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Inequality in Children's Contexts: Income Segregation of Households with and without Children

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Abstract

Past research shows that income segregation between neighborhoods increased over the past several decades. In this article, I reexamine income segregation from 1990 to 2010 in the 100 largest metropolitan areas, and I find that income segregation increased only among families with children. Among childless households—two-thirds of the population—income segregation changed little and is half as large as among households with children. I examine two factors that may account for these differences by household composition. First, I find that increasing income inequality, identified by past research as a driver of income segregation, was a much more powerful predictor of income segregation among families with children, among whom income inequality has risen more. Second, I find that local school options, delineated by school district boundaries, contribute to higher segregation among households with children compared to households without. Rising income inequality provided high-income households more resources, and parents used these resources to purchase housing in particular neighborhoods, with residential decisions structured, in part, by school district boundaries. Overall, results indicate that children face greater and increasing stratification in neighborhood contexts than do all residents, and this has implications for growing inequalities in their future outcomes.

Keywords

neighborhood segregation, income segregation, school district fragmentation, school district segregation, income inequality

Families have become more segregated by income between neighborhoods over the past 40 years. Income segregation between neighborhoods increased during the 1970s and 1980s, changed little during the 1990s, and increased again during the 2000s (Bischoff and Reardon 2014; Jargowsky 1996; Reardon and Bischoff 2011; Watson 2009). The increase in income segregation was partly due to rising income inequality, which led to a wider gap between high- and low-income families in the housing and neighborhoods they could afford (Reardon and Bischoff 2011; Watson 2009). However, trends in income inequality vary by household composition—that is, whether children live in a household. Income inequality rose faster among households with children than

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among households without children (Jencks et al. 2010; Western, Bloome, and Percheski 2008). In addition, the class gap in investments in children has grown over the past several decades (Kornrich and Furstenberg 2013), with high-income parents increasingly outspending low-income parents. Residence in neighborhoods seen as advantageous for children may be an additional investment parents make. These trends suggest that income segregation may have risen faster among households with children than among those without.

Financial resources influence residential decisions, but residential decisions are also shaped by households' preferences given the set of affordable options. Households with children may have different preferences than those without children for type and size of housing stock, neighborhood racial or age composition, and public goods like safety and schooling. In particular, parents likely pay special attention to the local structure of school options in terms of school district and attendance zone boundaries. Despite the proliferation of non-local options (e.g., school choice policies and magnet and charter schools), 73 percent of public school children attended their neighborhood school in 2007 (Grady and Bielick 2010). Local school options may be a key mechanism structuring the residential choices of families with children, leading to higher income segregation among them than among childless households, for whom school options are less relevant.

This article documents income segregation between neighborhoods among households with and without children from 1990 to 2010. My analyses address two research questions: First, what are the trends in income segregation between neighborhoods by household composition? I find that, on average, the increase in income segregation between neighborhoods over the past two decades occurred exclusively among families with children. Income segregation between neighborhoods is higher and increased by about 20 percent among families with children, but it changed little among childless households, who make up the majority of U.S. households.

Second, do school options and income inequality account for the higher level and greater rise in income segregation among households with children? I find that the gap in income segregation between households with and without children is larger in metropolitan areas with more school options, measured by school district fragmentation. I also reexamine the established relationship between income inequality and income segregation, and I find that the relationship is twice as large among households with children as among those without. Together, rising income inequality and school-related residential priorities led to higher levels and greater increases in income segregation among households with children compared to childless households.

Examining differences between households with and without children modifies the current understanding of income segregation over the past several decades and the factors that contribute to it, with important implications for researchers and policymakers. Rising income segregation between neighborhoods is a story about families with children, demonstrating the particularly high stratification of children's contexts. Neighborhood effects studies have documented considerable disadvantages associated with growing up in impoverished neighborhoods (Sharkey and Faber 2014), and the greater and growing inequality in children's contexts over time suggests growing inequality for future generations. Recent research (Bailey and Dynarski 2011; Duncan, Kalil, and Ziol-Guest 2013; Reardon 2011) documents rising economic disparities in educational outcomes, and rising income segregation in children's contexts may be one explanation for this growing economic inequality.

HOUSEHOLD COMPOSITION AND INCOME SEGREGATION

Income segregation between neighborhoods changed little in the 1990s but rose in the 2000s, and both poor and affluent households have become more segregated from all other

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households (Bischoff and Reardon 2014; Reardon and Bischoff 2011). Studies documenting the rise in income segregation between neighborhoods have used data on family income (Bischoff and Reardon 2014; Reardon and Bischoff 2011; Watson 2009), but these data include only family households (two or more people related by birth, marriage, or adoption) and exclude single-person and other non-family households. Non-family households are increasingly prevalent, accounting for 33 percent of all households in 2010 (U.S. Census Bureau 2014), and if their income segregation differs from that of family households, the current understanding of income segregation between neighborhoods may be inaccurate. Because non-family households do not have children,[1] their income segregation may indeed be different. Families with children may have different residential resources and priorities than do non-family households or family households without children (Rossi 1955).

Income inequality is one key factor accounting for rising income segregation between neighborhoods from 1970 to 2000 (Reardon and Bischoff 2011; Watson 2009). Growing income inequality particularly affected the segregation of affluent families, given that rising incomes at the top of the income distribution primarily drove income inequality (Reardon and Bischoff 2011). Whether income inequality is higher among families with children than among all households depends on the measure used. The variance of family income was larger from 1975 to 2005 among families with children than among all families (Western et al. 2008), while the ratio of household incomes at the 90th and 10th percentiles was higher among all households than among those with children from 1967 to 2008 (Jencks et al. 2010). Both measures indicate that income inequality grew more among families with children than among all households, suggesting that income segregation between neighborhoods may have risen more among families with children. However, childless households do not incur the financial costs of raising children, so they may have more income to spend on housing (Black et al. 2002; Marsh and Iceland 2010), weakening the association between income inequality and income segregation.

Studies of *racial* segregation provide insight into whether income segregation may vary by household composition. Marsh and Iceland (2010) find that households composed of single individuals living alone are less racially segregated from one another than from married-couple households. Lower income inequality among single-person households, compared to inequality between single-person and married households, accounts in part for their lower levels of segregation. Racial segregation between neighborhoods among families with children is higher than racial segregation among all households (Iceland et al. 2010; Logan et al. 2001), and school-aged children experience more racial segregation between neighborhoods than do all residents (Jargowsky 2014). Given the link between race and income, residential *income* segregation may be higher among families with children than among those without.

More is known about the segregation of children between *schools* than between neighborhoods. School racial segregation declined substantially from the late 1960s through the early 1980s. Measures that capture the sorting of students by race between schools show more modest declines since the mid-1980s, but given changes in public school composition, minority children are increasingly exposed to more minority schoolmates (for a review, see Reardon and Owens 2014). Less research documents economic segregation between schools. Owens, Reardon, and Jencks (2014) find that income segregation between school districts among public school families, and segregation between schools among students eligible and ineligible for free lunch, increased from 1990 to 2010. However, schools tend to be more segregated by race and poverty than are neighborhoods (Saporito and Hanley 2014), so trends in school economic segregation may not accurately describe trends in residential income segregation of families with children. This study provides some of the first evidence on

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neighborhood income segregation by household composition.

RESIDENTIAL CONCERNS AMONG HOUSEHOLDS WITH CHILDREN

Residential decisions are influenced by resources and available options, and households perceive and evaluate their choice sets differently depending on whether they have children (Rossi 1955). Some neighborhood characteristics are attractive to households regardless of composition. For example, households pay more for aesthetically attractive neighborhoods, better air quality, low noise pollution, low crime, and proximity to amenities like public transportation, topographical features, and the central business district (Bayer, McMillan, and Rueben 2004; Li and Brown 1980). However, families with children have additional concerns (e.g., child-friendly amenities like local parks and libraries) or may weigh amenities differently (e.g., type and size of housing stock and neighborhood safety) when choosing where to live.

One particularly important concern shaping parents' residential choices is the local structure of school options in terms of school and district attendance boundaries. Some metropolitan areas are composed of many municipalities, each with its own school district. Others are composed of just a few school districts that serve multiple municipalities. Past research finds that racial segregation between school districts is higher in metropolitan areas with greater school district fragmentation (Bischoff 2008; Clotfelter 1999; Urquiola 2005). When metropolitan areas are more fragmented between districts, parents have more choices and can more closely match their preferences to the available options, leading to more racial segregation. More fragmentation may also lead to greater income segregation as parents choose to live in neighborhoods in particular districts.

