Place meets race: Racial and ethnic heterogeneity in the association between childhood neighborhood disadvantage and adult incarceration

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Abstract:
Previous scholars have implicated both neighborhood disadvantage and race and ethnicity as independent causes of mass incarceration in the United States; however, rarely examining the interaction between the two. Rather than analyze neighborhood disadvantage and race and ethnicity separately to explain incarceration in the U.S., this paper explores how the two contribute to incarceration in tandem. I use 26 (1986 -2012) years of panel data that span the prison boom in the U.S. from two cohorts of the National Longitudinal Survey of Youth (1979 and Children and Young Adults) to study whether the association between childhood neighborhood disadvantage and adult incarceration varies for whites, blacks, and Latinos. Stratified and full factorial sibling fixed effects interaction models suggest that exposure to neighborhood disadvantage early in life increases the odds of incarceration in adulthood for whites and Latinos, but not for blacks, net of observed and unobserved adjustments. These results suggest that blacks from disadvantaged socioeconomic neighborhood contexts are equally likely to be incarcerated as blacks from more advantaged neighborhoods. Rather than neighborhood context, discrimination in policing, surveillance, and other prejudicial policies across the life-course are likely to have greater impact on incarceration for blacks in the U.S. compared to the socioeconomic conditions of where they grew up.

INTRODUCTION

The expansion of incarceration in the United States has had a disproportionately negative impact on black and Latino communities, leaving them largely bereft of the social and economic resources necessary for success (Alexander, 2010; Phelps and Pager, 2016; Rios, 2011; Sampson, 2013; Western, 2006). In concert with widespread poverty and social marginalization, the concentration of mass incarceration in already disadvantaged minority (i.e., black and Latino) neighborhoods has inhibited the social mobility of generations of residents (Clear, 2007; Sampson, 2012; Sharkey, 2013). A voluminous literature establishes the importance of attenuating the negative effects that mass incarceration has on outcomes across the life-course (Haskins, 2014; Haskins and Jacobsen, 2017; Pager, 2003, 2008; Wakefield and Wildeman, 2013). While scholars have previously examined the ill-effects of the concentration of violence and policing in disadvantaged neighborhoods on criminal justice contact (Clear, 2007; Sampson and Groves, 1989; Sampson and Loeffler, 2010; Sampson et al., 1997; Sampson, R.J. and Wilson, W.J., 2005), we know little about how early exposure to neighborhood disadvantage explicitly affects incarceration, specifically, in adulthood. Moreover, we know even less about heterogeneity in this process across racial and ethnic lines. Building off of previous research, this paper examines the following research puzzle: Would a change in early neighborhood context result in a change in adult incarceration? If so, are the effects different for blacks, whites, and Latinos? Indirectly, this paper also explores the relative impact of neighborhood context and racial and ethnic discrimination in explaining the mass imprisonment of blacks and Latinos in the U.S.

Myriad neighborhood effects scholars have previously found that growing up in disadvantaged neighborhoods has negative consequences for outcomes both in childhood

(Alvarado, 2016a, 2016b; Harding, 2003; Sharkey and Elwert, 2011; Wodtke, 2013; Wodtke and Parbst, 2017) and in adulthood (Alvarado, 2018; Chetty et al., 2016; Vartanian and Buck, 2005; Vartanian and Houser, 2010, 2012). However, rarely has previous research examined the impact of childhood neighborhood disadvantage on adult incarceration – and none, to my knowledge, have examined the moderating effect of race and ethnicity on this association. Two important impediments have been data constraints and challenges to causal inference. The current paper addresses both the substantive and methodological limitations of previous research in this area to expand our knowledge of the process that links early neighborhood disadvantage and incarceration in adulthood.

The current paper expands the understanding of whether neighborhood socioeconomic context matters for incarceration in adulthood, net of observed and unobserved factors that are associated with selection into neighborhoods and incarceration. In so doing, this paper also contributes to the literature by indirectly yielding an understanding of the role played by structural racism and discrimination in the process of mass incarceration of blacks and Latinos. These contributions are possible given the availability of restricted geocoded data from the National Longitudinal Survey of Youth 1979 (NLSY 1979) and the NLSY, Young Adults cohort (NLSY CYA), which follows children throughout childhood and into adulthood and includes per-wave measurements of both childhood neighborhood conditions and adult incarceration. These data are exemplary given that they are relatively new to the neighborhoods and criminology literatures and because they span the period (1986 – 2014) when mass incarceration peaked in the United States. Furthermore, the current analysis overcomes some of the shortcomings of previous studies of neighborhood effects by controlling for unobserved time-

invariant confounders at the level of the family that may bias estimates through using sibling fixed effects (FE).

