whose households contain children of elementary school age (i.e., under 12) in both Waves 1 and 2, the skill–neighborhood status interactions strengthen in magnitude. Both the middle skill tercile (OR = 1.53, $p < .05$) and top skill tercile (OR = 1.95, $p < .01$) are significant, suggesting that neighborhood status is particularly salient to highly skilled parents of *young* children (Goyette et al. 2014) (online appendix, Table A3).

Class, Skills, and Neighborhood School Quality

We now evaluate our second hypothesis testing whether among parents in the upper/upper-middle class, cognitive skills are associated with sorting on neighborhood K–12 test scores specifically rather than on neighborhood status generally. Model 1 in Table 6 employs Model 4 in Table 5 as a base but specifies the analytic sample to include only parents who are bachelor's degree holders or within the top two income quintiles in a given year. We interact neighborhood K–12 test scores with parents' cognitive skill tercile, as well as with age, household income (logged), and origin tract as controls. Model 1 supports Hypothesis 2. Advantaged parents within the top skill tercile are much more likely to sort into neighborhoods with higher-scoring schools (OR = 5.60, $p < .01$), as are those within the middle skill tercile (OR = 4.96, $p < .01$).[12] Significant skills–K–12 test scores interactions are replicated in a similar model specification limited to bachelor's degree holders (results available upon request). We also confirm that the same patterns do not hold among less advantaged parents: Model 1 of Table 6 applied to a sample of parents *without* a bachelor's degree and in the bottom three income quintiles in a given year generates nonsignificant cognitive skill–K–12 test scores interactions (Model 2, Table 6).

Does the observed link between skills and K–12 test scores among advantaged parents primarily reflect skill-based variation in *preferences* for, or *constraints* to,

[12] Parents plausibly use schools' sociodemographic properties rather than test scores to infer school quality, especially given the well-established link between the two (Rich 2018). Because our models control for sorting on neighborhood racial and economic status, we partially account for this possibility, although future research probing this concern is necessary.

Table 6 Sorting effects of respondent attributes, structural tract characteristics, and K–12 test scores on residential choice by class status, conditional logit models

Variables	Model 1 Upper/Upper-Middle Class		Model 2 Middle/Working Class	
	Odds Ratio	SE	Odds Ratio	SE
Destination Tract Attributes				
Origin tract	1,172.966**	380.330	2,438.635**	1,041.378
Origin tract × K–12 test scores	1.126	0.189	0.837	0.154
Network distance in miles from origin	0.748**	0.040	0.835**	0.039
Number of housing units	2.802**	0.566	1.370*	0.186
% Owner-occupied	2.021**	0.389	1.066	0.152
% Latino	0.901	0.295	1.175	0.336
% Black	0.607	0.166	1.132	0.187
% Asian	1.043	0.112	1.168	0.166
Tract status index	0.712	0.657	1.788	1.256
Tract K–12 test scores	1.804	1.636	0.654	0.490
Interaction of Individual and Tract Attributes				
Age × tract status index	1.010	0.023	0.968	0.017
Age × K–12 test scores	0.953	0.025	1.032*	0.015
Latino × % Latino	1.845**	0.427	1.783**	0.304
Black × % Black	1.447	0.353	1.718*	0.444
Asian × % Asian	1.254	0.367	2.316**	0.289
Household income (log) × tract status index	1.773**	0.315	1.052	0.275
Household income (log) × K–12 test scores	1.181	0.189	1.271	0.330
Medium passage comprehension × tract status index	0.457*	0.147	1.392	0.503
High passage comprehension × tract status index	0.441	0.190	2.026	0.843
Medium passage comprehension × K–12 test scores	4.962**	2.202	0.675	0.225
High passage comprehension × K–12 test scores	5.599**	2.316	0.668	0.251
Number of Persons	165		201	
Number of Person-Years	1,476		1,841	
Number of Person-Year-Tract Alternatives	74,522		92,820	

Notes: Upper/upper-middle class is defined as primary caregivers with a bachelor's degree *or* within the top two income quintiles of household income. *Middle/working class* is defined as primary caregivers without a bachelor's degree and in bottom three income quintiles of household income. Models include standardized measures of K–12 test scores, all census-derived tract-level variables, and the continuous household income (logged) variable; analytic weights based on L.A.FANS/MIP sampling procedures and attrition; and the offset term, $-\ln(q_{ijt})$, for sampling the choice set. Standard errors are clustered by persons.

