Heterogeneous Household Change Among Children

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Family instability has negative consequences, on average, for child and adolescent behavior, cognitive scores, and educational attainment. Beyond changes involving parents, many children experience household changes involving extended family and nonrelatives. These children are less likely to graduate from high school and complete some college than those who experience no such changes. Research finds small or insignificant negative consequences of these changes among Black children. I estimate heterogeneous effects of household changes involving parents, extended family, and nonrelatives on educational attainment among Black children based on the likelihood of such changes. Black children least likely to experience changes experience stronger negative effects on educational attainment than those moderately and most likely to do so. Black children who are least and moderately likely may be more negatively affected in terms of some college completion relative to Black children who are most likely to experience this type of household change.

Keywords: children, household change, educational attainment

Changes in household composition are disruptive events in the lives of children. Social scientists have long been interested in how father absence and changes in parents' romantic relationships affect children's well-being and outcomes (Cavanagh and Fomby 2019; McLanahan, Tach, and Schneider 2013). A growing, but still relatively small, literature explores how children's residence in shared households and exposure to changes in household composition are associated with longer-term outcomes (Harvey 2020; Perkins 2019). Looking beyond parents to examine whether the arrival and departure of nonparent members of children's households is related to their longer-term outcomes is a step forward in research on children's developmental environments. Despite increasing attention to heterogeneity in the effect of parental divorce and other types of disruptive events (Aquino, Brand, and Torche 2022; Torche, Fletcher, and Brand 2024, this issue), sociologists and social scientists more broadly have not yet explored heterogeneous effects resulting from the disruption of changes

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in household composition involving both parents and nonparents.

I build on two strands of recent research in this article, combining a focus on changes in household composition beyond parents and their romantic partners with the approach of other recent research considering heterogeneous effects of parental divorce on children's educational attainment. I accomplish this with data from the Panel Study of Income Dynamics (PSID), a longitudinal, nationally representative survey of families and households collecting data since 1968. I estimate propensity scores and use matching-smoothing estimates and linear probability models to assess whether the effect of changes in household composition involving parents, nonparents, or parents and nonparents differs across the population. Specifically, are children with a low propensity to experience household change more or less negatively affected by the change than children with a high propensity to experience household change in terms of high school graduation and some college completion? I estimate heterogeneity for Black children, both because research on family instability finds small or null effects among Black children (Brand et al. 2019b; Cavanagh and Fomby 2019) and because recent evidence demonstrates that family structures and family processes differ by racialized group (Cross 2020; Williams and Baker 2021).

My findings suggest that the effects of changes in household composition involving parents, nonparents, and both parents and nonparents may differ by the propensity to experience household change. The negative consequences of changes involving only parents, only nonparents, and changes involving both parents and nonparents, on educational attainment may be larger among Black children who are less likely to experience such changes whereas the negative consequences may be smaller in magnitude for Black children who are more likely to experience such changes. These findings suggest that a group of Black children may in fact be disadvantaged by changes in household composition, nuancing research concluding that all Black children are relatively unaffected by family instability. The findings thus add to a growing literature on heterogeneous effects of disruptive events. Further, the results finding significant negative effects among a subgroup of Black children support recent arguments (Cross 2021) calling for more research on how family processes differ and have different effects within racialized groups.

MOTIVATION AND OBJECTIVE

This article builds on two strands of recent research: one exploring the consequences of changes in household composition for children's educational attainment and a second estimating heterogeneous effects of family disruption on educational attainment. Demographers and family sociologists have established that family instability, defined as parental relationship dissolution and repartnering, has negative consequences, on average, for child and adolescent behavior, cognitive scores, and educational attainment (Cavanagh and Fomby 2019). Approximately 35 percent of children live with an extended family member at some point during childhood (Cross 2018); shared households that include adults other than the head of household and their romantic partner experience frequent changes in composition (Pilkauskas 2012). Thus, beyond changes in parental relationships, a substantial share of children experiences changes in household composition involving extended family members and nonrelatives (Perkins 2017; Raley et al. 2019). Our limited understanding of how these changes affect children and adolescents makes this a very active area of research. Among young children, those who experience changes in household composition involving nonparents have worse cognitive outcomes than children with stable households (Mollborn, Fomby, and Dennis 2012). Children who experience three types of changes in household composition, those involving parents only, nonparent extended family members and nonrelatives only, and both parents and nonparents, are less likely to graduate from high school and enroll in postsecondary education and more likely to have a child as a teenager compared with children who experience no changes in household composition during childhood (Perkins 2019, 2023). A negative effect, on average, could mask positive effects for some children and negative effects among

others, especially where the estimates are imprecise.

Household changes are motivated by a range of different characteristics and trigger events, and children and families may be more or less likely to anticipate such changes. Experiencing the divorce of one's parents has negative effects on children's cognitive and socioemotional skills and prompts young adults to leave home because of conflict and have nonmarital births (Cherlin, Kiernan, and Chase-Lansdale 1995; Kim 2011). These negative consequences, among others (Amato 2010), however, are not uniformly experienced across the population. Disruptive events including divorce, job loss, home loss and eviction, health shocks and deaths, and violence and incarceration are not equally harmful across groups (Aquino et al. 2022; Torche, Fletcher, and Brand 2024, this issue). Most relevant to this article, recent research has uncovered substantial heterogeneity by race, education, and propensity to experience divorce in the effects of divorce and family instability involving parental romantic relationships on child outcomes. Family instability has stronger associations with delinquent behavior, age at first nonmarital sex, and age at first nonmarital birth among White than among Black adolescents (Fomby, Mollborn, and Sennott 2010). A similar pattern is evident for educational outcomes: parental divorce lowers the probability of high school completion, college attendance, and college completion among White children, but effects are close to zero and nonsignificant among non-White children (Brand et al. 2019b). Children of more educated parents experience larger negative effects on the probability of their college completion after parental divorce than children of less educated parents (Bernardi and Radl 2014). The effect of parental divorce on children's educational attainment varies by the likelihood of divorce occurring: children who are least likely to experience parental divorce, and therefore, perhaps, least likely to expect it, appear to be more disadvantaged by divorce than children who have a higher propensity to experience divorce in terms of probability of high school completion, college attendance, and college completion (Brand et al. 2019a).

Given these findings of heterogeneity in the effect of family instability on children and adolescent outcomes, it may follow that the effects of other types of household change also vary across children. I estimate how exposure to changes in household composition involving parents and extended family and nonrelatives differentially affects educational attainment according to the likelihood of experiencing such changes. Selection into family structure and household changes may differ by race and recent evidence supports the conclusion that family structure operates differently by race, with time spent living in a two-biological-parent family less beneficial for Black children compared with White children in terms of on-time high school graduation (Cross 2020). Marriage is also less protective against poverty for Black mothers compared with White and Latinx mothers (Williams and Baker 2021). Household composition beyond the nuclear family, selection into changes in household composition, and the effects of these changes may differ by race (Cross 2018; Mollborn et al. 2012; Perkins 2017, 2019) and our predictions of such changes and estimates of their effects should account for different selection mechanisms.