THE STRUCTURAL ANTECEDENTS OF INCARCERATION

Policies such as 24-hour surveillance, aggressive policing, gang injunctions, and racial profiling are representative of the structural elements of social control that contribute to mass incarceration in minority neighborhoods across America. Other factors include the desertion of many of these communities by businesses and middle class residents and the dearth of effective institutions (e.g., recreation centers) that can serve as buffers against crime. These factors have collectively resulted in the depletion of many minority neighborhoods that, from a young age, normalize criminal justice contact for residents who grow up in these environments. What is often left in the wake of this decades-old erosion of local economic and social resources is the concentration of crime and incarceration in many minority communities across the country (Anderson, 1990; Sampson, R.J. and Wilson, W.J., 2005; Wacquant, 1993; Wilson, 1987).

The result of the milieu of concentrated neighborhood disadvantage and various forms of social control has been the development of an unequal distribution of incarceration across the residential landscape (Morenoff et al., 2001; Sampson and Wilson, 1995; Shaw, C.R. and McKay, D., 1942). Some argue that concentrated incarceration and other social ills stem from lacking social cohesion and self-regulation in disadvantaged neighborhoods (Sampson and Groves, 1989). That is, reports of homicide, robbery, assault, and violent and property crime victimization are likely intrinsically tied to the low pattern of social ties, social cohesion, and informal social control in disadvantaged neighborhoods (Sampson et al., 2002). Where social organization is weak due to the breakdown of economic and cultural ties to mainstream routines

and expectations (Small et al., 2010; Wilson, 1987, 2009) and where local social capital resources that provide anticrime role models are lacking (Anderson, 1990), a negative feedback loop may manifest by combining with intense police surveillance, resulting in an increase in incarceration (Clear et al., 2003; Rose and Clear, 1998).[1] Ongoing negative interactions with police, probation officers, and other institutional agents within disadvantaged communities may contribute to anxieties, fears, as well as diminished social life that can further lead to incarceration (Goffman, 2009; Rios, 2011; Sharkey and Faber, 2014). Simply, where economic opportunity and social cohesion are lacking, crime often follows (Sampson et al., 1997). Residents of socially, economically, and institutionally depleted neighborhoods are therefore often at greater risk of coming into contact with the criminal justice system either as victims, offenders, or both.

As criminal "hot spots" manifest across the residential landscape to entrap residents – regardless of their direct involvement with crime – in an ecologically vulnerable position within the social hierarchy, victimization and offense become normative and routine; as if expected by the patterns of everyday life (Miethe and Meier, 1994). Given the disappearance of steady jobs and social actors that facilitate the transfer of mainstream expectations, routines, and values (Wilson, 1996), entire communities often become entrenched in an increased risk of crime victimization (Sampson and Groves, 1989; Sampson and Wooldredge, 1987). Sometimes, even the presence of institutions such as retail establishments and libraries are ineffective at ameliorating violent crime in disadvantaged neighborhoods (Peterson et al., 2000). Rather, macro-structural forces of socioeconomic inequality may cause residents to become firmly

[1] Although, see Small (2004), Harding (2010), and Vargas (2016) for exquisite accounts of the constellation of intersecting cultural and social forces driving relationships and directing resources in urban minority communities.

enveloped by the criminal justice system. The theoretical case for neighborhood effects on incarceration lead me to my first hypothesis:

Hypothesis 1: Exposure to childhood neighborhood disadvantage will increase the odds of incarceration.

The empirical case for neighborhood effects on incarceration

Theoretically, rather than explaining criminal justice contact and incarceration through the lens of individual attributes and culture, focusing on the community antecedents to incarceration may expand our understanding of mass incarceration and lead to more effective policy intervention (Sampson, R.J. and Wilson, W.J., 2005). However, up to now, rarely have scholars brought empirical evidence to bear on whether neighborhood conditions predict future incarceration. What research does exist mainly focuses on the link between neighborhood disadvantage and criminal victimization (Hipp, 2007; Morenoff et al., 2001; Sampson et al., 1997, 2002; Velez, 2001; Villarreal and Silva, 2006), recidivism (Kubrin and Stewart, 2006; Mears et al., 2008; Stahler et al., 2013), and arrests (Kling et al., 2005; Sciandra et al., 2013), rather than focusing specifically on how incarceration alone is a function of neighborhood disadvantage.

There is even less research that attempts to attenuate selection bias that is involved in the process of linking neighborhood context and incarceration. Establishing clear causal associations between neighborhood conditions and incarceration is especially important if this research is to inform policy decisions. Undergirding any statistically plausible causal effects, however, is a conceptual framework for outlining the mechanisms through which neighborhoods may

influence incarceration. For example, Sampson and Loeffler (2010) use data from Chicago to examine the correlation between neighborhood disadvantage and incarceration. These scholars contribute a valuable conceptualization of the negative feedback loop between living in disadvantaged communities and experiencing incarceration. Clear (2007) also describes how disadvantaged neighborhoods and incarceration are intertwined while further describing the multitude of negative externalities that incarceration has on communities in which it is concentrated.