Past studies indicate that parents take schools into account when making residential choices. Some white and higher-income parents use school and neighborhood racial composition as a proxy for school quality when deciding where to live and whether to enroll their children in local public schools (Holme 2002; Johnson and Shapiro 2003; Krysan 2002; Lareau 2014). Lower-income parents may assess schools on the basis of safety, school leadership, and school culture rather than test scores or school composition, and they have less access to information about academic characteristics of schools than do high-income parents (Hastings, Van Weelden, and Weinstein 2007). Furthermore, lower-income parents often face considerable housing market constraints in terms of affordability and limited search time, and they may privilege safety, housing unit characteristics, and proximity to childcare and employment over considerations about schools when making residential moves (Rhodes and DeLuca 2014). These different approaches to residential and schooling decisions may lead to high levels of sorting by income between neighborhoods among families with children. Childless households do not face the additional constraint of high-quality schools when choosing where to live, and thus they may be less segregated between neighborhoods. For example, childless households may be willing to live in diverse neighborhoods with attractive amenities located in low-quality urban school districts.

School options also shape residential decisions because school quality is capitalized into housing prices, pricing some households out of neighborhoods (for a recent review, see Nguyen-Hoang and Yinger 2011). Studies show that a one standard deviation increase in test scores corresponds to a 1 to 4 percent increase in housing costs, accounting for other neighborhood characteristics that may affect house prices (Bayer, Ferreira, and McMillan 2007; Bayer et al. 2004; Black 1999; Clapp, Nanda, and Ross 2008; Dhar and Ross 2012). Some childless households may be willing to pay for school quality when buying a home to maximize home values; childless households could also be empty nesters who made past decisions with children in mind or young

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couples planning for future children. In general, however, families with children are willing to pay even more in housing costs than are childless households for residence in areas with higher quality schools (Bayer et al. 2007; Bayer et al. 2004). Therefore, income segregation may be higher among families with children, due in part to schooling concerns, as childless households are less likely to pay the premium for a public good they will not use.

Residential priorities specific to families with children may also have shaped *trends* in income segregation over the past 20 years in addition to levels. High-income and highly educated parents have increased investments in their children's education compared to low-SES parents over the past few decades. The class gap has grown in parental time spent in childcare, including managing the activities of school-aged children (Bianchi 2000; Kalil, Ryan, and Corey 2012; Ramey and Ramey 2010), money spent on children (Bianchi et al. 2004; Kornrich and Furstenberg 2013), and enrollment in preschool (Bainbridge et al. 2005). This growing class gap may be due to rising income inequality as well as parents' increasing concern about their children getting ahead, starting when children are young (Lareau 2003)—what Ramey and Ramey (2010) call "the rug rat race." Furthermore, research shows that the impact of school characteristics on housing prices increased from 1994 to 2004 (Clapp et al. 2008; Dhar and Ross 2012). Some of this increase may be due to greater availability of information about schools during this time, particularly following the passage of No Child Left Behind in 2001 (Bast and Walberg 2004). If increasing concern about children's futures and access to information about schools translates into (1) increased willingness to pay to live in an expensive area associated with greater opportunities for children; and (2) higher home prices associated with high-quality schools, income segregation may have increased more for families with children than for households that are not subject to these growing concerns.

HYPOTHESES AND ANALYSES

This article addresses two related research questions. First, what are the trends in income segregation between neighborhoods by household composition? To answer this question, I estimate income segregation between neighborhoods within the 100 largest metropolitan areas in the United States from 1990 to 2010 for households with and without children. Research reviewed in the previous sections documents greater growth in income inequality and higher racial residential segregation among households with children than among those without; increasing economic segregation between schools; a growing class gap in investments in children; and the importance of schooling in residential decision-making for households with children. Therefore, I hypothesize that *income segregation between neighborhoods is higher and has risen more among families with children than among childless households.* Second, what factors account for such differences in income segregation by household composition? I hypothesize that *school options and income inequality play important roles*. To explore the role of schooling, I first estimate income segregation between school districts by household composition to see whether trends parallel those of neighborhood segregation, which provides descriptive evidence that districts may structure neighborhood segregation. Then, I use longitudinal regression analyses to identify the role of income inequality and the structure of school options, operationalized as school district fragmentation, in accounting for differences in residential income segregation between households with and without children over time.

DATA AND METHODS

Income Data

I use income data from the 1990 and 2000 Census and the five-year estimates from the 2008 to 2012 American Community Survey (ACS) to estimate income segregation between neighborhoods.[2] (For convenience, I refer to

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2008 to 2012 ACS estimates as 2010, the midpoint year.) The Census and ACS provide counts of households in multiple income categories (25 in 1990; 16 in 2000 and 2010) by household composition in each census tract (my definition of neighborhood). I examine counts for all households, households without children, and family households with children.[3] I use absolute income and do not adjust for household size (consistent with Jargowsky 1996; Reardon and Bischoff 2011; Watson 2009).

To estimate income segregation between school districts, I use data from the School District Demographics System (SDDS), produced by the National Center for Education Statistics (NCES). The SDDS aggregates Census and ACS data to the school district level, and I use estimates from the 1990 and 2000 Census and the 2008 to 2012 ACS.[4] The SDDS provides counts of households in income categories in every public elementary or unified (consolidated) school district in the United States by household composition and school enrollment.[5] I estimate income segregation between school districts for all households, households without children, family households with children, and public school families—families with at least one child age 3 to 19 without a high school degree enrolled in public school (available SDDS data indicate that about 5 percent of public school families also had children enrolled in private school).

Estimating Income Segregation

I address the first research question by estimating income segregation between neighborhoods within metropolitan areas from 1990 to 2010 for each household type using the rank-order information theory index *H*.[6] *H* compares the variation in household incomes within neighborhoods to the variation in household incomes within the metropolitan area. The rank-order *H* index extends the binary *H* index (the information theory index) by estimating a weighted average of binary *H* computed at every income threshold (Reardon 2009). Entropy is calculated with the following equation (Theil 1972; Theil and Finezza 1971):

$$E(p) = p\log_2\frac{1}{p} + (1-p)\log_2\frac{1}{(1-p)} \quad (1)$$

where p is the proportion of households with incomes below a particular income threshold, and entropy is calculated at the neighborhood and metropolitan area levels. Entropy is calculated for every income threshold (defined by Census/ACS categories). Binary *H* is calculated as the average deviation of each neighborhood's entropy ($E_j(p)$) from the metropolitan area entropy ($E(p)$) weighted by the number of households:

$$H(p) = 1 - \sum_j \frac{t_j E_j(p)}{TE(p)} \quad (2)$$

To estimate the rank-order information theory index *H* over all income categories, I use the following:

$$H = 2\ln(2)\int_0^1 E(p)H(p)dp \quad (3)$$

Theoretically, *H* can range from 0 (no segregation) to 1 (total segregation). If *H* is 0, household income distributions are identical in all neighborhoods and therefore identical to the overall metropolitan area distribution. If *H* is 1, every household in a neighborhood has the same income as every other household in the neighborhood. I estimate *H* within metropolitan statistical areas (MSAs) or divisions based on 2003 OMB definitions for the 100 most populous MSAs as of 2010. I calculate segregation within MSAs, rather than within cities or counties, to capture the fuller set of residential choices for households, including city-suburban sorting. I measure segregation between *school districts* within MSAs in 1990, 2000, and 2010 using the same method.