One finding motivating this analysis is that the effect of household change on educational attainment is consistently negative among White children but imprecisely estimated among Black children (Perkins 2019). This result suggests that there could be positive effects of household change for some Black children and negative effects for other Black children based on the types of household change they experience, other characteristics of these children and families, or their propensity to experience such changes. Rather than speculatively choosing a particular dimension across which the effects of household change may vary, such as gender, income, or education, which may or may not represent the most meaningful variation across the population (Aquino et al. 2022), I estimate heterogeneous effects of three types of household change by the propensity of children to experience each type of household change. There are at least two potential explanations for heterogeneous effects of disruptive events across the population (Aquino et al.

2022; Torche, Fletcher, and Brand 2024, this issue). The first is a cumulative disadvantage pathway whereby negative effects of disruptive events are stronger for individuals who are more likely to experience them because these individuals have fewer resources to buffer against a disruption. Alternatively, a floor effect is possible whereby individuals whose disadvantages predispose them to experiencing disruptive events may not be adversely affected by any one given disruption because of general instability in their lives. The second proposed pathway, whereby those least likely to experience a disruptive event are most negatively affected by it, is a path of non-normative and unexpected shocks. When individuals who are unlikely to experience a parental divorce, job loss, health shocks, or other disruptive event do in fact face disruption, they may be poorly equipped to adjust to the change or may feel stigma, worsening the negative effect of the disruption (Aquino et al. 2022).

I explore heterogeneous change in household composition and the effect of such changes on educational attainment. Unlike research finding small or no negative effects of family instability and parental divorce on Black children's outcomes, I find that Black children who are less likely to experience changes involving parents and changes involving parents and nonparents have significantly lower educational attainment. The stronger negative effects among low-propensity Black children are consistent with the unexpected events explanation of heterogeneous effects. Even low-propensity Black children may have fewer resources supporting educational attainment other than a stable family that is disrupted by household change.

DATA

I use data from the PSID to examine heterogeneous household change and educational attainment. The PSID collected data from a nationally representative sample of approximately 4,800 families in 1968 and the study has added children and grandchildren of original sample members as they form their own independent households. There are now more than eighty thousand individuals who are captured in at least one wave of the study (PSID 2019). I use data from the 1968 through the 2019 waves of the study. The PSID surveyed respondents annually from 1968 through 1997 and biennially since 1997. Children enter my sample in the first year that they appear in the PSID, soon after they are born, and I must observe them over time to track changes in household composition during childhood and their educational attainment by age twenty, measured as high school completion (completed at least twelve years of education) and some college (at least thirteen years). My sample includes Black individuals born between 1968 and 1999.[1]

I use household roster data collected at every survey wave to identify the relationship between each household member and the focal child and track, across waves, who enters and leaves the child's household. The first step is using parent pointers and the relationship to head variables to identify the relationship between each household member and the head of household. Then I use the relationships between head and all other household members and the parent pointers to infer the relationship between each child and every other person in the household. Most households in the PSID contain only one family unit, but for the approximately 10 percent of households that contain more than one family unit I must use the variable identifying the relationship between heads of different family units to infer relationships within households, but across family units. I use a four-category measure of exposure to household change involving parents, extended family, and nonrelatives based on observing children's households through age seventeen: first, experienced household changes involving only parents and stepparents; second, experienced household changes involving only nonparents (that is, adult siblings age twenty-five and older, and extended family and

1. My sample includes individuals whose families were originally part of the Survey of Economic Opportunity (SEO) sample, families within 200 percent of the federal poverty level in 1967. Including the SEO sample means that African Americans are adequately represented in the PSID and permits analysis of heterogeneity by propensity to experience household change.

nonrelatives, including children and adults); third, experienced household changes involving both parents and nonparents, and, fourth, experienced no household changes. It is difficult to know whether the changes children are experiencing are considered good or bad: I conceptualize changes in household composition as disruptions in children's environments that may be stressful and require a period of adaptation, regardless of whether they bring more resources to or subtract resources from children's households. These categories are admittedly coarse, but they capture different levels of volatility children experience.

Readers are naturally curious about the effects of parent (or grandparent) exit versus entrance, for example, but children rarely experience only one type of change during childhood. I measure change rather than exit and entrance because for most children I cannot isolate one type or direction of change in an analysis that uses household composition across childhood to predict an outcome in young adulthood. In my sample, among children who had a parent leave their household, 57 percent also had a parent join, and 32 percent had a parent leave more than once. Among children who had a parent join their household, 75 percent also had a parent leave. Of the children in my sample who had a nonparent join their household, 91 percent also experienced a nonparent leave, and 65 percent experienced nonparent exits more than once. Of those who had a nonparent leave the household, 87 percent had a nonparent join and 60 percent experienced two or more nonparent entrances. Even if I limited my sample to children who experienced a parent leave only once and no parents join to estimate a "cleaner" effect of parental relationship dissolution, I would still have to account for the 62 percent of these children who had a nonparent join and the 56 percent who had a nonparent leave their household.[2] Therefore, I choose to model these events as categories of changes rather than exits or entrances because so few children experience an exit, or entrance, in isolation. Modeling exits or entrances in iso-

lation would require either that I restrict my sample to the few children who experience only one type of change or that I ignore the complexity that characterizes the majority of children's households and developmental environments (for more, see Perkins 2019, 2023; DeLuca, Papageorge, and Boselovic 2024, this issue).

METHOD

Assessing heterogeneity in household change and its effects on high school graduation and some college completion requires estimating each child's likelihood of experiencing changes involving parents, changes involving nonparents, and changes involving both parents and nonparents. I begin by using the matching-smoothing method to estimate heterogeneous treatment effects (Xie, Brand, and Jann 2012). This method involves four steps (Jann, Brand, and Xie 2007). First, I restrict my sample to children who experienced at least one change involving parents only (treatment) and children who experienced no household changes (control). I estimate propensity to experience parent change using a logit model with the set of baseline covariates. Because household change can occur anytime during childhood, I must restrict pretreatment covariates to those available at baseline. This is a trade-off: pretreatment covariates alone do not adjust for time-varying confounders associated with both household change and educational attainment, but by limiting covariates to those observed at baseline I also avoid conditioning on endogenous variables, which could bias my estimates of the effect of household change. These models include baseline characteristics of the child (sex, indicator for living with married parents, indicator for parent head of household, indicator for having an older sibling, year of entry into PSID, whether the child's family joined the PSID as part of the SEO sample), characteristics of the head of household at baseline (sex, age, educational attainment, employment status, indicator for residence in the south), and characteristics of the household at baseline (home-

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2. Christina Cross (2018) finds that more than one-third of children lived with an extended relative at some point during childhood and that coresidence often occurs simultaneously with more than one type of extended family member, further justifying an approach that considers household members beyond parents.

ownership, household income, poverty status, household size, number of children in the household). Results from these logit models estimating propensity scores are shown in table A.1.