Nevertheless, selection bias continues to pose a threat to analyses of neighborhood effects on incarceration using observational data because unobserved factors that are not present in the model may explain away zero-order associations. As with most social science research, scholars have attempted to address the issue of unobserved selection bias by introducing an array of statistical controls. For example, using data from Ohio, Wooldredge (2007) finds that that judges take the neighborhood in which defendants reside into account when making decisions about sentences and penalize those who live in worse neighborhoods – further exacerbating the negative consequences of living in disadvantaged neighborhood (Karp and Clear, 2000). Controlling for background characteristics, scholars have also found that residence in a disadvantaged neighborhood positively predicts recidivism, likely due to the continued exposure to weak economic and social resources as well as the heavy enforcement of policing activities (Kubrin and Stewart, 2006; Mears et al., 2008; Stahler et al., 2013). Yet, these studies fall short of explicitly examining the association between childhood neighborhood disadvantage and incarceration in adulthood, examining racial and ethnic heterogeneity in neighborhood effects, using national data, or in addressing unobserved confounding.

Alternatively, scholars have also used experimental data to examine the link between neighborhoods and criminal justice contact. Notably, however, these studies do not examine incarceration as an outcome. For example, female youth respondents in the Moving to Opportunity (MTO) study whose families were offered vouchers to move to less-poor neighborhoods experienced reduced odds of being arrested for violent and property crimes 4 – 7 years after random assignment (Kling et al., 2005). Male youth who were treated, however, experienced increased odds of property crime arrests, but lower odds of arrests for violent crimes. Sciandra et al. (2013) also found that among treated males, the odds of arrests for violent crimes decreased between the ages of 15 and 25. However, these males experienced increased odds of arrests for property crimes. However, these assessments of the MTO treatment conclude that long-term effects of neighborhood context are unlikely – allowing for short rather than long-term neighborhood effects on criminal justice contact. Still, neighborhood effects may be felt across the life-course as respondents come into greater contact with the various economic and social mechanisms (e.g., lack of good, steady jobs and social pressures to commit crimes as well as discriminatory policing and prosecution) present in these neighborhoods (Sampson, 2001; Sampson et al., 2002).

Others have examined this topic by focusing on the impact that incarceration has on neighborhoods. For instance, scholars have examined the link between being incarcerated and the reproduction of neighborhood inequality (Hipp et al., 2010a, 2010b; Massoglia et al., 2013; Warner, 2016) and how incarceration affects the social and economic vitality of already struggling neighborhoods (Clear, 2007). Despite the fact that previous research has examined how neighborhood context in adolescence affects adolescent criminal justice contact (Wikstrom and Butterworth, 2006; Wikström and Loeber, 2000), we still know very little about the

association between (1) childhood neighborhood disadvantage and adult incarceration and (2) heterogeneity by race and ethnicity. It is especially important to study this heterogeneity because black and Latino children are disproportionately likely to endure years of police surveillance, stop and frisk policies, and discrimination that is likely to lead to their enhanced criminal justice contact in adulthood (Rios, 2011).

Race/ethnicity, neighborhoods, and incarceration

Previous research finds that black Americans are likely to live in neighborhoods that are uniquely disadvantaged (Massey and Denton, 1993; Sampson, 2012), complicating comparisons of neighborhood effect between blacks and other racial and ethnic groups. On the one hand, from a substantive point of view, this fact may lead one to expect that neighborhood effects are strongest for blacks because they experience acutely violent and socioeconomically disadvantaged neighborhoods. Experimental evidence from the MTO suggests that blacks are indeed likely to experience amplified neighborhood effects (Sanbonmatsu et al., 2006) on reading scores. However, one must note that most of the studies that find extreme differences in the degree of neighborhood stratification focus only on acutely segregated Chicago, which some have argued could explain the disparate results for black MTO respondents who originated in extremely disadvantaged and violent neighborhoods (Burdick-Will et al., 2011).

On the other hand, from a methodological point of view, this also suggests that it is virtually impossible to study heterogeneity in the effect of highly disadvantaged neighborhoods by race and ethnicity because blacks are much more likely to live in these neighborhoods than either Latinos or whites (Sampson et al., 2008). Given this uneven gradient of exposure to neighborhood disadvantage by race and ethnicity, Sharkey and Faber (2014) argue that any

amplified neighborhood effects for blacks may be better explained by differential features of the residential environments in which they live (i.e., the depleted structure of opportunity and discrimination that surrounds them) rather than any unique characteristics tied to individual traits of blacks such as culture. Of course, any extension of this line of argument outside of Chicago is eligible for debate.

