Assessing the Benefits of a Rising Tide:

Educational Attainment and Neighborhood-level Economic Growth

William Johnston

Harvard Graduate School of Education

October 2013

Introduction

Although the United States has enjoyed 50 years of rising high school graduation rates, disparities endure across gender-, race-, and residence-based groups (Rumberger 2001; Swanson 2009). Males consistently have lower graduation rates than females, and the graduation rate for Black males is currently 30 percentage points lower than that of White males (Schott Foundation for Public Education 2012d; Sum and Harrington 2003). Neighborhood characteristics may be associated with these disparities as well. There are gaps of over ten percentage points between the graduation rate for adolescents growing up in economically disadvantaged urban communities compared with their peers from more economically advantaged contexts (Swanson 2009; Wodtke, Harding, and Elwert 2011). The urban dropout crisis is particularly acute among Black males, with only 28% of Black males in urban schools graduating from high school on time, compared with 45% for Black males nationwide (Schott Foundation for Public Education 2012).

Researchers interested in understanding these residence-based disparities often have relied on the comparison of youth who relocate from disadvantaged urban contexts via intra- or inter-district busing policies or housing relocation programs (DeLuca and Dayton 2009; Leventhal, Dupere, and Brooks-Gunn 2009). Another approach, which we know much less about, is to focus on studying adolescents growing up in previously disadvantaged neighborhoods that are experiencing economic growth. This approach capitalizes on the fact that whereas urban poverty and concentrated disadvantage often endure over time, economic growth has been observed in many poor urban communities, particularly during the 1990s (Ellen and O'Regan 2008; Galster et al. 2003; Jargowsky

2003; Kingsley and Pettit 2003). This growth has sparked much debate regarding whether these gains are associated with improvements in the quality-of-life for residents of these urban communities, notably children and adolescents (Hackworth 2007; Vigdor 2002). Are there educational benefits for adolescents who reside in communities where economic growth occurs, and is this true for certain subgroups of adolescents more so than others?

This study focuses on the association between neighborhood economic growth and the educational attainment of adolescents from moderate and high-poverty urban neighborhoods. Using nationally representative data from the National Longitudinal Study of Adolescent Health (Add Health), I ask two specific research questions: (1) do adolescents living in economically disadvantaged urban neighborhoods that undergo economic growth over the course of their teenage years have greater educational attainment compared with a matched sample of their peers who reside in similar neighborhoods that are economically stable or declining? And, (2) does the nature of this association differ across racial and gender groups?

In the sections that follow, I review the extant literature on neighborhood effects as they pertain to youth's educational attainment. This review is punctuated by a discussion of how methodological complications inherent in neighborhood-based studies have led researchers to rely heavily on mobility programs as a means of assessing the influence of neighborhood characteristics on youth's educational outcomes. Finally, I introduce the emerging place-based strategy of studying individuals who reside in neighborhoods that change as an alternative method of investigation that is the analytic strategy of the present study.

Neighborhood SES and Educational Attainment

Educational attainment, a commonly studied developmental outcome for adolescents, is most often operationalized by measuring high school graduation rates. Although it may only represent one discrete step on an individual's path to social and economic independence, graduating from high school is a pivotal gateway that may foreshadow economic well-being later in life (Crowder and South 2011; Fischer and Kmec 2004; Murnane et al. 1995; Swanson 2009). Educational experiences such as high school graduation and post-secondary enrollment are shaped by the multitude of ecologies within which children develop, such as the home, school and neighborhood (Bronfenbrenner 1979). The neighborhood context may be particularly salient for adolescents, as peer groups and other non-familial ecologies become more influential than the home due to decreased parental oversight and increased time spent outside of the home compared with earlier childhood (Elliot et al. 1996; Leventhal, Dupere, and Brooks-Gunn 2009; Steinberg and Morris 2001).