The second step, after predicting a propensity score, is matching treated to control units using kernel matching. Third, I plot the difference in high school graduation and some college completion between treated and control units against a continuous representation of the propensity score. Fourth, I apply a local polynomial regression to visualize a nonparametric smoothed curve for the difference in educational attainment between those who experience at least one parent change and those who experience no household changes as a function of the propensity score. I repeat these four steps for two other treatment categories: household changes involving nonparents and household changes involving parents and nonparents. Following these four steps produces figures showing the observed differences in high school graduation and some college completion between children who experienced one of three types of changes in household composition and those who experienced no changes. Patterns evident in these figures inform the second part of my strategy for estimating heterogeneous effects: using linear probability models to regress indicators for high school graduation and some college completion on household change within propensity score strata.

Based on the matching-smoothing figures and the propensity score prediction models, I group individuals into three propensity score strata and estimate stratum-specific treatment effects. I specify eighteen linear probability models regressing an indicator for high school graduation or some college completion on an indicator for one of three types of household change (parent change, nonparent change, both parent and nonparent change; reference group experienced no household changes), separately by likelihood to experience the given type of change (least likely, moderately likely, most likely). These models include only one co-variate: the propensity score estimate of the probability that the individual experiences the given type of household change (following Brand et al. 2019a). To check the robustness of these eighteen models, all of which have relatively small sample sizes, I specify a second set of six regression models (three types of household change, two education outcomes), interacting the type of household change with indicator variables for moderate and high propensity to experience the given type of change (low propensity is the reference group). These models pool the sample for each type of change, increasing precision while still allowing the treatment effect to differ by propensity to experience household change.

RESULTS

Table 1 shows, descriptively, how baseline child, head of household, and household characteristics differ among Black children in each of the four categories of household change.[3] Only 13 percent of Black children experience no changes in household composition involving parents or nonparents during childhood. Experiencing changes involving only parents is even less common, at 12 percent. A much larger share, 30 and 45 percent, experience changes involving nonparents or changes involving both parents and nonparents. Thus the modal category among Black children is experiencing household changes involving both parents and nonparents during childhood.

Most children in the no-change category live with married parents, at least one of whom is employed. The no-change category is more privileged, on average, than the change categories, but even within this relatively privileged category, the homeownership rate is rather low and poverty rate high. Most children in the parent change category experience one or two changes involving parents during childhood. Eighty-five percent of the children in the parent change group experience at least one parent exit, 20 percent experience parent exits twice, and 50 percent experience at least one parent entrance. Compared with children in the no-change category, a smaller share of children in

3. Descriptive statistics by the three propensity score strata within each treatment condition are shown in table A.2.

Table 1. Descriptive Statistics

	Overall Mean (SD)	No Change Mean (SD)	Parent Change Mean (SD)	Nonparent Change Mean (SD)	Both Change Mean (SD)
Household change category					
Change in parents	0.12	0.00	1.00	0.00	0.00
Change in nonparents	0.30	0.00	0.00	1.00	0.00
Change in both parents and nonparents	0.45	0.00	0.00	0.00	1.00
No change	0.13	1.00	0.00	0.00	0.00
Educational attainment					
High school graduation	0.76	0.80	0.87	0.75	0.72
Some college	0.29	0.48	0.40	0.26	0.23
Baseline characteristics					
Child sex (female=1)	0.47	0.48	0.45	0.49	0.46
Child lives with married parents	0.41	0.71	0.67	0.30	0.32
Child's parent is head of household	0.74	0.99	1.00	0.65	0.66
Child has an older sibling	0.59	0.64	0.63	0.66	0.52
Characteristics of head of household					
Sex (female=1)	0.47	0.27	0.31	0.59	0.50
Age	33.70 (12.47)	29.24 (5.89)	27.91 (6.07)	36.13 (12.97)	34.93 (13.92)
Education					
Less than high school	0.44	0.26	0.17	0.49	0.53
High school diploma	0.36	0.38	0.44	0.38	0.32
Some college	0.13	0.17	0.32	0.10	0.10
Bachelor's or more	0.06	0.19	0.07	0.04	0.04
Employment					
Employed	0.82	0.96	0.88	0.80	0.78
Unemployed	0.10	0.03	0.10	0.11	0.11
Retired or disabled	0.08	0.01	0.02	0.09	0.11
Marital status					
Married	0.51	0.71	0.67	0.38	0.48
Single	0.26	0.22	0.24	0.30	0.25
Widowed, divorced, separated	0.23	0.07	0.08	0.32	0.27
Region of Residence					
South	0.59	0.61	0.54	0.56	0.61
Characteristics of household					
Housing tenure: owned	0.29	0.34	0.23	0.31	0.29
Household income quintile					
First	0.38	0.26	0.25	0.43	0.43
Second	0.32	0.27	0.44	0.30	0.32
Third	0.16	0.24	0.17	0.15	0.14
Fourth	0.11	0.18	0.10	0.11	0.08
Fifth	0.03	0.05	0.04	0.01	0.03
Income below poverty line	0.39	0.24	0.22	0.45	0.43
Household size	5.08 (2.38)	3.74 (1.01)	3.95 (1.43)	5.63 (2.67)	5.42 (2.42)
Number of children in household	2.79 (1.82)	2 (0.97)	2.22 (1.34)	3.17 (2.01)	2.92 (1.89)

Table 1. (*continued*)

	Overall Mean (SD)	No Change Mean (SD)	Parent Change Mean (SD)	Nonparent Change Mean (SD)	Both Change Mean (SD)
First year child observed in PSID	1983	1983	1985	1983	1983
SEO sample	0.58	0.65	0.54	0.59	0.57
Observations	2,712	428	304	804	1,176

Source: Author's tabulation.

Note: Table based on author analysis of PSID data from 1968 to 2019. Statistics limited to Black children and are weighted to account for sampling design and attrition.

the parent change category live with married parents and in owned homes at baseline, and a larger share have household incomes in the lowest categories.

Overall, children in the parent change group live in households at baseline characterized by higher socioeconomic status than children in the nonparent and both change groups. Children in the nonparent change category experience between three and four changes involving nonparents, on average. In this group, 47 percent experience a grandparent exit, 22 percent experience a grandparent join, 47 percent experience an aunt or uncle leave, and 32 percent experience an aunt or uncle join. A larger share live in a grandparent's home at baseline and have household incomes below the poverty line relative to both the no-change and parent change categories.