Still, when considering black mass incarceration, the structural argument that Sharkey and Faber (2014) advance about heterogeneity in neighborhood effects may make sense given the heavy policing and surveillance tactics that often disproportionally target black Americans. That is, if one considers police surveillance and racial profiling as features of the structure of opportunity for blacks, then one might explain differences in the effect of neighborhood context by race and ethnicity through the differences in policing that black, Latino, and white Americans experience.

However, if structural discrimination undergirds racial and ethnic heterogeneity in neighborhood effects on incarceration, then it stands to reason that blacks Americans may be subject to similar levels of discriminatory policing, no matter where they live due to racial discrimination in the criminal justice system (Steffensmeier et al., 1998, 2017). Here, I advance an idea or theory that states that all black Americans – no matter where they live – are likely to experience similar levels of discriminatory policing and racial profiling originating in the wider society and structure of opportunity. One may then expect that blacks experience similar odds of incarceration no matter where they live, regardless of the socioeconomic standing of their neighborhood. This leads to the guiding hypothesis of the current study:

Hypothesis 2: The odds of incarceration in adulthood will be similar for black Americans regardless of their childhood neighborhood conditions.

Indeed, using nationally representative data, Turley (2003) finds that increases in the socioeconomic profile of neighborhoods have no effects on black children's test scores or behavior, but do so for white children. Other studies by Brooks-Gunn et al. (1993), Clark (1992), and Halpern-Felsher et al. (1997), and Crowder and South (2003) provide further evidence that whites often experience larger neighborhood effects than blacks. It is worth noting, however, that no previous study has examined racial and ethnic heterogeneity in the long term effect of childhood neighborhood exposure on adult incarceration.

The vast majority of previous scholarship that has focused on the link between community-level factors and criminal justice contact has done so without explicitly focusing on the racial and ethnic contours of this relationship (Jones and Lynam, 2008; Lynam et al., 2000; Sampson et al., 2002; Vazsonyi et al., 2006; Vogel and South, 2016; Zimmerman, 2010; Zimmerman and Messner, 2010, 2011). Krivo and Peterson (1996) are among the few scholars to examine the link between neighborhood disadvantage and urban crime from a racial and ethnic lens. Again, these scholars (like scholars studying the MTO) do not examine incarceration per se, but focus on the associated outcome of crime. Using data from Columbus, Ohio and OLS models that control for observed characteristics, they find no difference in the effect of neighborhood disadvantage on crime in black and white neighborhoods. Moreover, Krivo and Peterson (2000) also find similar effects of neighborhood disadvantage on homicide for whites and blacks. These findings support Sampson and Wilson's (1995) earlier postulation of equality in the impact of neighborhood disadvantage on crime for whites and blacks. Rather than cultural deficits driving

higher rates of crime for blacks, these authors argue, the increased sources of crime can be traced back to the deficiencies in the structure of opportunity and in the eroded social capital in many disadvantaged black neighborhoods.

Taken together, there is suggestive evidence from prior research that childhood exposure to neighborhood disadvantage will positively predict incarceration in adulthood; however, what remains unclear is whether there are heterogeneous effects by race and ethnicity. Thus far, the neighborhood effects literature gives reason to expect equality of neighborhood effects – at least for whites and blacks – if not amplified effects for whites.

The current study

To expand scholars' understanding of the process of neighborhood effects on incarceration, scholars must confront the following challenges: (1) examine childhood exposure to neighborhood disadvantage on adult incarceration; (2) examine neighborhood effect heterogeneity by race and ethnicity; (3) include Latinos in analyses; (4) include data with coverage at the national level; and (5) estimate associations that minimize selection bias. To examine neighborhood effects on incarceration across the life-course, I use 15 waves (28 years) of longitudinal data at the national level that includes measures of incarceration for adults ages 19 – 42; all of which is possible by introducing a new data set, the NLSY:CYA, to the study of neighborhood effects to this literature. I expect that childhood neighborhood disadvantage across will increase the odds of incarceration in adulthood and that black Americans from disparate socioeconomic neighborhood origins will experience similar levels of incarceration in adulthood.

DATA

This paper uses 15 waves of restricted tract-level data on two cohorts of respondents from the National Longitudinal Survey of Youth: the 1979 cohort of mothers (NLSY79) and the Child and Young Adult cohort (NLSY:CYA). These data span the period when the U.S. experienced an enormous spike in its incarcerated population (1986 – 2014) and contains data on both neighborhood location and incarceration history at each wave – which distinguishes it from other longitudinal data sets. The Bureau of Labor Statistics (BLS) maintains these data and requires federal clearance for researchers to access the tract location variable – which also required on-site analyses and review at BLS headquarters in Washington, D.C. One can only link female respondents from the NLSY79 to NLSY:CYA respondents; however, I maintain information about household characteristics by using variables that contains information about both parents.