Segregation can be measured in many ways, capturing the *evenness* with which residents of different incomes are sorted between neighborhoods or the *exposure* of residents to other income groups within neighborhoods (Reardon et al. 2006). *H* is an evenness measure, and it has several advantages over similar measures

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that compare neighborhood variation in income to total variation in income (e.g., the Neighborhood Sorting Index [Jargowsky 1996] or the Centile Gap Index [Watson 2009]). Because *H* relies only on information about households' rank in the income distribution rather than their actual income, it is insensitive to inflation and changes in the shape of the income distribution. Particularly important here, *H* does not confound changes in income inequality with changes in income segregation, allowing for an investigation of the relationship between them (Reardon 2009; Reardon and Bischoff 2011). *H* is insensitive to the number or location of thresholds used to define income categories once there are more than a modest number of categories that capture the underlying distribution reasonably well. This feature makes *H* appropriate for comparing income segregation over time and across MSAs. *H* also has advantages over evenness measures like the dissimilarity index, commonly used in the racial segregation literature, because it uses information about the entire income distribution rather than measuring segregation between two categories (e.g., poor versus non-poor).[7]

H captures segregation between neighborhoods among either households with or without children, but these two types of households share neighborhoods. As a supplemental analysis, I use exposure indices to estimate the average neighborhood income composition experienced by households with and without children. I categorize households according to national income quintiles (based on all households). Then, I use the two-group interaction and isolation indices (Massey and Denton 1988) to generate the average neighborhood composition experienced by households with and without children in each income quintile in the 100 largest MSAs.[8] Together, the evenness and exposure indices provide a comprehensive picture of neighborhood income segregation for households with and without children.

The Role of School Options and Income Inequality

To address the second research question, I first compare trends in segregation between neighborhoods with segregation between school districts. I operationalize school options in terms of districts rather than schools for conceptual and practical reasons. Conceptually, families consider district boundaries when making residential choices between, for example, city and suburban neighborhoods and among neighborhoods in municipalities with multiple districts. If parents take school resources into account when choosing where to live, resource distribution is primarily determined at the district rather than the school level. Furthermore, between-district segregation accounts for the majority of racial and economic segregation between schools, suggesting that district boundaries are an important segregating mechanism (Fiel 2013; Logan, Oakley, and Stowell 2008; Owens et al. 2014; Stroub and Richards 2013). Practically, data limitations necessitate a focus on district rather than school attendance zone boundaries, although both likely shape residential choices.[9]

Next, the decomposability properties of *H* permit estimates of the proportion of neighborhood income segregation that lies between districts by dividing neighborhood income segregation within the MSA by district segregation within the MSA (Theil 1972). The decomposition requires neighborhoods to be defined as geographic units circumscribed entirely within school districts. I link tracts to elementary and unified school district boundaries using the MABLE/Geocorr Geographic Correspondence Tool for 2000 and 2010 (Missouri Census Data Center 2012). (The tract-district crosswalk is available in 1990 only for Missouri.) MABLE/Geocorr provides a crosswalk between tracts and school districts based on the proportion of tract population that lies within a school district. About half of tracts are divided between two or more districts. For tracts that are divided, I multiplied the number of households with and without children in each income category by the population proportion of the tract in the district, creating counts for partial tracts within districts (district-tracts). I estimated income segregation between district-tracts within MSAs to get a measure of total

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district-tract (neighborhood) segregation.[10] Then, I aggregated the district-tract income counts to the district level to estimate income segregation between districts within MSAs.[11] Dividing neighborhood segregation by district segregation provides the proportion of neighborhood segregation that occurs between district boundaries.

Finally, moving beyond descriptive analyses, I predict income segregation between neighborhoods among households with and without children, focusing on the roles of school options and income inequality. I use a longitudinal regression model:

$$\begin{aligned} H_{ijt} = {} & \beta_1 C_i + \beta_2 Y_t + \beta_3 C_i \times Y_t + \\ & \beta_4 G_{ijt} + \beta_5 G_{ijt} \times C_i + \\ & \beta_6 C_i \times F_j + \beta_7 F_j \times Y_t + \\ & \beta_8 C_i \times F_j \times Y_t + \\ & \beta_x X_{ijt} + \beta_x X_{ijt} \times C_i + \\ & \beta_9 R_{jt} + \beta_{10} R_{jt} \times C_i + \gamma_j + e \end{aligned}$$

where H_{ijt} is income segregation between neighborhoods (H) for group i (households with or without children) in MSA j in year t (1990, 2000, or 2010). C_i is a dummy variable for group (1 = families with children; 0 = childless households), Y_t is a vector of dummy variables for 2000 and 2010, and I include an interaction term between C_i and Y_t. Thus, β_1 indicates whether segregation was higher among families with children in 1990; β_2 is a vector of coefficients capturing whether income segregation changed over time for households without children; and β_3 indicates whether changes in income segregation over time were larger or smaller for families with children.

I measure income inequality by estimating the Gini index (G_{ijt}) for group i in MSA j in year t. The Gini index is a common measure of income inequality ranging from 0 to 1, indicating the extent to which the income distribution deviates from a distribution in which everyone has an equal share (when Gini is 0). I estimated the Gini index from categorical Census and ACS income data using a robust Pareto mean estimation procedure developed by von Hippel, Scarpino, and Holas (forthcoming). Table 1 shows that income inequality is higher among households without children but grows much more among families with children (in fact, income inequality among households without children declined in the 2000s). I include an interaction term between Gini and group. Therefore, β_4 indicates whether changes in income inequality predict changes in income segregation for households without children, and β_5 indicates whether the association between income inequality and income segregation is larger or smaller for families with children.

The second key independent variable is school district fragmentation F_j, my operationalization of school options, in MSA j in 1990. I measure fragmentation with the Herfindahl index, which estimates the probability that two randomly selected students in an MSA attend school in different districts, using data on the number of districts and public school enrollment from the Common Core of Data (CCD). The index is estimated in each MSA by $\sum_{d=1}^{k} P_d\left(1-P_d\right)$, where P is the proportion of students in the MSA enrolled in district d. Theoretically, the index ranges from 0 (every child in the MSA attends school in the same district) to 1 (every child in the MSA attends school in a different district). Fragmentation has changed little since 1990, so I estimate it only in that year (Table 1). This also somewhat mitigates reverse causality concerns—economic and racial segregation may lead to later district fragmentation, although it is difficult to determine how much of the relationship occurs in each direction (Bischoff 2008). By including interactions between F, Y, and C, I test (1) whether fragmentation accounts for the difference in H between groups in 1990 (β_6); and (2) whether the difference grows over time—if income segregation increases more in MSAs with higher district fragmentation in 1990 (β_7 tests this among childless households; β_8 captures differential effects for families with children). Because I measure

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Table 1. Descriptive Statistics, School District Fragmentation and Income Inequality

	1990		2000		2010	
District Fragmentation	.828 (.149)					
	HNC	HWC	HNC	HWC	HNC	HWC
Income Inequality (Gini)	.431 (.020)	.390 (.029)	.443 (.020)	.409 (.025)	.436 (.015)	.427 (.024)

Note: HNC denotes households without children; HWC denotes family households with children. Cells present means with standard deviations in parentheses.

fragmentation only in 1990, β_7 and β_8 do not indicate that growth in fragmentation led to growth in segregation, but that fragmentation sets the stage for greater growth. Segregation may increase more in highly fragmented areas because it provides more discrete choices for parents who have increasing resources or growing concerns about their children getting ahead.

I control for factors that potentially confound the relationships of fragmentation and income inequality with income segregation, drawing on past research (Bischoff 2008; Reardon and Bischoff 2011; Watson 2009). For example, increases in unemployment rather than income inequality could account for increases in income segregation (because unemployment is positively associated with income segregation and income inequality); or higher racial segregation, rather than fragmentation, could account for higher income segregation (because fragmentation is positively associated with both income and racial segregation). X_{ijt} is a vector of group-MSA-year controls for household demographic (log population, proportion over age 65, proportion female-headed households, proportion non-Hispanic black and Hispanic, racial segregation between black and white households, and proportion foreign-born) and socioeconomic (proportion with at least a bachelor's degree, unemployment rate, and proportion employed in manufacturing) characteristics. I interact the group-MSA-year controls with group. The coefficients for X_{ijt} indicate whether changes in control variables account for changes in income segregation for households without children; the coefficients for $X_{ijt} \times C_i$ index larger or smaller associations for households with children. I also control for private school enrollment rate (R_{jt}), because income segregation may be lower in places where more households opt out of public schools and thus care less about district boundaries when choosing where to live. I include an interaction with group to test whether private school enrollment rate accounts for segregation more among households with children than without. γ_j represents MSA fixed effects. The Appendix describes the source, construction, and descriptive statistics of control variables.

INCOME SEGREGATION BETWEEN NEIGHBORHOODS BY HOUSEHOLD COMPOSITION

What are the trends in income segregation between neighborhoods by household composition? Figure 1 presents estimates of income segregation between neighborhoods among all households, childless households, and family households with children from 1990 to 2010 averaged across the 100 largest MSAs. (Averages are not weighted by MSA population size. Weighting the average by 2010 population size produces substantively identical results.) Table 2 presents descriptive statistics.