Finally, children who experience changes involving both parents and nonparents have, on average, the lowest socioeconomic status at baseline. This group experiences the most volatility in household composition: 29 percent more than one parent exit, 68 percent a parent entrance, 50 percent a grandparent exit, and 34 percent a grandparent entrance. Changes involving cousins and nonrelatives also occur, though less frequently than those involving parents, grandparents, and aunts and uncles. The relatively large proportion of Black children in the nonparent change and parent and nonparent change groups, combined with the volume of changes experienced by children in these groups, underscores substantial exposure to household change among Black children.

Matching-Smoothing Estimates

Figure 1 presents matching-smoothing heterogeneous effects for three types of household change, the x-axis being a continuous propensity score predicting the likelihood that an individual in the sample experienced a given change in household composition, and the y-axis representing observed differences in high school graduation or some college completion. All figures include 95 percent confidence intervals and represent the middle 90 percent of the propensity score distribution. The top two panels show the differences in high school graduation and some college completion for Black children who experience parent change during childhood. For high school graduation, children with a low propensity to experience household changes involving parents appear to be more negatively affected by these changes relative to those with a higher propensity. The pattern differs for some college completion, where children who are least and most likely to experience parent change are most negatively affected. Children in the middle of the propensity score distribution are predicted to experience small negative effects.

The middle panels in figure 1 show treatment effects of experiencing a household change involving nonparents compared with no changes in household composition. The matching-smoothing estimates for Black children who experience changes involving nonparents do not show monotonic patterns. The negative effect of experiencing a nonparent change on both high school graduation and some college completion is bigger around propensities of between 0.4 and 0.5 and 0.9 and

Figure 1. Matching-Smoothing Heterogeneous Effects of Changes in Household Composition
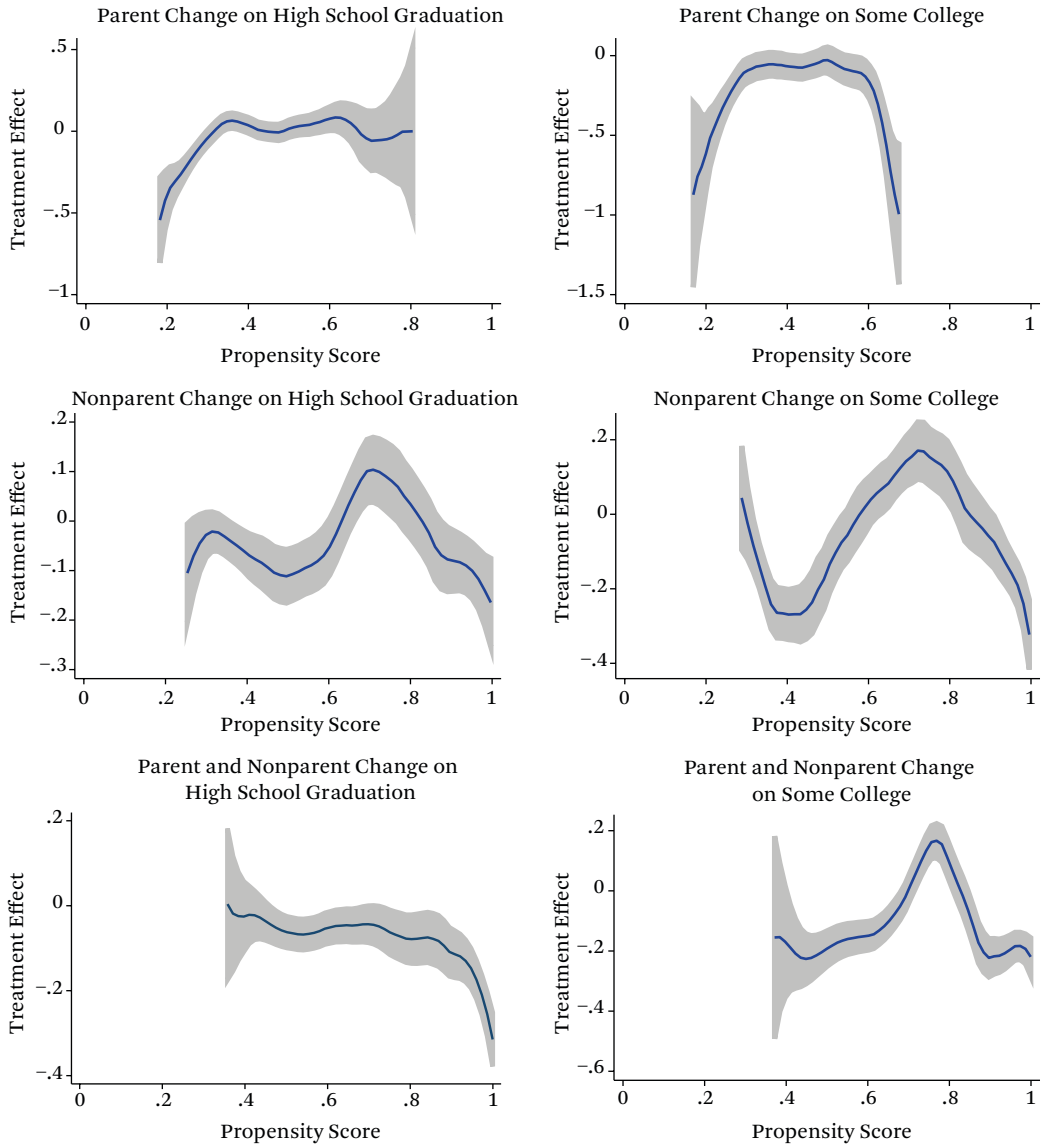
Source: Author's tabulation.
Note: Propensity scores estimated by logit regressions of household change involving parents, nonparents, and both parents and nonparents on a set of baseline covariates (see table A.1). No household change is the reference group in all models. Shading indicates 95 percent confidence intervals. Figures show middle 90 percent of the propensity score distribution (trimmed below 5th and above 95th percentiles).

smaller (or even positive) in the middle of the propensity distribution.

The bottom panel in figure 1 shows matching-smoothing estimates for the effect of changes involving parents and nonparents on high school graduation and some college completion. The negative consequences of parent and nonparent change for high school graduation among Black children appear to increase as propensity to experience this type of house-

hold change increases, driven by bigger negative effects at the upper end of the propensity score distribution. The pattern of effects of parent and nonparent change on some college completion among Black children is similar to the nonmonotonic pattern observed for nonparent change: more negative effects at smaller and larger propensity scores and less negative, or positive effects, at propensity scores around 0.8.

Linear Probability Models

Altogether, the matching-smoothing figures suggest that the likelihood of experiencing different types of household change may help explain the severity of the effect on educational attainment. The next step in the analysis is to estimate treatment effects within each propensity score stratum and compare the effect of a given type of change in household composition on educational attainment for children who are least likely, moderately likely, and most likely to experience the change. Figure 2 plots coefficients from linear probability models regressing indicators for high school graduation or some college completion on parent change, nonparent change, or parent and nonparent change and the individual's propensity to experience the change (coefficients, standard errors, p-values, 95 percent confidence intervals, and number of observations per model are presented in table A.3).