When linked to the NLSY79, the NLSY:CYA represents children born to a nationally representative sample of women aged 21-28 years on January 1, 1986. The BLS started collecting information biennially for all of the children that were born (or would be born) to female respondents of the NLSY79 cohort beginning in 1986 (Center for Human Resource Research 2009). These data are unique in that they provide information on sibling pairs within families. That is, some NLSY79 respondents were siblings belonging to the same household in 1979. In subsequent waves, the sample of mothers becomes increasingly representative of mothers across the full range of childbearing years (e.g., by 2012 over 95 percent of childbearing years have been covered by NLSY79 mothers). That is, the overrepresentation of young low-SES mothers decreases with each wave of the NLSY:CYA. By 2014, a total of 11,521 children had been born to NLSY79 mothers, the oldest being 42 years old. Missing data ranged from 0% – 17.05% (household income of NLSY:CYA adults in 2010). I analyzed imputed data to correct for missingness using the ice command in Stata (Allison, 2002; von Hippel, 2007).

Neighborhood disadvantage

I use tract-level neighborhood data from the Geolytics Neighborhood Change database to construct my measure neighborhood disadvantage.[2] First, I created a continuous composite scale of the following seven standardized neighborhood characteristics at each of the 15 waves of the NLSY (1986-2014): percent of residents at or below 100% of the poverty threshold as defined by the U.S. Census Bureau, the percent of residents who are unemployed, the percent of residents out of the labor force, the percent who have at least a Bachelor's degree (reverse coded), the percent of managers and professionals in the neighborhood (reverse coded), median income (reverse coded), and the median housing value (reverse coded). The Cronbach's α was .88 for the neighborhood disadvantage scale. That is, I first created 15 separate scales, one for each wave when the child was between 0 and 18 years of age (and was presumably living with the mother).

Second, I created neighborhood quintiles at each wave (the least disadvantaged neighborhood quintile = 1; the most disadvantaged neighborhood quintile = 5). Each respondent then had a single quintile value at each wave between ages 0 and 18. Next, I calculated the mean quintile score for each respondent across ages 0 – 18. This mean disadvantage quintile across childhood is my main predictor.

[2] Geolytics provides data on tract socioeconomic characteristics for 1980, 1990, 2000 using the Census long form, normalized to 2000 tract boundaries. Geolytics provides 5-year 2011-2014 American Communities Survey (ACS) data that contains tract level socioeconomic indicators, normalized to 2000 tract boundaries. Following previous literature (Sampson et al., 2008; Sharkey and Elwert, 2011), I linearly-interpolated neighborhood characteristics to fill-in neighborhood data for every NLSY wave between 1986 and 2014. The NLSY:CYA is ideally structured for a sibling FE model because in addition to multiple births per mother, siblings are often widely spaced in age (mean of 3.5 years apart), allowing for variation in neighborhood conditions within families.

Incarceration in adulthood

I use self-reports from each of the NLSY:CYA waves regarding incarceration in adulthood (ages 19 – 42) as my main outcome. For incarceration I use respondents' answers to whether or not they have been sentenced to a corrections institution such as a jail, prison, or training/reform school since the previous wave.

Controls

Table 1 provides a full summary of means and standard deviations for all of the controls in this analysis. I use data from each of the 15 waves to measure each of these variables. Many of these have never been included in models of neighborhood effects such as conviction, hard drug use in adulthood (i.e., "cocaine, crack, hallucinogens, downers, sniffing glue, or other"), work limitations in adulthood, unemployment in adulthood, and neighborhood disadvantage in adulthood. I include adult neighborhood disadvantage to address the critique that it is not childhood neighborhood but instead adult neighborhood context that drives long-term impacts. Further, scholars often understandably criticize measures of neighborhood conditions that use Census geographies because they may not reflect the environments where respondents spend most of their time. Indeed, criminologists argue that the networks of neighborhoods beyond the residential are key in conceptualizing how neighborhood ecology influences crime (Graif et al., 2014). Fortunately, the BLS provides subjective assessments of the neighborhood that NLSY:CYA respondents lived in as adults that allow the respondent to define what s/he means by a "neighborhood" without the bureaucratic definitions from the government. The adult

neighborhood disadvantage scale is a composite of NLSY:CYA respondents' concern that the following conditions are a problem in the neighborhoods where they reside as adults in each wave: 1) people do not respect rules/laws; 2) crime and violence; 3) abandoned/run-down buildings; 4) parents do not supervise their children; 5) people do not care/keep to themselves; and 6) people cannot find jobs.