Income segregation between neighborhoods is nearly twice as high among households with children as among those without—by 2010, average H was .21 among households with children compared to .11 among those without, a statistically significant difference between populations.[12] Past research estimates average H among all families

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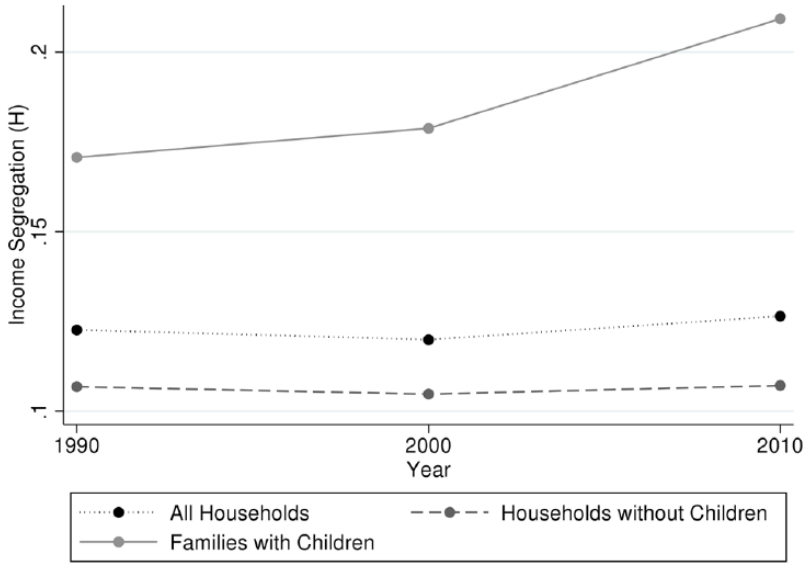

Figure 1. Average Income Segregation between Neighborhoods by Household Composition in the 100 Largest MSAs, 1990 to 2010

Table 2. Average Income Segregation between Neighborhoods and between School Districts within MSAs by Household Composition, 1990 to 2010

	1990	2000	2010	1990	2000	2010	1990	2000	2010	1990	2000	2010
	All Households			Households without Children			Households with Children					
Between Neighborhoods												
Median	.121	.119	.125	.108	.106	.106	.168	.176	.205			
Mean (SD)	.123	.120	.126	.107	.105	.107	.171	.179	.209			
	(.021)	(.018)	(.019)	(.017)	(.015)	(.015)	(.031)	(.029)	(.031)			
	All Households			Households without Children			Households with Children			Public School Families		
Between Districts												
Median	.042	.045	.046	.030	.031	.031	.069	.072	.077	.075	.079	.088
Mean (SD)	.042	.043	.043	.031	.031	.030	.070	.073	.080	.076	.080	.089
	(.024)	(.023)	(.024)	(.018)	(.017)	(.017)	(.042)	(.042)	(.046)	(.046)	(.046)	(.050)

Note: N for between-neighborhood segregation = 100 largest MSAs. *N* for between-district segregation = 95 largest MSAs with multiple districts.

(excluding non-family households) to be .148 in 2009 (Bischoff and Reardon 2014), masking the higher level among families with children. Income segregation increased substantially from 1990 to 2010 among families with children but changed little among childless households. The average change from 1990 to 2010 among families with children was .038—an increase of over 20 percent—compared to no change, on average, among childless households. In the metric of *H,* the increase for families with children is 1.2 standard deviations.

My results indicate that including non-family households and examining income

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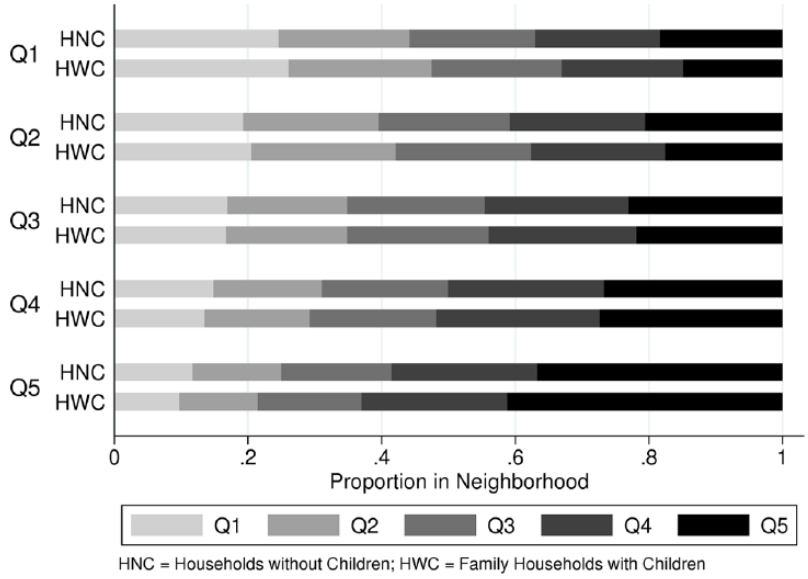

Figure 2. Average Neighborhood Income Composition for Households with and without Children in the 100 Largest MSAs, 2010

segregation by the presence of children in the household is critical to understanding income segregation over the past two decades. Past research documenting trends in income segregation among all families reports little change in the 1990s and an increase since 2000 (Bischoff and Reardon 2014). My results show that income segregation did rise slightly among families with children in the 1990s: past research missed this trend because it is obscured by small declines among households without children. The rise in the 2000s is much greater among families with children than among childless households. The increase in residential income segregation over the past two decades occurred almost entirely among families with children. Among childless households—two-thirds of the population—income segregation changed very little. When accounting for rising income segregation, factors specific to families with children must be taken into account.

What are the implications for the neighborhood income composition of households with and without children? Families with children sort by income between neighborhoods more than households without children, but both types of households share neighborhoods. (Table A2 in the Appendix indicates that segregation between households with and without children was low and changed little from 1990 to 2010.) The low economic sorting among households without children may dwarf the higher economic sorting among households with children, resulting in similar exposure of households with and without children to various income groups. Figure 2 presents the average neighborhood income composition experienced by households with and without children in 2010, estimated with interaction and isolation indices. Households in each income quintile (Q1 through Q5, based on the national income distribution for all households) are indexed on the *y*-axis for households without children (HNC) and households with children (HWC). The *x*-axis indexes the proportion of all households, regardless of composition, in each income quintile in the average neighborhood for households of that type in that income quintile, summing to 100 percent.

The bottom two bars in Figure 2 present the average neighborhood income composition of households with and without children in the highest income quintile. In 2010, the

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average high-income household with children lived in a neighborhood where 10 percent of all households had incomes in the lowest quintile and 41 percent had incomes in the top quintile. In contrast, the average high-income household without children lived in a neighborhood where 12 percent of all households had incomes in the lowest quintile and 37 percent had incomes in the top quintile. The average high-income household with children thus lived in a neighborhood with slightly more high-income and fewer low-income neighbors than did the average high-income household without children. The average *low-income* household with children lived among slightly more poor and fewer rich neighbors than did the average low-income household without children. The top two bars in Figure 2 show that the average household with children in the lowest income quintile lived in a neighborhood where 47 percent of households were in the bottom two quintiles and 33 percent of households were in the top two quintiles, compared to 44 and 37 percent, respectively, for households without children. Overall, Figure 2 demonstrates that households with children live in slightly more economically homogeneous and segregated neighborhoods than do those without.

Compared to neighborhood economic composition in 1990 (available upon request), high-income families with children experienced increasingly economically homogenous neighborhood contexts over time. For example, in 1990, top-quintile households with children lived in neighborhoods where high-income neighbors comprised 2 percent more of their neighbors compared to childless households; this disparity rose to 4 percent by 2010. The disparities in exposure between low-income households with and without children remained more stable over time, consistent with the discussion of segregation across the income distribution in the next section. The focus of this article is evenness and sorting rather than composition, but these analyses provide insight into the differences in neighborhood economic composition by household type.