Theories of neighborhood influence propose both positive and negative associations between neighborhood-level socioeconomic status (SES) and adolescents' educational attainment (Jencks and Mayer 1990). On one hand, "protective" models argue that elevated neighborhood SES, indicated by low poverty and unemployment rates as well as high income and education levels among adults, is likely to be associated with higher levels adolescents' educational attainment. On the other hand, "person-environment fit" models suggest that high neighborhood SES may have deleterious effects on the educational trajectories of some disadvantaged youth residing in affluent

contexts (Boyle et al. 2007; Kupersmidt et al. 1995, Lund and Dearing 2012). Each set of models is discussed below, in turn.

Protective Theories

Protective theories of neighborhood influence posit that high SES neighborhoods are likely to have higher levels of adolescent educational attainment than neighborhoods with weak economic conditions due to both institutional and social mechanisms (Sampson et al. 2008). High neighborhood SES might be positively associated with the quantity and quality of schools as well as informal learning and recreational institutions that provide enriching contexts for youth. In turn, access to these quality institutions may then promote or hinder adolescents' motivation and ability to graduate from high school and pursue post-secondary educational opportunities (Jencks and Mayer 1990; Leventhal and Brooks-Gunn 2000).

High neighborhood SES also may support educational attainment due to adolescents' exposure to successful adult role models in their communities. Adult community members' attitudes and educational and work-force experiences could shape adolescents' academic aspirations and motivations in these areas, which may be associated with their educational attainment (Ginther, Haveman, and Wolfe 2011; Wilson 1987). Furthermore, higher neighborhood SES may be linked to greater youth's high school completion because they have a lower probability of being exposed to negative influences that are often associated with impoverished communities, such as delinquency, violence, or drug and alcohol use (Harding 2003; Jencks and Mayer 1990; Leventhal and Brooks-Gunn 2000).

Empirical support of protective models of neighborhood influence can be seen in a variety of studies that demonstrate a positive association between neighborhood affluence and youth's educational attainment (Brooks-Gunn, Guo, and Furstenberg 1993; Duncan 1994; Halpern-Felsher et al. 1997). Interestingly, this association may be stronger now than it was in previous decades. The differences in eventual post-secondary enrollment between a high school senior living in a neighborhood at the 10th percentile of affluence compared to a neighborhood at the 90th percentile was between 19-23 percentage points, which has grown consistently larger since the 1990s (Altonji and Mansfield, 2012).

Person-Environment Fit Theories

Although the aforementioned studies suggest that elevated neighborhood socioeconomic status is likely to have a positive association with adolescents' educational attainment, there is a complementary set of theoretical models arguing that improved socioeconomic conditions might be associated with negative educational outcomes for some youth in some situations. These "person-environment fit" models argue that neighborhood advantages may benefit more advantaged youth only, thus exacerbating the disadvantages experienced by some at-risk youth living in the same communities (Kupersmidt et al. 1995). Sociological theories of competition and relative deprivation argue that neighborhood improvements may lead to negative educational outcomes for some youth due to increased competition for community resources and lowered self-valuation by youth in more advantaged contexts, respectively (Jencks and Mayer 1990). In other words, disadvantaged youth will become even more

disadvantaged as the neighborhood around them experiences an elevation in status overall.

Person-environment fit models are essentially investigations of differences in the association between neighborhood SES and educational attainment based on the characteristics of the adolescents being studied, and one of the most salient characteristic that marks this relationship is race. Stemming from decades of residential segregation and social isolation in American cities, variation in neighborhood economic conditions is strongly defined along racial lines (Massey and Denton, 1993). Regarding racial differences, multiple studies find that Black adolescents are more susceptible to the harmful influence of neighborhood disadvantage, whereas Whites benefit more from high neighborhood SES (Crane 1991; Crowder and South 2003; Dornbusch et al. 1991; Vartanian and Gleason 1999).

Like race, gender appears to play a moderating role in the relationship between neighborhood SES and educational attainment. Males from neighborhoods with lower concentrations of disadvantaged neighbors and jobless males and higher concentrations of middle-class neighbors had a higher probability of remaining in school beyond eleventh year, and no such association was detected for females (Connell and Halpern-Felsher 1997). However, females may be more susceptible to the deleterious effects of neighborhood economic disadvantage, as exposure to neighborhood economic distress was found to have a stronger association with their risk of dropping out compared to that of boys (Crowder and South 2003).