$^{*}p < .05$; $^{**}p < .01$ (two-tailed tests)

accessing neighborhoods with high-quality schools? A preferences account suggests that among upper/upper-middle class parents, the highly skilled prioritize child-optimizing neighborhood amenities, such as schools with high test scores, compared with other neighborhood features than do the less skilled. A constraints perspective might hold that the highly skilled more deftly overcome informational and institutional barriers and ingratiate themselves to, or experience less discrimination by, key residential and educational gatekeepers than the less skilled.

Our discrete-choice models cannot cleanly clarify whether preferences, constraints, or both underlie skill-based sorting on neighborhood school test scores among advantaged parents (see Quillian's (2015) discussion of this concern about preferences vs. constraints). Although the skill-based parenting and concerted cultivation literatures suggest skill-based preferences rather than constraints may predominate in neighborhood selection among advantaged parents, to our knowledge, a definitive resolution remains elusive. Thus, we opt to exploit descriptive data bearing on this question.

Figure 3 reveals the proportion of L.A.FANS primary caregivers who participated in Wave 1 regardless of MIP inclusion, moved residences within the prior five years, and reported in Wave 1 that proximity to good schools motivated their neighborhood choice. Congruent with concerted cultivation studies, parents in the upper/upper-middle class overall are much more likely to report access to good schools for their kids as a mobility driver than are other parents.

Do cognitive skills shape school-based preferences, net of socioeconomic status? Congruent with Hypothesis 2, our descriptive data suggest that they might. Advantaged parents within the top and middle skill terciles are about 50% more likely to cite school quality as a mobility driver as similarly advantaged bottom tercile parents—a pattern not replicated among middle/working class parents. These descriptive results reinforce the class heterogeneity in skill-based neighborhood school quality sorting revealed by our discrete-choice models and implicate class- and skill-based disparities in preferences for school quality as a potential driver. Yet skill-based constraints are not ruled out. Figure 4 reveals that conditional on expressing a school-based preference, a large class-based difference in median K–12 test scores remains (~130 points). Future research is needed to examine whether parental skills mediate this residual class gap.

Our analyses thus far do not solidify whether skills themselves stratify school-centric residential preferences and sorting or whether skill and class correlates, such as parents' educational expectations and investment in their children, confound observed skill effects. Leveraging L.A.FANS data on how many years of education parents expect their children to receive (to proxy expectations) and on the number of extracurricular activities in which their children are involved (to proxy investment), we confirm that each construct is positively correlated with parents' cognitive skill levels (~.3) (Table 7).[13]

We then interact these variables with the tract status index and K–12 test scores and add them into our most complete discrete-choice models from Tables 5 and 6. The partial model output in Table 8 reveals that although extracurricular investment interactions are strongly significant in each model ($p < .01$), the cognitive skill interactions with neighborhood status and K–12 test scores remain significant. Parents' educational expectations and especially extracurricular investments may thus account partially—but likely not fully—for class- and skill-based stratification in neighborhood preferences and, in turn, contextual sorting.

[13] For more details on how we constructed these measures, see the online appendix section, Educational Expectations and Extracurricular Investments.

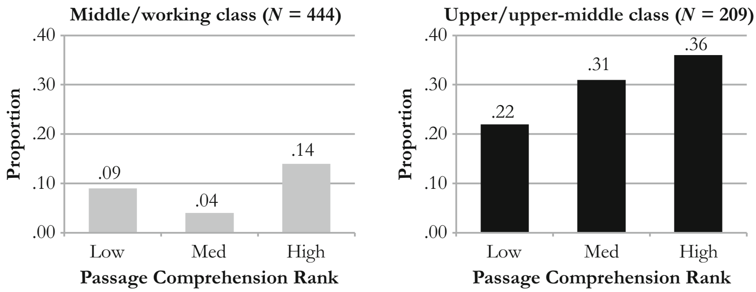

Fig. 3 Proportion of Wave 1 L.A.FANS primary caregivers who moved within prior five years and reported access to good schools as a driver of neighborhood mobility decision during the Wave 1 survey, by class and skill levels. All estimates are weighted based on L.A.FANS Wave 1 sampling procedures.

Discussion and Conclusion

The burgeoning literature exploring the intergenerational process of skill development highlights the role of parenting tactics but not contextual selection. The rich urban stratification literature, for its part, takes contextual selection as its object of analysis, yet its structural orientation obscures cognitive skills' role. We believe that cognitive processes contribute to urban stratification and the intergenerational transmission of context. Neighborhoods shaped parents' skill development as children, and these skill levels predict their own children's neighborhood conditions. Evolving housing market dynamics and school choice systems may amplify skill-based sorting processes, and these processes plausibly shape the residential and educational opportunities available to less advantaged and less skilled city residents.