Income Segregation across the Income Distribution

H provides a weighted average of segregation across the income distribution, obscuring changes in segregation at various points in the distribution that may offset one another. Past research shows that segregation of families above and below the median income rose fairly steadily, whereas segregation of the poor and of affluent families was flat in the 1990s but rose since 2000 (Bischoff and Reardon 2014; Reardon and Bischoff 2011). Does this vary by household composition? I created segregation profiles that display levels of segregation at each percentile of the income distribution, averaged across the 100 largest MSAs. I created the profiles by taking the binary *H* estimates at each income category threshold, which provide estimates of *H* across the income distribution, and fitting a polynomial through each binary estimate. Coefficients from this model and the distribution of households across the income categories can be used to predict *H* at each percentile in the income distribution (for details, see Reardon and Bischoff 2011).

Figures 3 and 4 present income segregation profiles between neighborhoods from 1990 to 2010. *H* is on the *y*-axis and percentiles of the income distribution are on the *x*-axis. A given percentile on the *x*-axis indicates a household's position in the national income distribution (of all households). The solid line in each figure is 1990, the dashed is 2000, and the dotted is 2010. Distance between the lines indicates change over time. The U-shape for both populations indicates that segregation is highest for affluent households, particularly among families with children (Figure 4). Segregation of the poor (between households with incomes above and below the 10th percentile) is also higher than segregation in the middle of the income distribution. Figure 3, the profile for households without children, shows little overall change. Figure 4 shows that from 1990 to 2000, income segregation between neighborhoods for families with children increased among the top ~80 percent of the income distribution but declined at the bottom. From 2000 to 2010,

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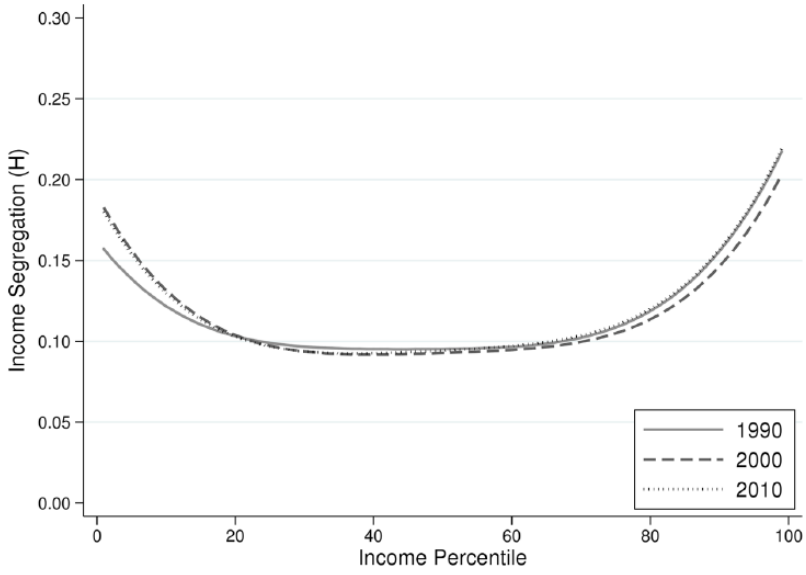

Figure 3. Income Segregation between Neighborhoods among Households without Children across the Income Distribution, 1990 to 2010

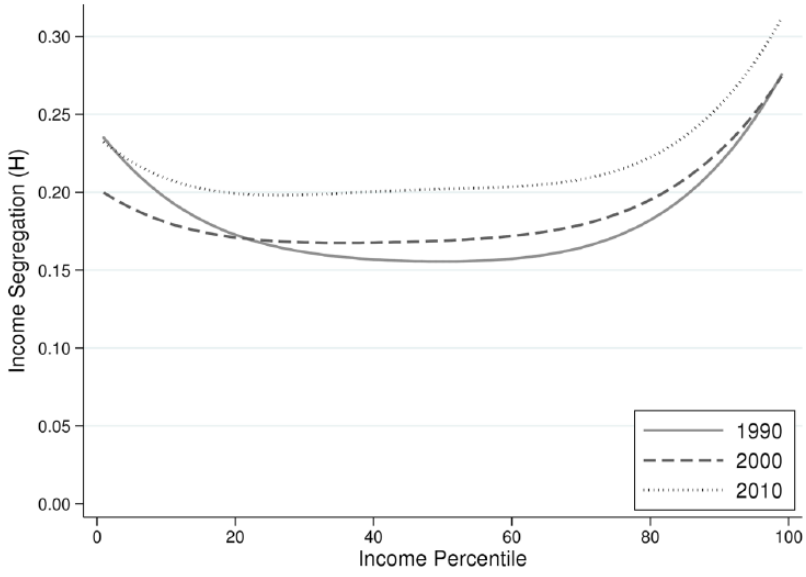

Figure 4. Income Segregation between Neighborhoods among Families with Children across the Income Distribution, 1990 to 2010

families with children became more segregated between neighborhoods at every income percentile. Comparing 1990 and 2010, the smallest change has been among the bottom quintile of the income distribution. Overall, these profiles (1) reveal the high levels of segregation among affluent households with children; and (2) emphasize that the increase in income segregation between neighborhoods occurred almost exclusively among households with children.

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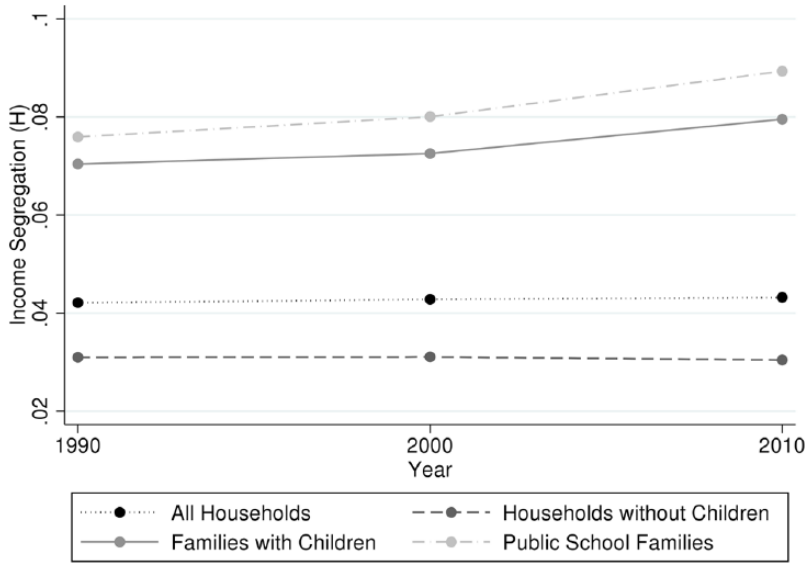

Figure 5. Average Income Segregation between School Districts by Household Composition in the 95 Largest MSAs with Multiple School Districts, 1990 to 2010

WHAT ACCOUNTS FOR DIFFERENCES IN SEGREGATION BY HOUSEHOLD TYPE?

Income segregation between neighborhoods is higher and increased exclusively among families with children, on average, consistent with my hypothesis. I now explore whether the structure of schooling and income inequality account for these differences in income segregation between households with and without children. First, I estimate income segregation between school districts to see if trends parallel those of segregation between neighborhoods. If school district boundaries are more relevant to the residential choices of families with children, segregation between school districts will be higher among these households compared to childless households. Figure 5 presents estimates of income segregation between school districts within MSAs, averaged across the 95 largest MSAs with more than one school district, for four populations: all households, childless households, families with children, and public school families.[13] Table 2 presents descriptive statistics.

Income segregation between school districts follows a similar pattern to income segregation between neighborhoods: it is higher and has risen more among households with children than among those without. Segregation by income between school districts is highest among public school families, for whom district boundaries are most relevant. By 2010, income segregation between districts among public school families was .089, on average, nearly three times as high as segregation among childless households.[14] Average segregation between school districts did not change from 1990 to 2010 for households without children. Income segregation grew among families with children during the 1990s and 2000s, and the increase was largest for public school families—17 percent, over one-quarter of a standard deviation. Segregation was about 9 percent higher among public school families than among all families with children in 1990 and about 11 percent higher in 2010. This difference suggests that public school options in particular, beyond district characteristics attractive to all families with children, contribute to segregation for public school families. The greater increase in segregation among public school families, compared to the

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Table 3. Proportion of Neighborhood Income Segregation Occurring between School Districts, 2000 and 2010

	2000	2010
All Households	.323	.326
Households without Children	.291	.268
Households with Children	.348	.380

Note: $N = 95$ largest MSAs with multiple districts.

increase among all families with children, is consistent with the hypothesis that school options have become a bigger factor in residential choice over time.