The top left plot in figure 2 presents coefficients from models estimating the effect of parent change on educational attainment. The models suggest that the negative effect of parent change may be largest among Black children least likely to experience parent change. The coefficients among Black children moderately and most likely to experience parent change are not significant, much closer to zero, and for high school graduation, are positive. The sample sizes are small within propensity score strata, therefore, these estimates are imprecise, yet the pattern of the point estimates is consistent with the matching-smoothing results. Table A.4 presents a supplemental approach to assessing effect heterogeneity, predicting high school graduation and some college completion with an interaction between household change and indicator vari-

ables for propensity score stratum. The main effect of parent change (that is, parent change for the lowest propensity score stratum) is negative and significant, at -0.140 for high school graduation and -0.234 for some college completion. The next two rows of the table present linear combinations of the parent change coefficient and indicators for the moderately and most likely strata, all of which are closer to zero and none of which are significant. This suggests that the negative effects of parent change may be less negative at higher propensities to experience change.

In models estimating the effect of nonparent change on educational attainment (top right plot), the coefficients in the model predicting high school graduation in the least likely stratum and both educational outcomes in the most likely stratum are relatively close to zero and imprecisely estimated. The coefficient predicting some college completion in the least likely stratum and both coefficients within the moderately likely to experience nonparent change stratum are negative and (at least marginally) significant. Recall the matching-smoothing estimates were nonmonotonic, with large negative effects at propensities around 0.4 to 0.5 and positive effects at propensities around 0.8. The regression results reflect this nonmonotonic pattern. Results from table A.4 follow the same pattern, where the effects for least and most likely to experience nonparent change are close to zero with wide confidence intervals and the linear combination of nonparent change and the moderately likely interaction terms are negative and significant for both high school graduation and some college completion.

Finally, the bottom plot presents coefficients from models predicting high school graduation and some college completion for children who experience changes involving parents and nonparents compared with children who experience no such changes. Suggestive evidence indicates a negative gradient for high school graduation as propensity to experience changes involving parents and nonparents increases among Black children, but the estimates are imprecise may not differ from each other. The pooled specification (table A.4) returns negative and marginally significant linear

Figure 2. Coefficients from Strata-Specific Linear Probability Models Predicting Educational Attainment with Household Change
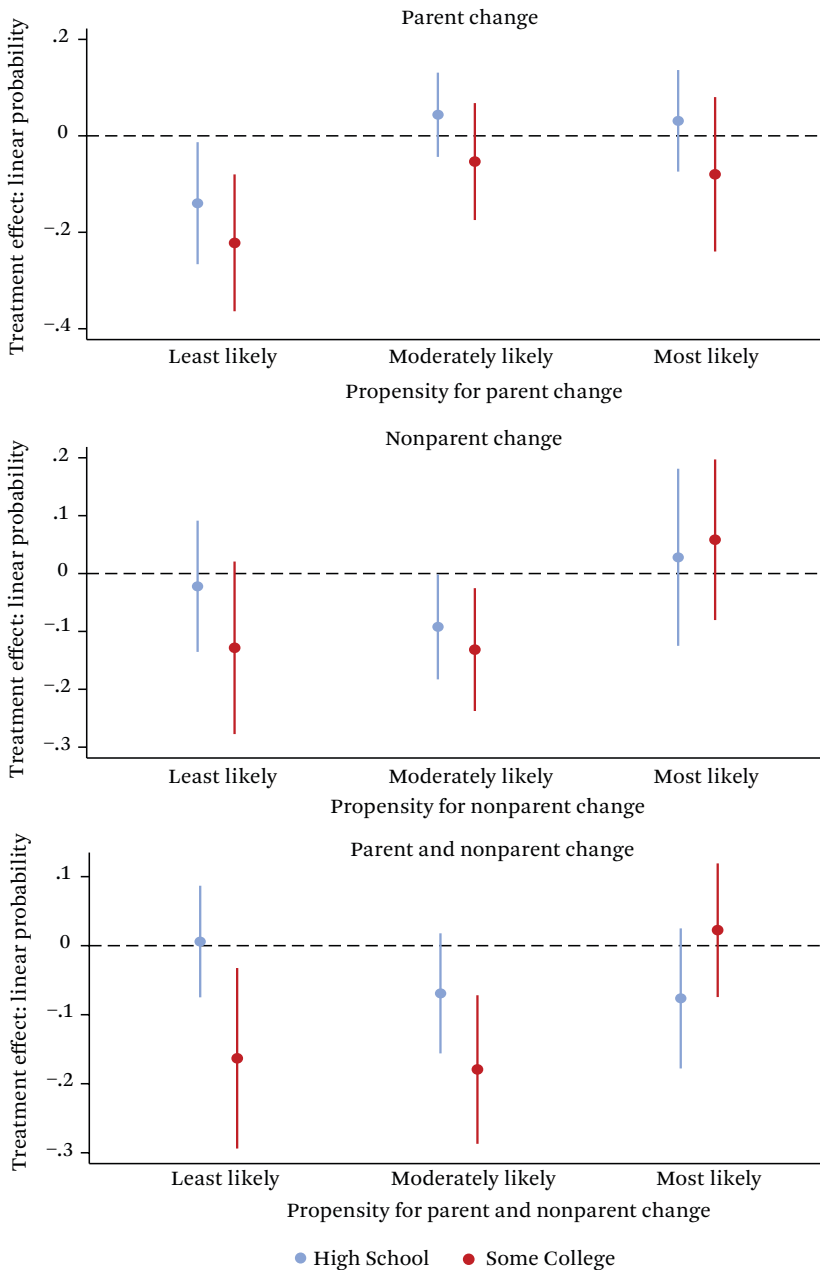
Source: Author's tabulation.
Note: Plots show coefficients and 95 percent confidence intervals for stratum-specific linear probability models predicting high school graduation and some college completion with household change (reference group in all models is no household change), controlling for the individual's propensity score. Propensity scores estimated by a logit regression model of household change on a set of baseline covariates (see table A.2). Coefficients, standard errors, *p*-values, 95 percent confidence intervals, and number of observations for each of the 18 models represented in this figure are shown in table A.3.

combinations of coefficients for the moderately and most likely strata for high school graduation. The pattern of effects for some college completion is similar to the pattern for parent change: significant negative effects of changes involving both parents and nonparents on some college completion among those in the least and moderately likely strata and a nonsignificant coefficient in the most likely stratum, notwithstanding overlap in the confidence intervals across strata.