To assess our theoretical framework, we integrate Angelenos' sociodemographic characteristics, cognitive skills, and residential histories with census, GIS, and administrative data on L.A. County neighborhoods' spatial locations, housing markets, sociodemographics, and public school test scores. Neighborhood attainment–oriented discrete-choice models show that cognitive skills interact with evolving opportunity structures to independently shape neighborhood status sorting, even after confirming the key roles played by race and class, housing markets, and spatial proximity. Among advantaged parents, cognitive skills are associated with sorting on public school test

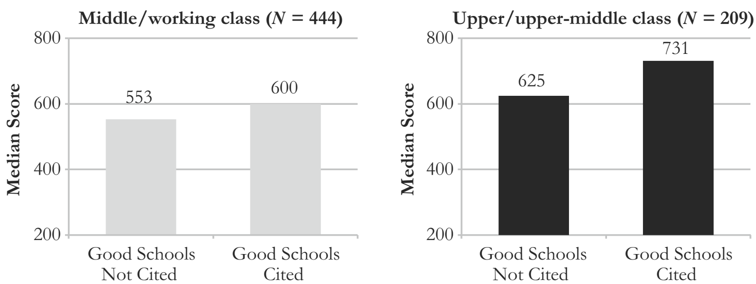

Fig. 4 Median K–12 test score of the chosen tract at the survey baseline, by whether good schools were cited as a driver of neighborhood mobility. Estimates of subgroups' median K–12 test scores are calculated based on an average of respondents' baseline census tracts' estimated K–12 test scores over the three years during which Wave 1 was fielded (2000–2002). All estimates are weighted based on L.A.FANS Wave 1 sampling procedures.

Table 7 Correlation matrix of person, person-year, and tract attributes with potential mechanisms underlying residential sorting effects of respondent skills, structural tract characteristics, and K–12 test scores (N = 3,317)

	Passage Comprehension	Educational Expectations	Extracurricular Investment
Passage Comprehension	—	.2724	.2868
Educational Expectations	.2724	—	.3984
Extracurricular Investment	.2868	.3984	—
Household Income (log) (time-varying)	.3944	.2666	.4411
Bachelor's Degree (time-varying)	.3834	.2448	.2308
White	.3603	.0399	.2506
Latino	–.2703	–.1242	–.4562
African American/Black	–.0026	–.0563	.0281
Asian/Pacific Islander	–.1371	.1633	.2162
Tract Status Index (time-varying)	.4723	.3616	.5431
K–12 Test Scores (time-varying)	.3777	.3134	.5146

Notes: For more details on educational expectations and extracurricular investment variable operationalizations, descriptive statistics, and imputation procedures for missing values, see the online appendix section Educational Expectations and Extracurricular Investments.

scores specifically, rather than on neighborhood status generally, net of interactions between skills and neighborhood status and a wide range of controls. Skill-stratified preferences for neighborhood school quality—or perceived signals of quality—may drive this pattern.

Our results suggest neighborhood sorting occurs not only on the basis of race and class but also on the basis of cognitive skills, a mechanism we call *skill-based contextual sorting*. This model has important implications for the urban stratification and intergenerational transmission of skills literatures. As Krysan and Crowder (2017) argued, urban stratification's structural focus on economic resources, racial residential preferences, and housing discrimination may obscure key processes underlying neighborhood sorting. Race and class continue to profoundly shape housing markets, but their firm grip may be slowly weakening, and the roles played by information and networks are undoubtedly expanding. Results of a recent policy experiment reinforce this intuition. In King County (Washington state), modest investments in reducing informational barriers among housing voucher recipients (via customized housing search assistance paired with short-term financial support and landlord engagement) dramatically increased the likelihood they selected neighborhoods with high rates of upward mobility (Bergman et al. 2019).