School districts are administrative units, but they are also a larger definition of neighborhoods. Therefore, the school district results could merely reflect that families with children increasingly sort between neighborhoods on a large geographic scale, as Reardon and Bischoff (2011) show. To demonstrate that school district boundaries are meaningful distinctions and not just large definitions of neighborhoods, I estimate the proportion of neighborhood segregation occurring between districts, dividing neighborhood segregation by district segregation. Table 3 presents the proportion of between-neighborhood income segregation within MSAs that occurred between school districts in 2000 and 2010.

If district boundaries delineate school options relevant to parents, rather than simply demarcating neighborhoods, a greater proportion of neighborhood segregation will occur between school districts among households with children than among childless households. Table 3 shows this is the case. Furthermore, during the 2000s, the proportion of neighborhood income segregation occurring between districts increased among families with children and decreased among households without children. This suggests that compared to childless households, families with children place more emphasis on school district boundaries when deciding where to live, and school district boundaries have become an increasingly salient residential sorting device over time among families with children. The results also show that over 60 percent of neighborhood segregation occurs *within* districts, indicating the importance of both districts and school attendance zones in contributing to residential choice and segregation.

The Role of Income Inequality and School District Fragmentation

The trends in income segregation between neighborhoods and between school districts are consistent, indicating higher segregation and greater growth among families with children compared to childless households. Now, I formally test the role of income inequality and the structure of schooling, measured by school district fragmentation, in accounting for these differences. Table 4 presents results from the longitudinal regression model described in the Methods section. Model 1 predicts group-MSA-year income segregation from group-MSA-year income inequality, school district fragmentation in 1990, a series of year and group (household type) dummy variables and interaction terms, and MSA fixed effects. Model 2 adds group-MSA-year demographic and socioeconomic controls, MSA-year private school enrollment, and interaction terms with group. (Table A3 in the Appendix presents coefficients for control variables.)

The group dummy variable indexes the difference in income segregation between households with and without children in 1990. Controlling for income inequality and fragmentation, there is no significant difference (Model 1). Model 2 indicates that, accounting for control variables, income segregation would be *lower* among families with children. The negative coefficients for year indicate that, with full controls, segregation among households without children declined slightly over time. The coefficients for the interaction between group and year indicate that the change in segregation over time is larger among households with children (the non-significant coefficient for 2000 indicates that fragmentation, income inequality, and controls account for the greater growth in segregation among households with children from 1990 to 2000).

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Table 4. Longitudinal Regression Predicting Group-Specific Income Segregation between Neighborhoods, 1990 to 2010

	Model 1	Model 2
Group = Families with Children	.008	−.153***
	(.024)	(.029)
Year = 2000	−.005*	−.012***
	(.002)	(.002)
Year = 2010	−.001	−.012**
	(.002)	(.004)
Families with Children × 2000	.006*	.003
	(.003)	(.003)
Families with Children × 2010	.028***	.021***
	(.003)	(.005)
Income Inequality	.160*	.232***
	(.079)	(.069)
Income Inequality × Families with Children	.157**	.223***
	(.056)	(.057)
Fragmentation × Families with Children	.039**	.028**
	(.013)	(.010)
Fragmentation × 2000	.002	−.001
	(.012)	(.009)
Fragmentation × 2010	−.003	−.012
	(.012)	(.009)
Families with Children × Fragmentation × 2000	.010	.014
	(.018)	(.013)
Families with Children × Fragmentation × 2010	.014	.023^
	(.018)	(.013)
MSA Fixed Effects	X	X
Group-MSA-Year Controls		X
Group-MSA-Year Controls × Group		X
Private School Proportion		X
Private School Proportion × Group		X
Constant	.038	−.025

Note: MSAs with only one school district are excluded from analyses ($N = 5$; see Table A3 in the Appendix for full sample results). $N = 570$ observations (95 metros × 3 years × 2 groups).
$^p \leq .10$; $^*p \leq .05$; $^{**}p \leq .01$; $^{***}p \leq .001$ (two-tailed tests).

The coefficient for income inequality is significant and positive, indicating that rising income inequality led to rising income segregation among households without children. The coefficient for the interaction between income inequality and group is also significant and positive: rising income inequality had a larger impact on income segregation among families with children. The total magnitude for families with children is nearly .5 (.232 + .223); a one-point increase in income inequality among families with children is associated with nearly a one-half-point increase in their income segregation. Predicted values from Model 2 indicate that income segregation among households with children rose twice as much in the 10 MSAs with the largest increases in income inequality compared to the 10 MSAs with the smallest increases in income inequality.

This finding refines past understandings of the relationship between income inequality and income segregation (Reardon and Bischoff 2011; Watson 2009). Rising income inequality contributes to income segregation much more among families with children. Not only is the relationship between income inequality and income segregation twice as large among

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families with children as among childless households, but income inequality increased much more among families with children. Income inequality and income segregation were both fairly flat among childless households, but where income inequality did rise, its impact on income segregation was half as large as among families with children. Spending priorities may lead high-income childless households to spend growing resources in different ways than do families with children. For families with children, the increasing resource gap strongly translated into segregation, perhaps because concerns about children and schools prompted high-income households' expenditures on mobility to neighborhoods seen as advantageous for children.

I measure school district fragmentation in 1990 and use group and year dummies and interactions to test whether fragmentation accounts for group differences in segregation. I mean-center fragmentation to ease interpretation. The coefficient for the interaction between group and school district fragmentation is significant and positive across models.[15] Income segregation is higher among households with children than among childless households in all MSAs, but the difference is even larger in more fragmented places. Predicted values from Model 2 indicate that in 2010, income segregation was twice as large among households with children as among childless households in the 10 most fragmented MSAs. In the 10 least fragmented MSAs, households with children were about 1.8 times as segregated as those without. Fragmentation thus has a modest effect size.

The interactions between fragmentation and year and between fragmentation, year, and group are non-significant, suggesting similar growth in segregation among households with and without children regardless of fragmentation (although in Model 2, the borderline significant interaction between families with children, fragmentation, and 2010 provides suggestive evidence that fragmentation contributed to the growing income segregation gap between groups). The descriptive analyses presented earlier indicated that segregation between school districts rose over time, and the proportion of neighborhood segregation occurring between district boundaries increased. However, the multivariate analyses do not strongly support a conclusion that the residential segregation gap increased more in highly fragmented MSAs.

Overall, these results show that rising income inequality is a more powerful predictor of income segregation among families with children, for whom income inequality increased much more. Families with children have different spending and residential concerns than do childless households, and the growing resource gap between high- and low-income parents translated into rising segregation among children. The results also show that the higher level of segregation among families with children is due, in part, to school district fragmentation, a more relevant concern for parents that provides a clear structure of possible residential choices. Together, rising income inequality and the structure of schooling within which inequality plays out combine to contribute to greater and growing income segregation among families with children.

DISCUSSION

This article makes several contributions to the current scholarship on income segregation and economic inequality. First, past research documents rising income segregation between neighborhoods (Bischoff and Reardon 2014; Jargowsky 1996; Reardon and Bischoff 2011; Watson 2009), but my analyses by household composition modify this conclusion. The increase in residential income segregation occurred entirely among families with children, for whom income segregation rose by about 20 percent. Among childless households—two-thirds of the population—income segregation did not change, on average. By 2010, income segregation between neighborhoods among families with children was twice as high as segregation among childless households. My findings reveal that the current narrative of an increasingly unequal metropolis in terms of income segregation is true only for families with children.

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Second, my findings suggest that explanations for residential segregation must consider this variation by household composition. I examine two factors in this article: income inequality and the structure of schooling. Past research identifies rising income inequality as an important driver of income segregation (Reardon and Bischoff 2011; Watson 2009). My findings show that the relationship between income inequality and income segregation is twice as large among households with children, for whom income inequality rose more. Income inequality changed little among childless households during this time period, and households without children may have different residential concerns and spending priorities, so that income inequality is a less powerful predictor of income segregation. Among families with children, high-income parents may have become increasingly concerned about their children's well-being, or they may have prioritized expenditures on residence in neighborhoods seen as advantageous for their children, and rising income inequality provided the resources with which to achieve these residential goals.