[Table 1 about here]

Time-varying controls include mother's poverty status, the number of weeks that the mother has been unemployed, the number of children in the home, household income (logged 2014 dollars), single parenthood, mother's education, child's experiences using hard drugs (e.g., cocaine, crack, LSD) over the age of 18, child's history of work limitations due to health issues over the age of 18, child's unemployment history over the age of 18, child's household income over the age of 18, child's highest year of schooling, child's criminal conviction history over the age of 18, and child's neighborhood disadvantage over the age of 18.

I also include time-invariant controls such as race and ethnicity, foreign-born status of the mother, children's sex, and whether children ever moved neighborhoods during childhood. Because parent's cognitive ability may impact child development and adult outcomes, I include a control for mother's score on the Armed Forces Qualifying Test (AFQT). All of the mother specific variables are limited to when the child was between 0 and 18 years of age.

The sibling FE model capitalizes on variation between siblings on these covariates. I create measures of conditions that are stable within a given person but vary between siblings. Therefore, I calculate the means of continuous covariates (e.g., mother's household income) over

time within a given subject and by maximizing dichotomous variables within a given subject to indicate whether a subject ever experienced being poverty as a youth, for instance. I also convert years of schooling to the highest year ever reported. In this way, the values of these variables are constant within persons but vary between siblings. The conventional logistic regression model is able to estimate the impact of the time-invariant controls while the FE models drop them.

ANALYTIC STRATEGY

I invoke four types of models to estimate the impact of exposure to childhood neighborhood disadvantage on incarceration in adulthood: (1) bivariate logistic models; (2) pooled logistic models with controls; (3) multivariate conditional FE models with controls; and (4) linear probability models with full controls and sibling fixed effects. The logistic models have the strength of using the time-invariant controls, including respondents without siblings, and including respondents whose siblings did not differ from them in neighborhood context and in the outcomes. However, these models are limited in their ability to account for unobserved confounders that can bias estimates. Although no panacea for the issue of selection bias, the FE models improve upon the logistic models by addressing unobserved "hidden" confounding. However, children must have at least one sibling to be included in the sibling FE models, possibly introducing some selection bias because of cultural and class sorting. Fortunately, by 2014 79% of NLSY:CYA respondents had at least one sibling. Further, 28% of NLSY79 mothers with children have three or more and 11% have four or more. Not only are there many family units with multiple births but also there are many family units where two or more children are widely spaced in age, thus expanding the possibility for variation in neighborhood conditions between siblings. The FE model capitalizes on variation in neighborhood conditions that result

from 1) older and younger siblings experiencing different neighborhood conditions due to moving and/or 2) neighborhood conditions changing around separate siblings over time.[3]

RESULTS

I expect neighborhood disadvantage to have a positive impact on incarceration in adulthood. I also expect neighborhood disadvantage to have non-linear effects across race and ethnicity; specifically, that black Americans will face equal odds of incarceration regardless of their childhood neighborhood conditions. To test these hypotheses, I first examine the zero-order impact of neighborhood disadvantage on incarceration. Second, I add the full array of family and childhood controls. Third, I analyze the within-family impact of childhood neighborhood disadvantage on adult incarceration by adding sibling fixed effects. I first run stratified models for whites, blacks, and Latinos. Next, I run full-factorial interaction models.

In Figure 1, I summarize the results from the stratified analysis with full controls and sibling fixed effects. When examining the association between childhood neighborhood disadvantage and adult incarceration for whites, blacks, and Latinos separately, I find that only whites and Latinos exhibit statistically significant associations. Meanwhile, the association

[3] Within-group regression, such as sibling FE, have been an important empirical estimation strategy in studies of neighborhood effects in economics (see Aaronson, 1998; Plotnick and Hoffman, 1999; Vartanian and Buck, 2005; Vartanian and Houser, 2010), but have rarely been used in sociology (Alvarado, 2016c, 2016b). Fixed effects models are useful because they control for anything that may be unobserved and invariant between siblings (e.g., genes and salient family events) by using siblings as their own controls (Allison, 2009; Gangl, 2010; Greene, 2008; Halaby, 2004; Johnston and DiNardo, 1997; Oakes, 2004; Wooldridge, 2002). A shortcoming of the FE approach is that it cannot account for any unobserved characteristics that differ between siblings. These include ambition and ability. Further, FE models do not control for varying parental characteristics such as parents' psychological and emotional states, which could vary over time and impact siblings differently, thereby potentially influencing neighborhood choice and children's outcomes. Nevertheless, the FE technique has proven to be a useful tool in neighborhood effects studies because variation is confined to within siblings while unobserved within-family characteristics are held constant.