As neighborhood-level data on measures ranging from upward mobility to K–12 school quality proliferate, the perceived neighborhood status hierarchy may no longer be determined solely based on race and class composition. These dynamics plausibly open the door to skill-based stratification, especially among advantaged parents who can readily access or prefer this kind of information and who can overcome the financial constraints required to act on it. Amid the increasing residential separation of the affluent (Owens 2016; Reardon and Bischoff 2011), understanding precisely how

Table 8 Partial output from conditional logit models for potential mechanisms underlying residential sorting effects of respondent skills, structural tract characteristics, and K-12 test scores

	Table 6, Model 1 Upper/Upper-Middle Class Sample		Table 6, Model 1 With Mediators		Table 5, Model 4 Full Sample		Table 5, Model 4 With Mediators	
Variables	Odds Ratio	SE	Odds Ratio	SE	Odds Ratio	SE	Odds Ratio	SE
Medium Passage Comprehension × Tract Status Index	0.457*	0.147	0.449*	0.152	1.208	0.220	1.093	0.197
High Passage Comprehension × Tract Status Index	0.441	0.190	0.413	0.187	1.702*	0.357	1.523*	0.297
Medium Passage Comprehension × K–12 Test Scores	4.962**	2.202	4.877**	2.264				
High Passage Comprehension × K–12 Test Scores	5.599**	2.316	5.944**	3.918				
Educational Expectations × Tract Status Index							1.008	0.033
Extracurricular Investment × Tract Status Index							1.305**	0.085
Educational Expectations × K–12 Test Scores			0.941	0.153				
Extracurricular Investment × K–12 Test Scores			1.500**	0.312				
Number of Persons	165		165		284		284	
Number of Person-Years	1,476		1,476		3,317		3,317	
Number of Person-Year-Tract Alternatives	74,522		74,522		167,342		167,342	

Notes: For more details on educational expectations and extracurricular investment variable operationalizations, descriptive statistics, and imputation procedures for missing values, see the online appendix section Educational Expectations and Extracurricular Investments. Full output for all models is available upon request. Models include standardized measures of all census-derived tract-level variables, K–12 test scores, the educational expectations and extracurricular investment variables, and the continuous household income variable; analytic weights based on L.A.FANS/MIP sampling procedures and attrition; and the offset term, $-\ln(q_{ijt})$, for sampling the choice set. Standard errors are clustered by persons.

$^*p < .05$; $^{**}p < .01$ (two-tailed tests) elites preserve spatial advantages may illuminate key mechanisms by which disadvantaged families' residential options are constrained.

These processes have further implications for the intergenerational transmission of skills literature, which should supplement its focus on parenting tactics with a deeper analysis of how skills shape, and are shaped by, environmental conditions to which children are exposed. The neighborhood appears to be an important domain for skills development, but contextual sorting *vis-à-vis* other domains (e.g., childcare, schools) is also likely salient. Skills scholars should examine what environmental domains, and what features of them, interact with parental skills to produce sorting.

We acknowledge the limitations of our study. L.A.FANS encompasses a relatively small group of parents within one urban ecology during one temporal era. Future studies should leverage larger samples with more diverse household structures and life cycle phases, spanning longer periods and broader geographies. Data on private schools and nontraditional public schools could also prove useful. Further theorizing is required to determine what additional skills (e.g., quantitative, noncognitive, or socioemotional capacities) and neighborhood features (e.g., environmental toxicity, crime levels) should be incorporated into ever-richer neighborhood sorting models. Examining whether these finer-grained sorting processes help explain race- and class-based gaps in neighborhood conditions and whether race and class moderate these processes would meaningfully enrich urban stratification models. Such analyses also promise to improve non-experimental estimates of neighborhood effects on individuals' outcomes (van Ham et al. 2018).

Our study could not definitively resolve whether sorting patterns reflect skill-based differences in preferences or constraints *vis-à-vis* neighborhood characteristics and whether skill-based sorting on neighborhoods' school test scores among advantaged parents reflects differential prioritization of school quality or merely differential perceptions of school test scores as a proxy for it. The challenge of disentangling preferences from constraints and clarifying their sources is endemic to all decision-making research. Stratifying respondents not only on sociodemographics but also on skills and combining stated preferences (neighborhood vignettes) with revealed preferences (residential mobility histories) may help. Additional research that closely documents how cognitive skills versus other correlated factors, such as educational expectations, shape the contemporary housing search is also necessary.

Our results are nonetheless robust in identifying skill-based contextual sorting as an emerging axis along which urban inequality is unfolding. This development is important to explore, especially in an era of liberalized, choice-oriented urban policy marked by school choice regimes and housing voucher programs. Reducing constraints to individuals' residential and school enrollment decisions in such an era, although intended to equalize socioeconomic opportunities across race and class lines, could well amplify skill-based stratification instead.

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