One such residential goal may be to live in a particular school district. Descriptive analyses show that trends in school district segregation by income are consistent with neighborhood segregation trends: I found higher levels and greater growth in income segregation between school districts among families with children, particularly public school families, compared to childless households. Furthermore, a larger (and growing) proportion of segregation between neighborhoods can be attributed to segregation between school districts among families with children, rather than among childless households. This indicates that school district boundaries shape the residential choices of households with children, contributing to their higher levels of segregation. Multivariate analyses confirm that segregation among families with children is modestly higher in more highly fragmented places, accounting for part of the gap in segregation levels between households with and without children. Past quantitative and qualitative research suggests that schooling concerns shape residential choices, but this article is among the first to document the aggregate impacts of school-related concerns on income segregation. My analyses examine school district fragmentation, but other measures of school options and other child-related amenities, such as housing options or local social services, are likely relevant and require further investigation.

Third, my analyses reveal that segregation is highest and has risen steadily between neighborhoods among affluent families with children. Growing income inequality and concerns about educational advantages for children may contribute to high segregation of affluent families. As the cultural norms around parenting and investments in children have intensified, spending on investments in children has risen among families at the top of the income distribution (Kornrich and Furstenberg 2013). My results indicate that real estate is another area where the class gap in investments in children has grown—income segregation between high- and low-income families with children has increased.

This article has implications for several related fields of study. First, my findings have implications for studies of neighborhood effects, which have demonstrated a link between neighborhood socioeconomic status and a variety of child and adolescent outcomes, including psychological well-being, test scores, educational attainment, and teen pregnancy (Brooks-Gunn et al. 1993; Chetty, Hendren, and Katz forthcoming; Jencks and Mayer 1990; Owens 2010; Sampson, Sharkey, and Raudenbush 2008; Wodtke 2013; Wodtke, Harding, and Elwert 2011). Given the widening gulf between children's neighborhoods that I document, future neighborhood effects research should adopt a temporal perspective and test whether neighborhood effects have increased over the past few decades as these disparities have grown. This line of inquiry would enrich our understanding of whether absolute or relative neighborhood deprivation matters. Furthermore, research should

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continue to examine whether children face more unequal contexts than adults on other dimensions, including racial segregation and exposure to violence.

Second, this study has implications for understanding growing economic gaps in educational achievement and attainment (Bailey and Dynarski 2011; Duncan et al. 2013; Reardon 2011). Rising segregation between both neighborhoods and school districts may account, in part, for the growing economic achievement gap. Neighborhoods and school districts serve as social contexts for children, determining public school students' classmates and influencing the types of adult supervision and role models children will encounter outside of school. Growing segregation among families with children between neighborhoods and, particularly, among public school families between districts since 1990 affects diversity in the composition of district schools. This may lead to inequalities in where teachers choose to work, how involved parents are in schools, and other contextual resources that contribute to children's outcomes. Furthermore, school districts serve as administrative units that determine educational funding and spending, curricular decisions, and school choice options, and rising segregation may lead to inequalities in the local tax and voter bases.

Finally, my findings have implications for policies designed to reduce inequality in children's neighborhood and school contexts. Families with children have become more segregated by income between neighborhoods, which suggests that schools may also have become more economically segregated (as the available evidence suggests [Owens et al. 2014]). For decades, school choice policies have been in place to overcome the role of neighborhood racial and income segregation in creating segregated schools. However, nearly all school choice plans operate *within* school districts, so they do not address the increasing economic homogeneity of school districts documented here. Furthermore, within-district school choice policies based on socioeconomic status have done little to reduce economic segregation between schools (Reardon and Rhodes 2011). Policymakers need to consider new ideas in breaking the link between neighborhood residence and school attendance to thwart the increasing pace of segregation between neighborhoods, schools, and school districts among families with children. Educational policymakers may be able to effect change by redrawing district boundaries to reduce the number and fragmentation of districts within MSAs. Designing inter-district choice plans and strengthening current intra-district choice plans may also mitigate inequalities. Breaking the link between neighborhood residence and school attendance may also reduce the capitalization of school quality into home prices, facilitating neighborhood income integration. Although politically challenging, using school attendance policies to reduce neighborhood and district segregation may be more feasible than reducing income inequality, raising the minimum wage, instituting metropolitan governance, or creating a large affordable housing stock to address residential segregation. Many researchers have noted that housing policy is school policy, but school policy can also be housing policy. Future research should continue to explore the causes and consequences of segregation between schools, school districts, and neighborhoods by household composition.

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APPENDIX

Multivariate Model Control Variables

Group-MSA-year control variables are constructed from IPUMS USA data (Ruggles et al. 2010). Table A1 presents descriptive statistics. To obtain metro-level estimates with consistent MSA boundaries, I first aggregate the data to the Public Use Microdata Area (PUMA) level for the 1990 and 2000 Census and 2008 to 2012 ACS. Then, I use a PUMA-county crosswalk provided by Missouri Census Data Center (2012) and finally aggregate county-level data to 2003 OMB-defined MSAs. Counties span PUMAs and the crosswalk is based on population proportion. As a check, I compared non-group-specific estimates between this method and Census data aggregated from tracts. Correlations are high (~.9). I also ran the longitudinal regression analysis with non-group-specific covariates and covariate interactions with group, and results are substantively identical for the key independent variables (income inequality and fragmentation).

Because income segregation is estimated between households, I estimate group-specific covariates at the household level for households with and without children. I estimate log population of each group, the proportion of householders who are non-Hispanic black, Hispanic, foreign-born, or over 65 years old. For the socioeconomic variables, I consider the characteristics of the householder or the householder's spouse, if present, estimating the proportion of households where the householder or spouse was unemployed, had at least a bachelor's degree, or worked in manufacturing. I estimate group-MSA-year proportion of female-headed households from Census and ACS data. I constructed the proportion of students enrolled in private school from SDDS data.

I constructed racial segregation from tract-level 1990 and 2000 Census and 2008 to 2012 ACS data on householder race by household type. These racial categories do not provide race-by-Hispanic-origin counts. I estimated segregation between whites and blacks and between whites and all non-whites between tracts within MSAs using the binary *H* index. Regression results are substantively identical regardless of the measure used.

Multivariate Model Results for 100 Largest MSAs

Table A3 presents results from the multivariate model presented in Table 4. Column 1 replicates Model 2 from Table 4 for the 95 largest MSAs, providing coefficients for control variables and their interactions with group (the coefficients for group, year, income inequality, fragmentation, and their interactions are identical to Table 4). Column 2 presents Model 1 (no control variables) for all 100 MSAs, including those with just one district where fragmentation is by definition zero. Results are similar to those presented in Table 4. When the full set of controls and control-group interactions are included in Column 3, the interaction between fragmentation and group becomes non-significant. However, the interaction between fragmentation, group, and year = 2010 is significant and positive. Segregation is higher in 2010 in more fragmented places among families with children. I prioritize results for the 95 MSAs with more than one district (following Bischoff [2008]), because low fragmentation scores are intended to capture low distribution across districts, not a lack of options as in the one-district MSAs. Most importantly, fragmentation scores of zero are statistical outliers that have undue leverage on the model and thus bias results. Post-estimation diagnostic tools reveal that the five one-district MSAs have higher leverage (hat-scores) than the 95 multi-district MSAs, as reflected in the drastic change in the fragmentation × group coefficient.

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Table A1. Descriptive Statistics for Control Variables used in Multivariate Analysis

	1990		2000		2010	
Private School Enrollment Rate	.142 (.047)		.137 (.044)		.133 (.042)	
	HNC	HWC	HNC	HWC	HNC	HWC
Log Population	12.545 (.718)	11.905 (.662)	12.706 (.691)	12.023 (.669)	12.846 (.673)	12.043 (.678)
Proportion over Age 65	.306 (.056)	.066 (.016)	.281 (.051)	.072 (.016)	.306 (.038)	.089 (.015)
Proportion Female-Headed Households	.325 (.023)	.214 (.037)	.332 (.022)	.237 (.042)	.339 (.020)	.263 (.045)
Proportion Non-Hispanic Black	.076 (.060)	.125 (.102)	.089 (.069)	.141 (.111)	.091 (.073)	.126 (.102)
Proportion Hispanic	.041 (.069)	.095 (.145)	.056 (.081)	.132 (.164)	.065 (.090)	.156 (.171)
White-Black Segregation	.391 (.149)	.427 (.158)	.340 (.149)	.373 (.161)	.298 (.136)	.320 (.143)
Proportion Foreign-Born	.068 (.046)	.112 (.100)	.087 (.056)	.163 (.127)	.091 (.063)	.192 (.136)
Proportion with a Bachelor's Degree	.239 (.059)	.279 (.065)	.278 (.068)	.320 (.076)	.307 (.073)	.383 (.093)
Proportion Unemployed	.047 (.012)	.063 (.019)	.040 (.009)	.050 (.018)	.076 (.016)	.087 (.019)
Proportion Employed in Manufacturing	.253 (.085)	.278 (.086)	.193 (.069)	.227 (.075)	.160 (.058)	.178 (.060)

Note: HNC denotes households without children; HWC denotes family households with children. Cells present means with standard deviations in parentheses.