Neighborhood Change and Educational Attainment

It is important to note that the theoretical framework and empirical evidence presented thus far focuses on *static* notions of neighborhood economic conditions. Shifting the analysis to time-varying measures of neighborhood context allows for an examination of the potential educational consequences of continuously residing in changing neighborhoods and also may provide insight into the potential educational payoff of place-based neighborhood development initiatives (Komro, Flay, and Biglan 2011; Leventhal and Brooks-Gunn 2009). Unfortunately, the theoretical and empirical literature concerning associations between neighborhood economic change and youth's educational attainment is less prolific and well-defined than the work pertaining to static neighborhood conditions. Research on gentrification processes often focuses on institutional-level outcomes such as real estate market trends, school openings and closures, and aggregated measures of displacement and poverty concentration (Freeman, 2006; Lees et al. 2008). Thus, it becomes useful to incorporate some potential extensions to the protective and person-environment fit models when considering the association between neighborhood-level change processes and individual-level educational outcomes.

The protective model might be extended to argue that economic improvements in high poverty neighborhoods may offset prior disadvantages for adolescent residents, as educational institutions might benefit from the local economic capital. Improved neighborhood socioeconomic conditions also may generate civic momentum and resources for greater capital investment in the infrastructure of the community. Neighborhood institutions such as schools and other youth service institutions may see newfound support that in turn improves the educational offerings for adolescents in the

communities (Grogan and Proscio 2008). In addition, adolescents from economically growing neighborhoods may be more likely than their peers in consistently poor communities to be exposed to educationally and economically successful neighbors and also may develop relationships with these neighbors that may foster pro-social development.

On the other hand, changes in neighborhood SES and educational outcomes may be decoupled in the sense that there really is no discernable link between economic growth and youth's educational attainment, with any apparent associations likely to be the result of school or family characteristics (Solon, Page, and Duncan 2000; Dobbie and Fryer 2011). In other words, neighborhood "improvements" may have little to do with the local schools getting better or with the students graduating in higher numbers. This decoupling could be particularly salient in urban districts in this current era of open enrollment policies, whereby many urban high school students attend schools outside of their neighborhood of residents. Even if neighborhood institutions improve along with the neighborhood's economic prospects (as protective models would suggest), the improvements may only benefit those teenagers from families with greater levels of valued social, political, and economic capital (Noguera 2003; Pattillo 2007). In other words, disadvantaged adolescents may become even more marginalized as the economic tide rises around them due to local institutions shifting their focus on serving the needs and tastes of other children.

Methodological Challenges in Capturing Neighborhood Variation

Underlying the theoretical and empirical complexity regarding the link between neighborhood economic growth and youth's educational attainment is the methodological challenge of isolating and measuring this relationship. It is challenging to distinguish neighborhood-based influences from individual, family, and school characteristics; the latter often have stronger measured associations with educational outcomes compared with neighborhood characteristics (Dobbie and Fryer, 2009; Ellen and Turner, 1997; Ginther, Haveman, and Wolfe 2000; Owens 2010; Sampson, Morenoff, and Gannon-Rowley 2002). Even if neighborhood-based associations are observed, these relationships may be confounded by family characteristics. In addition, it is very difficult to have an effective counterfactual in neighborhood studies that would enable comparison of how a particular family or student would fare either by remaining in a certain neighborhood context versus moving to a different setting or experiencing an exogenous neighborhood transition (Harding 2003).

Another commonly cited threat to the internal validity of neighborhood research is endogenous self-selection into (or out of) certain types of neighborhoods. This self-selection could confound the relationship between the neighborhood characteristics and adolescents' educational outcomes, as familial characteristics could potentially influence both the choice of neighborhood residence and children's educational attainment (Duncan, Connell, and Klebanov 1997). In addition, systematic patterns of migration out of neighborhoods could make suspect the estimates of the relationship between the neighborhood characteristics and educational attainment. Although innovative techniques of accounting for important individual- and neighborhood-level confounders are continuously emerging, it remains impossible to account for all possible endogeneity

between the groups of individuals that are being compared in an observational study (Harding 2003; Murnane and Willett 2011).