Supplementary Analyses

My results suggest that different groups of children may experience more or less negative effects of changes in household composition on educational attainment. In supplemental analyses, I focus on characteristics of two groups negatively affected by household change: children who have a low propensity to experience parent change and children who have a moderate propensity to experience both parent and nonparent change. In general, children with a low propensity to experience parent change are relatively advantaged relative to all Black children. A reasonably high proportion live with married parents at baseline with relatively educated heads of household, high employment and homeownership rates, and a more even distribution across income categories (compared with the low-skewed Black income distribution overall). In sum, this group appears to be more advantaged socioeconomically, on average, than children with moderate and high propensities to experience parent change, for whom evidence of negative effects of parent change on educational attainment is much more limited.

One explanation for heterogeneous effects of household change is that the treatment of household change is itself heterogeneous. Perhaps the volume or type of change experienced is different for low-propensity children and high-propensity children. The volume of changes does not appear to explain why low-propensity Black children are the most negatively affected by parent change, given that the number of times children experienced parent change ranges from 1.4 to 1.6 across propensity levels. If we expect a higher volume to lead to more negative effects, this pattern is inconsis-

tent with the regression results. Type of change, however, may provide an explanation. Among low-propensity children, 32 percent have a parent leave their household and 9 percent have a parent join. This group has the biggest gap between the proportion of children who experience a parent leave their household and the proportion who experience a parent join (23 percentage points). If having a parent join is particularly beneficial, or offsets other challenges, then it may not be surprising that I find that children for whom household change rarely includes a parent joining have lower educational attainment.

Whereas Black children who are least likely to experience a change involving parents have characteristics that put them at an advantage, Black children who are moderately likely to experience changes involving both parents and nonparents have on average many fewer resources. Fewer of these children live with married parents at baseline, nearly 30 percent of their heads of household have less than a high school degree, only 13 percent live in an owned home, and nearly one-third have household incomes below the poverty line. These children also experience a high volume of changes in household composition over the course of childhood. Together, fewer socioeconomic resources and more instability in household composition appear to make these children particularly vulnerable to low educational attainment.

DISCUSSION

Changes in household composition can be disruptive to children in the household because of relationships shifted or interrupted when household members join or leave the household, or as a result of changes in physical space, childcare arrangements, or other resources in children's lives. Not all changes in household composition are the same, however, and not all are experienced the same way. Elsewhere in this issue we learn that 150 low-income African American youth in a seemingly homogenous sample experience a wide range of adverse events and conditions and have heterogeneous responses to them: some youth perceive adverse events as negative and destabilizing while others perceive similar events as turning points

or sources of later strength (DeLuca, Papageorge, and Boselovic 2024, this issue). In this article, I explore one facet of heterogeneity in the effects of changes in household composition on Black children's educational attainment: is propensity to experience changes in household composition involving parents, nonparents, or both parents and nonparents related to whether household changes affect high school graduation or some college completion?

My results suggest that there may be heterogeneous effects of changes in household composition on educational attainment among Black children. Black children who are least likely to experience changes involving parents experience the strongest negative effects on educational attainment. This differs from research finding small or no effects of family instability and parental divorce on Black children (Brand et al. 2019b; Cavanagh and Fomby 2019). Instead, I find important, large effects of household change on educational attainment by exploring heterogeneity among Black children. Moving up the propensity score distribution for changes involving parents, the negative coefficients are closer to zero (or even positive) and most are not significantly different from zero. Finding strong negative effects among the least likely to experience change is consistent with an unexpected events explanation for heterogeneous effects (Aquino et al. 2022). Children least likely to experience household change are generally more advantaged than higher propensity children. And yet a stable family may be what is enabling this group to complete more education. When that resource is compromised, these children may have a much tougher time persisting in education. Children who are moderately and most likely to experience changes in household composition may have other disadvantage or instability in their lives, such that the independent effect of household change involving parents may be less consequential for their longer-term educational outcomes. Black children experiencing changes only involving parents are also a select group, only 12 percent of the sample, whereas most of the children in my sample experience changes involving extended family and nonrel-

atives instead of, or in addition to, changes involving parents.

In the biggest group, the 45 percent of Black children who experience changes involving parents and nonparents, my results suggest that the effects on some college completion are more consistently negative for children who are least and moderately likely to experience changes involving parents and nonparents than for those who are most likely: children who are more compared with less likely to experience these changes may be more negatively affected by them in terms of high school graduation, but confidence intervals for these estimates overlap. The sheer volume of changes in household composition among these children in combination with fewer socioeconomic resources may compromise this group's educational trajectory. Finding negative effects of changes in household composition for educational attainment among Black children runs counter to research concluding family instability is less consequential for Black children's outcomes. My results may differ because I allow for heterogeneity within a group that some prior research treats as homogenous, concurring with recent calls to examine within-group variation in the effects of family processes (Cross 2021; Cross, Fomby, and Letiecq 2022; see also DeLuca, Papageorge, and Boselovic 2024, this issue). Further, research estimating the effects of divorce on children's outcomes assumes an equal treatment for all children whose parents divorce, even if some children who experience divorce also experience parent repartnering and higher order dissolution. Research on family instability assumes household changes involving parents operate similarly regardless of whether changes involving parents are accompanied by changes involving nonparents. My results, suggesting that the pattern of effects may differ for children who have different propensities to experience parent changes and parent and nonparent changes, should justify future research and theory development exploring the full range of household composition and change to which children are exposed.

Attempts to explain or interpret differences by propensity to experience change raise some

limitations of the analysis. First, I use a categorical measure that accounts for all changes in household composition from a child's first year of life through age seventeen. This is a relatively parsimonious measure of change, but it admittedly masks quantity of changes experienced. Children in the no-change category by definition experience no changes in household composition involving parents or nonparents. Children in the parent change category experience, on average, between one and two such changes during childhood. Children in the nonparent change category experience more changes compared with children in the parent change category. And children in the parent and nonparent change category experience the highest quantity of changes overall. Supplementary analyses on type of change suggest that the groups most disadvantaged by changes involving parents—low-propensity—have relatively low rates of parent joining their households relative to parent leaving their households.

As true of all research based on observational data, drawing causal inferences relies on the assumption that I have included all confounding variables in the prediction model estimating the propensity scores. I discussed my decision to include only baseline covariates in the prediction models estimating the probability of experiencing household change. Characteristics that vary over time during childhood may indeed be associated with changes in household composition and educational attainment. By including only baseline covariates, I am not conditioning on potentially endogenous variables, those that could be pathways between household changes and educational attainment, but I am potentially missing some time-varying confounding variables. Additionally, my stratum-specific linear probability models require that I divide the distribution of propensity scores into discrete strata, assuming there is no pretreatment or treatment effect heterogeneity within each stratum (Xie et al. 2012). For ease of interpretation and comparability, I divided propensity scores for each type of change into three strata; some of these distributions may be better represented by a different number of strata.