between childhood neighborhood disadvantage and adult incarceration for blacks is not statistically different from zero. This leads to the conclusion that it appears that blacks from advantaged and disadvantaged neighborhoods face equivalent chances of experiencing incarceration in adulthood, net of observed and unobserved confounders. This may be unexpected given Sampson's ,Sharkey's ,and other's recent work showing the unique disadvantages of black neighborhoods. However, we may want to consider that discrimination, racial profiling, and other racialized policing policies may make it so that blacks from all neighborhoods have equal chances of incarceration. A one-SD increase in neighborhood disadvantage quintile for whites increases the odds of adult incarceration by 22 percent (e[0.58]*0.34= 1.22), net of observed and unobserved confounders. A one-SD increase in neighborhood disadvantage quintile for Latinos increases the odds of adult incarceration by 16 percent (e[0.38]*0.40= 1.16), net of observed and unobserved confounders. Where you grew up may matter little if you are black — i.e., the chances of incarceration are equivalent between advantaged and disadvantaged neighborhood origins for blacks.

Figure 2 summarizes results from a full-factorial interaction logistic regression model that tests for differences in the association between blacks and whites and Latinos and whites. Here, a formal interaction model with sibling FE shows that the difference between blacks and whites is statistically significant. The difference between blacks and whites is statistically significant – reinforcing the findings that it does not matter where you grew up if you are black Again, we must remember that rates are high for blacks across the board. For example, research with other samples shows that the cumulative risks for college-educated Blacks are about the same as for high school dropout Whites. So some of what's driving the interaction could be associated.

The functional form of the model can also impact estimates. Given that conditional logistic regression with family fixed effects constrains the sample to families with multiple siblings and favors larger families, running a linear probability model partially addresses the concern of non-random selection of large families into the identifying sample. Figure 3 summarizes the full-factorial interaction model – only this time from a linear probability model. Here, I run a FE linear probability model with interactions and it does not appear that this result is due to the functional form of the logistic model. Selection into the treatment by large families in the conditional logistic FE model does not seem to affect the qualitative finding. The difference between blacks and whites continues to be statistically significant in a sibling fixed effects LPM model that accounts for potential bias stemming from the non-random selection of families into the identifying sample

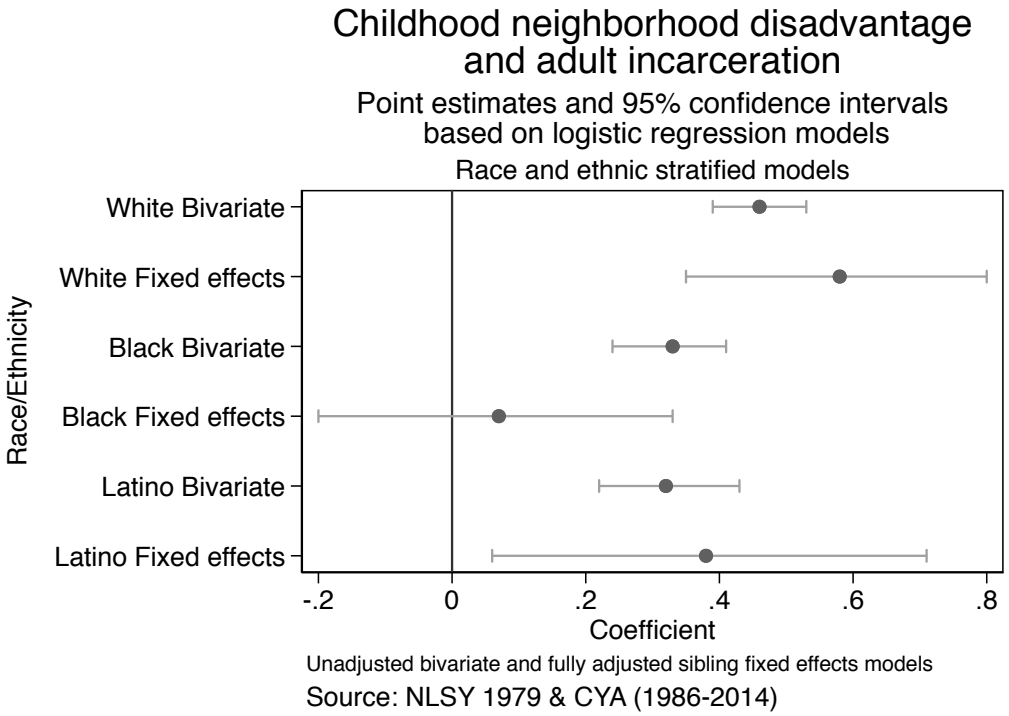

Figure 1. The association between childhood neighborhood disadvantage and adult incarceration: Sibling fixed effects logistic model stratified by race and ethnicity.