Table A2. Average Neighborhood Segregation between Households with and without Children in the 100 Largest MSAs

	1990	2000	2010
Binary *H*	.046 (.020)	.040* (.019)	.045^ (.018)

Note: Cells present standard deviations in parentheses.
* = statistically significantly different from 1990; ^ = statistically significantly different from 2000.

Table A3. Longitudinal Regression Predicting Group-Specific Income Segregation between Neighborhoods, 1990 to 2010

	95 MSAs with >1 District	All MSAs	
Group = Families with Children	−.153*** (.029)	.014 (.023)	−.120*** (.029)
Year = 2000	−.012*** (.002)	−.004^ (.002)	−.013*** (.002)
Year = 2010	−.012** (.004)	−.0005 (.002)	−.014*** (.004)
Families with Children × 2000	.003 (.003)	.006* (.003)	.004^ (.003)

(continued)

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Table A3. *(continued)*

	95 MSAs with >1 District	All MSAs	
Families with Children × 2010	.021***	.029***	.025***
	(.005)	(.003)	(.004)
Income Inequality	.232***	.154*	.275***
	(.069)	(.076)	(.070)
Income Inequality × Families with Children	.223***	.142**	.161**
	(.057)	(.053)	(.058)
Fragmentation × Families with Children	.028**	.018*	.002
	(.010)	(.008)	(.007)
Fragmentation × 2000	−.001	−.006	−.006
	(.009)	(.008)	(.006)
Fragmentation × 2010	−.012	−.008	−.012^
	(.009)	(.008)	(.006)
Families with Children × Fragmentation × 2000	.014	.013	.014
	(.013)	(.011)	(.008)
Families with Children × Fragmentation × 2010	.023^	.024*	.029***
	(.013)	(.011)	(.008)
Log Population	.016***		.018***
	(.005)		(.005)
Log Population × Families with Children	−.004		−.002
	(.002)		(.002)
Proportion Householders over Age 65	−.012		−.009
	(.020)		(.019)
Proportion Householders over Age 65 × Families with Children	−.023		.004
	(.056)		(.050)
Proportion Female-Headed Households	−.324***		−.283***
	(.062)		(.060)
Proportion Female-Headed Households × Families with Children	.381***		.336***
	(.054)		(.053)
Proportion Non-Hispanic Black	−.004		.017
	(.028)		(.028)
Proportion Non-Hispanic Black × Families with Children	−.021		−.040*
	(.019)		(.019)
Proportion Hispanic	.200***		.215***
	(.036)		(.036)
Proportion Hispanic × Families with Children	−.116***		−.138***
	(.020)		(.020)
White-Black Segregation	−.044**		−.040*
	(.016)		(.016)
White-Black Segregation × Families with Children	.032***		.035***
	(.009)		(.009)
Proportion Foreign-Born	−.092*		−.133***
	(.043)		(.039)
Proportion Foreign-Born × Families with Children	.050^		.089***
	(.028)		(.024)
Proportion with Bachelor's Degree	−.065**		−.037^
	(.023)		(.022)
Proportion with Bachelor's Degree × Families with Children	.143***		.107***
	(.021)		(.021)
Proportion Unemployed	.001		.009
	(.068)		(.068)

(continued)

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Table A3. *(continued)*

	95 MSAs with >1 District		All MSAs
Proportion Unemployed × Families with Children	−.091		−.090
	(.078)		(.078)
Proportion Manufacturing	−.089***		−.077***
	(.021)		(.021)
Proportion Manufacturing × Families with Children	.082***		.070***
	(.013)		(.013)
Private School Enrollment	−.015		−.012
	(.036)		(.033)
Private School Enrollment × Families with Children	.066**		.063**
	(.024)		(.024)
Constant	−.025	.041	−.104

^$p \leq .10$; *$p \leq .05$; **$p \leq .01$; ***$p \leq .001$ (two-tailed tests).

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Notes

1. Over 99 percent of non-family households do not include members under age 18 (those that do are institutional or group-quarters households).
2. I accessed income data by household type and the presence of children in 2000 and 2008–2012 from Social Explorer and in 1990 via the National Historic Geographic Information System (Minnesota Population Center 2011).
3. I use counts by household income for all households and childless households and counts by family income for family households with children; using household income for all groups does not appreciably change results. I generated income counts for households without children by combining counts for non-family households (99 percent of which have no children) and family households without children. Data for non-family households' income by presence of children are not available, so I must count all non-family households as childless.
4. The SDDS collapses the 16 income categories in the 2008 to 2012 ACS to 10. This does not meaningfully alter results—between-district segregation estimated from 2006 to 2010 ACS data, which retain the 16 income categories and include three of the five years in the 2008 to 2012 data, is within .001 or less of results presented in Table 2.
5. The SDDS also provides counts for secondary-school districts composed of multiple elementary districts. I excluded these districts to assess segregation between non-overlapping districts within metropolitan statistical areas (MSAs). In 1990, data are missing from several counties in California. Estimates excluding California altogether are substantively identical to estimates reported here, so I retained available California data in the analyses.
6. Estimates of income segregation can be biased upward when the population is relatively small compared to the number of geographic units. Following Reardon and Bischoff (2011), I drew 50 random samples of sample size 50 × number of tracts, estimated H in each sample, and took the mean of these 50 estimates as the population-size-adjusted estimate of income segregation between neighborhoods.
7. I estimated the dissimilarity index (D) between poor and non-poor households with and without children. Consistent with H, D is higher among households with children than among those without (.44 versus .33 in 2010). Jargowsky (2014) also finds a higher D for children than for all residents in 2009. Poor–non-poor D declined slightly for families with children in the 1990s and increased in the 2000s, as reflected in Figure 4.

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8. The two-group interaction index is estimated as follows (Massey and Denton 1988):

$$_xP_y^* = \sum_{i=1}^{n}\left[\frac{x_i}{X}\right]\left[\frac{y_i}{t_i}\right],$$ where x_i and y_i are counts of members in income quintile x and y. t_i is the tract population, and X is the total population of income quintile x in the MSA. The interaction index estimates the probability that a randomly drawn member of income quintile x shares a neighborhood with a member of income quintile y. The isolation index subs x_i for y_i to estimate the probability that a randomly drawn member of income quintile x shares a neighborhood with another member of x.
9. Historic school attendance boundary data for all MSAs are not available, preventing the aggregation of Census data to these geographic units.
10. The estimates of segregation between tracts and between district-tracts within metropolitan areas are correlated at over .9.
11. The aggregation of district-tract counts to the district level provides nearly identical data to the SDDS, with differences accounted for by the different aggregation procedures used by SDDS and MABLE/Geocorr. Correlations between income counts at the district level between datasets are greater than .95. I use SDDS data for all between-district segregation estimates except for the decomposition.
12. Interpreting the magnitude of H is not particularly intuitive—for comparison, multiracial segregation between tracts measured with H was about .3 in 2000, and black-white segregation measured with binary H was about .4 (Reardon et al. 2008). Income segregation may be lower because the measure of income is imprecise, which affects the segregation measure. Furthermore, the measure of racial segregation is at the individual level, whereas I measure income segregation at the household level.
13. I exclude the five MSAs (Honolulu, Las Vegas, Miami, West Palm Beach, and Fort Lauderdale) composed of one school district, where segregation between districts is by definition zero. Including these districts does not alter trends in income segregation between districts but does reduce the level slightly. I present results for the multivariate model including all MSAs and discuss differences with the main results in the Appendix.
14. For comparison, Stroub and Richards (2013) use the same method to estimate that student multiracial segregation between school districts was .165 in 2009.
15. I ran analyses with an alternative measure of fragmentation—number of districts per 10,000 students—and the positive and significant coefficient for fragmentation × group holds.

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