Table A.3 shows household change coefficients, standard errors, p-values, 95 percent confidence intervals, and number of observations for each of the stratum-specific linear probability models predicting high school graduation and some college completion. Some of these estimates are based on only a couple hundred observations, which leads to imprecision in the results and limits my ability to claim that the effects of household change are significantly different across strata. I decided to model each type of household change separately: parent change (only) versus no change, nonparent change (only) versus no change, and parent and nonparent change versus no change. This reduces the sample sizes in each model but also produces "cleaner" estimates that may be easier to interpret, given that the comparison group in all cases contains children who did not experience changes involving parents or nonparents.

Consensus among family sociologists and demographers is established on the importance of family instability for child well-being and outcomes. One strand of recent research finds heterogeneous effects of divorce on educational attainment; a second strand shows that changes in household composition involving extended family and nonrelatives also negatively affect children. In this article, I combine the approaches of these two strands to estimate heterogeneous effects of household change on educational attainment among Black children. I find that the negative effects of changes in household composition may vary based on a child's likelihood of experiencing household change. These findings contribute to a burgeoning literature on heterogeneous effects of disruptive events and my results finding significant negative effects among a subgroup of Black children underscore recent research calling for more attention to how family processes differ and have different effects within racialized groups.

Table A.1. Logit Models Predicting Propensity Score

	Parent Change		Nonparent Change		Parent and Nonparent Change	
	Coefficient	95 percent CI	Coefficient	95 percent CI	Coefficient	95 percent CI
Year	0.03***	(0.01,0.05)	-0.01	(-0.03,0.01)	0.01	(-0.01,0.02)
Child female	0.01	(-0.29,0.30)	0.01	(-0.28,0.30)	-0.02	(-0.27,0.24)
Married parents	-0.49	(-1.61,0.63)	-0.74	(-2.04,0.55)	-1.29*	(-2.28,-0.30)
Has older sibling	0.03	(-0.41,0.47)	-0.14	(-0.58,0.29)	-0.48**	(-0.85,-0.12)
Parent is head	1.93	(-0.78,4.65)	-1.65*	(-3.03,-0.26)	-1.55*	(-2.75,-0.34)
Head characteristics						
Female	-0.14	(-1.57,1.29)	2.73***	(1.32,4.15)	0.94	(-0.15,2.03)
Age	0.01	(-0.02,0.03)	0.02	(-0.01,0.05)	-0.02	(-0.04,0.01)
Education (ref = high school diploma)						
Less than high school	0.09	(-0.29,0.48)	0.07	(-0.29,0.44)	0.29	(-0.02,0.60)
Some college	0.27	(-0.13,0.67)	-0.01	(-0.44,0.41)	0.26	(-0.10,0.61)
Bachelor's or more	-0.57	(-1.20,0.06)	-0.45	(-1.08,0.18)	-0.70*	(-1.26,-0.14)
Employed	-0.68**	(-1.19,-0.17)	0.05	(-0.49,0.59)	-0.44	(-0.89,0.02)
Lives in South	-0.19	(-0.53,0.15)	0.03	(-0.30,0.36)	-0.30*	(-0.59,-0.01)
Household characteristics						
Home is owned	-0.61***	(-0.96,-0.25)	-0.20	(-0.55,0.15)	-0.45**	(-0.75,-0.14)
Household income quintile (ref = first)						
Second	0.09	(-0.57,0.75)	-0.04	(-0.68,0.60)	-0.43	(-0.96,0.09)
Third	-0.45	(-1.18,0.28)	-0.17	(-0.89,0.54)	-0.94**	(-1.54,-0.35)
Fourth	-0.21	(-1.00,0.59)	0.10	(-0.69,0.88)	-0.53	(-1.18,0.12)
Fifth	-0.47	(-1.61,0.66)	-0.40	(-1.58,0.79)	-1.05*	(-2.05,-0.05)
Poverty income	-0.35	(-1.02,0.31)	-0.30	(-0.91,0.31)	-0.39	(-0.90,0.13)
Household size	0.55	(-0.46,1.56)	2.01***	(1.30,2.73)	2.03***	(1.38,2.68)
Number of children	-0.49	(-1.51,0.54)	-1.50***	(-2.24,-0.76)	-1.51***	(-2.17,-0.86)
SEO sample	-0.00	(-0.45,0.44)	-0.03	(-0.45,0.40)	-0.09	(-0.47,0.29)
Constant	-61.08***	(-96.18,-25.97)	10.37	(-25.84,46.59)	-17.56	(-48.51,13.39)
Observations	794		1,342		1,760	

Source: Author's tabulation.

Note: Table shows coefficients and 95 percent confidence intervals (CI) for three logit models predicting type of household change with child, head of household, and household characteristics. No household change is the reference group in all three models.

* p < .05; ** p < .01; *** p < .001

Table A.2. Descriptive Statistics by Propensity Strata

	Parent Change			Nonparent Change			Parent and Nonparent Change		
	Least Mean (SD)	Moderately Mean (SD)	Most Mean (SD)	Least Mean (SD)	Moderately Mean (SD)	Most Mean (SD)	Least Mean (SD)	Moderately Mean (SD)	Most Mean (SD)
Household change category									
Change in parents	0.33	0.38	0.72	0.00	0.00	0.00	0.00	0.00	0.00
Change in nonparents	0.00	0.00	0.00	0.22	0.59	0.90	0.00	0.00	0.00
Change in both parents and nonparents	0.00	0.00	0.00	0.00	0.00	0.00	0.35	0.63	0.92
Educational attainment									
High school graduation	0.87	0.78	0.85	0.91	0.74	0.72	0.85	0.76	0.71
Some college	0.48	0.43	0.42	0.55	0.30	0.27	0.55	0.29	0.22
Baseline characteristics									
Child sex (female=1)	0.50	0.42	0.47	0.45	0.38	0.56	0.46	0.46	0.46
Child lives with married parents	0.86	0.67	0.54	1.00	0.57	0.15	0.92	0.70	0.20
Child's parent is head of household	0.99	1.00	1.00	1.00	1.00	0.55	1.00	1.00	0.60
Child has an older sibling	0.60	0.65	0.65	0.49	0.76	0.66	0.56	0.59	0.54
Characteristics of head of household									
Sex (female=1)	0.14	0.32	0.41	0.00	0.41	0.71	0.08	0.29	0.59
Age	28.65 (5.70)	29.04 (6.25)	28.10 (6.04)	28.38 (5.18)	29.52 (7.47)	38.22 (13.33)	31.09 (6.49)	27.64 (5.72)	36.03 (14.64)
Education									
Less than high school	0.20	0.28	0.17	0.15	0.25	0.59	0.12	0.29	0.62
High school diploma	0.38	0.46	0.38	0.40	0.50	0.32	0.45	0.53	0.25
Some college	0.13	0.16	0.46	0.15	0.20	0.06	0.12	0.14	0.11
Bachelors or more	0.29	0.10	0.00	0.30	0.05	0.02	0.32	0.04	0.02
Employment									
Employed	1.00	0.96	0.80	0.98	0.92	0.77	0.98	0.98	0.73
Unemployed	0.00	0.04	0.15	0.02	0.08	0.12	0.01	0.01	0.14
Retired or disabled	0.00	0.00	0.04	0.00	0.01	0.11	0.01	0.00	0.13