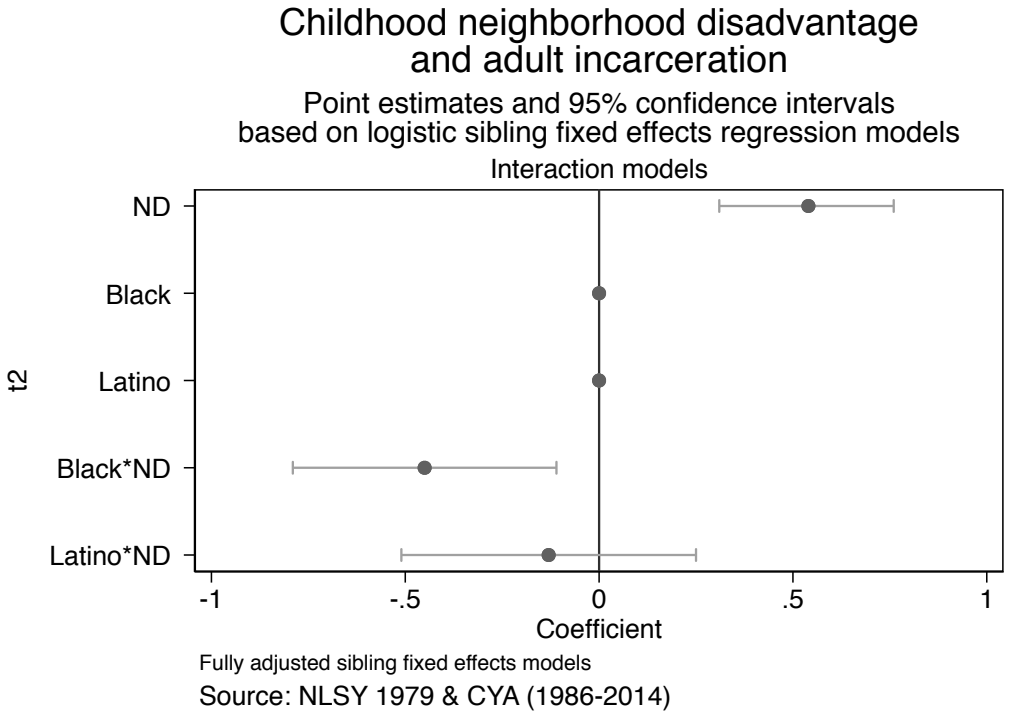

Figure 2. The association between childhood neighborhood disadvantage and adult incarceration: Sibling fixed effects interaction logistic model

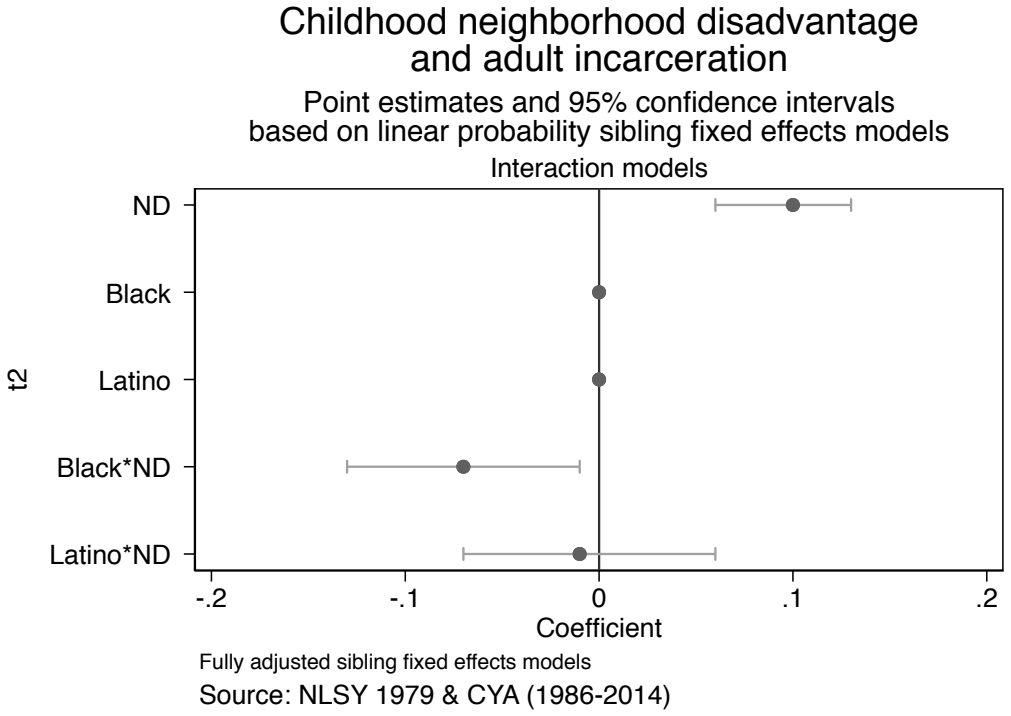

Figure . The association between childhood neighborhood disadvantage and adult incarceration: Sibling fixed effects interaction linear probability model

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