(*continued*)

	Parent Change			Nonparent Change			Parent and Nonparent Change		
	Least Mean (SD)	Moderately Mean (SD)	Most Mean (SD)	Least Mean (SD)	Moderately Mean (SD)	Most Mean (SD)	Least Mean (SD)	Moderately Mean (SD)	Most Mean (SD)
Marital status									
Married	0.86	0.67	0.54	1.00	0.57	0.26	0.92	0.70	0.39
Single	0.08	0.24	0.38	0.00	0.32	0.35	0.04	0.22	0.30
Widowed, divorced, separated	0.06	0.08	0.08	0.00	0.11	0.40	0.05	0.07	0.31
Region of residence									
South	0.71	0.58	0.43	0.62	0.53	0.58	0.65	0.63	0.59
Housing tenure									
Owned	0.59	0.20	0.04	0.50	0.23	0.30	0.62	0.13	0.27
Household income quintile									
First	0.18	0.34	0.24	0.08	0.35	0.50	0.05	0.33	0.49
Second	0.13	0.33	0.61	0.24	0.31	0.29	0.23	0.39	0.31
Third	0.40	0.16	0.06	0.39	0.13	0.13	0.40	0.15	0.11
Fourth	0.17	0.16	0.09	0.19	0.21	0.07	0.23	0.13	0.06
Fifth	0.12	0.01	0.00	0.09	0.00	0.01	0.10	0.00	0.03
Income below poverty line	0.18	0.32	0.19	0.07	0.32	0.53	0.04	0.31	0.50
Household size	3.71 (0.83)	3.83 (1.18)	3.99 (1.59)	3.54 (0.56)	3.84 (1.33)	6.18 (2.70)	3.63 (0.73)	3.62 (1.09)	5.80 (2.44)
Number of children in household	1.85 (0.83)	2.15 (1.13)	2.34 (1.44)	1.54 (0.56)	2.25 (0.94)	3.53 (2.11)	1.71 (0.69)	1.92 (0.89)	3.19 (1.95)
First year child observed in PSID	1979	1984	1990	1982	1983	1983	1983	1983	1983
SEO sample	0.51	0.71	0.55	0.65	0.58	0.61	0.53	0.59	0.60
Observations	235	312	185	290	337	605	302	371	931

Source: Author's tabulation.

Note: Table shows descriptive statistics presented in table 1 by the three propensity score strata (least likely to experience change, moderately likely, most likely) across each of the three treatment conditions. Each column contains individuals who experienced one of three types of household change and individuals in the reference group of no household change but who have a similar propensity to experience household change. Statistics limited to Black children and are weighted to account for sampling design and attrition.

Table A.3. Household Change Coefficients from Linear Probability Models

	High School					Some College				
	Coefficient	SE	p	95 percent CI	N	Coefficient	SE	p	95 percent CI	N
Parent change										
Least likely	-0.140	0.064	0.031	(-0.266, -0.013)	236	-0.222	0.072	0.002	(-0.364, -0.080)	211
Moderately likely	0.044	0.044	0.326	(-0.044, 0.131)	315	-0.053	0.062	0.387	(-0.174, 0.068)	288
Most likely	0.031	0.053	0.560	(-0.074, 0.136)	190	-0.080	0.081	0.326	(-0.240, 0.080)	178
Nonparent change										
Least likely	-0.022	0.058	0.703	(-0.135, 0.091)	295	-0.128	0.076	0.091	(-0.277, 0.021)	269
Moderately likely	-0.092	0.046	0.046	(-0.183, -0.001)	339	-0.131	0.054	0.015	(-0.238, -0.025)	312
Most likely	0.028	0.078	0.718	(-0.125, 0.181)	613	0.058	0.071	0.409	(-0.080, 0.197)	592
Both change										
Least likely	0.006	0.041	0.884	(-0.075, 0.087)	303	-0.163	0.066	0.015	(-0.294, -0.032)	267
Moderately likely	-0.069	0.044	0.119	(-0.156, 0.018)	374	-0.179	0.055	0.001	(-0.287, -0.072)	350
Most likely	-0.076	0.052	0.140	(-0.178, 0.025)	945	0.022	0.049	0.650	(-0.074, 0.119)	903

Source: Author's tabulation.

Note: Table shows output from eighteen stratum-specific linear probability models predicting high school graduation or some college completion. Each row shows the treatment coefficient (no household change is the reference group in all models), standard error, p-value, 95 percent confidence interval, and number of observations. The only covariate in these models is the individual's propensity score estimating propensity to experience the treatment household change.

Table A.4. Household Change Coefficients from Pooled with Dummy Regression Models

	High School					Some College				
	Coefficient	SE	p	95 percent CI	N	Coefficient	SE	p	95 percent CI	N
Parent change					741					677
Least likely	-0.140	0.063	0.027	(-0.263, -0.016)		-0.234	0.072	0.001	(-0.375, -0.094)	
Moderately likely	0.047	0.044	0.284	(-0.039, 0.134)		-0.055	0.064	0.364	(-0.174, 0.064)	
Most likely	0.023	0.053	0.661	(-0.080, 0.127)		-0.081	0.080	0.315	(-0.239, 0.077)	
Nonparent change					1,247					1,173
Least likely	-0.024	0.057	0.675	(-0.135, 0.087)		-0.139	0.078	0.075	(-0.293, 0.014)	
Moderately likely	-0.106	0.046	0.020	(-0.196, -0.016)		-0.150	0.055	0.007	(-0.258, -0.042)	
Most likely	0.017	0.075	0.821	(-0.130, 0.164)		0.049	0.061	0.421	(-0.071, 0.170)	
Both change					1,622					1,520
Least likely	-0.014	0.041	0.723	(-0.095, 0.066)		-0.183	0.063	0.004	(-0.307, -0.060)	
Moderately likely	-0.076	0.043	0.081	(-0.161, 0.009)		-0.192	0.055	0.000	(-0.299, -0.084)	
Most likely	-0.079	0.048	0.097	(-0.173, 0.041)		0.028	0.044	0.528	(-0.059, 0.114)	

Source: Author's tabulation.

Note: SE = standard error. CI = confidence interval. Table shows output from three models predicting high school graduation and three models predicting some college completion with a given type of household change, two indicator variables for membership in the moderate or most likely strata to experience the change (least likely is the reference group), and an interaction between the type of change and the indicator variables. The coefficients shown are the main effect for the type of change (in the least likely row since that is the omitted category for the strata variable) and linear combinations of the main effect of the change plus the interaction term between change and strata (in the moderately likely and most likely rows). These rows should be compared with the equivalent rows in table A.3.

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