The methodological limitations have led the field to rely on mobility programs in which low-income families from high poverty neighborhoods are randomly selected (or an approximation) to receive housing assistance to move to low poverty communities as a means of assessing the associations between neighborhood conditions and a variety of individual outcomes, including educational attainment. The primary example of a random assignment mobility study of neighborhood effects is the Moving to Opportunity (MTO) program that began in 1994. This five-city study randomly assigned low income families from public housing in high poverty neighborhoods to either an experimental group that was given a housing voucher to move to a low-poverty neighborhood, a comparison group that was given a voucher to move to a community of choice regardless of its poverty rate, or a control group in which they received no voucher.

Analyses of outcomes 5- and 10-years after the experiment find no impact of receiving a voucher to move from a high- to low-poverty neighborhood on children's and adolescents' reading or math achievement (Ludwig et al. 2013; Sanbonmatsu et al. 2006). However, the lack of program effects does not apply to all children in all settings. Evidence from re-analysis of the MTO 5-year suggests that for some children (particularly Black boys) from some communities (particularly extremely poor areas), moving to a less impoverished community was favorably associated with their educational attainment and achievement (Burdick-Will et al. 2011; see also Leventhal and Dupere 2011).

For all that has been gained from the groundbreaking MTO study, it is also useful

to adopt an alternative approach of isolating and studying the association between neighborhood economic conditions and educational attainment by focusing on individuals who continuously reside in neighborhoods that change. Some have argued that mobility programs may not allow for testing the effect of neighborhood conditions, but rather the effect of moving from one neighborhood to another, as moving may have an effect all its own that may confound the estimation of neighborhood effects (Sampson 2008; Sampson, Sharkey, and Raudenbush 2008). Furthermore, the low take-up rates in the MTO study suggest that the subsample of individuals who moved to lower poverty neighborhoods may not be representative of the larger population (Lopez-Turley 2003).

As an alternative to mobility studies such as MTO and point-in-time observational studies of neighborhood contexts, an emerging strategy of estimating neighborhood effects is to analyze the outcomes of individuals continuously residing in changing neighborhoods as compared to individuals living in more stable communities. This approach assumes urban communities to be dynamic social contexts and takes advantage of the variation in neighborhood socioeconomic conditions that has been observed over the past three decades in many cities across the U.S. (Kingsley and Pettit 2003; Kneebone et al., 2012).

The present study informs the emerging body of empirical work that focuses on the associations between neighborhood economic improvements and individual-level outcomes. For example, improved economic conditions (as measured by declines in poverty) in the 1990s have been found to be associated with males' increased problem behaviors (Leventhal and Brooks-Gunn 2011). In addition, individuals in a nationally

representative sample who resided in neighborhoods that saw a decline concentrated disadvantage[1] as youth in the 1980s had greater educational attainment and income levels as adults in the early 2000s (Sharkey 2012). These results suggest there is much more to be learned from studying neighborhood change in terms of its association with developmental and educational outcomes for the youth.

The Approach of this Study

The present study makes a number of contributions to the growing knowledge base regarding associations between neighborhood changes and youth outcomes. The focus on two outcome measures of educational attainment (high school graduation and total years of schooling completed) broadens the literature on the potential associations between youth development and changes in neighborhood characteristics. Adolescents' educational attainment has long been a focus of neighborhood research, yet it has received limited empirical attention regarding its association with neighborhood economic *change*. Second, the focus on group-specific associations for gender- and race-based subgroups builds on the prior literature that has found associations between neighborhood characteristics and educational attainment to be quite different for youth with differing demographic profiles (Crane 1991; Crowder and South 2003; Elliot et al. 1996; Leventhal and Brooks-Gunn 2011; Vartanian and Gleason 1999). Third, this study is unique in its use of both absolute and relative measures of neighborhood SES; the models consider both changes in a census tract's absolute poverty rate as well as changes

[1] This is a composite measure derived from a principal component analysis that includes welfare receipt, poverty rate, unemployment, percentage of female-headed households, percentage Black, and density of children.

in the ratio of a census tract's median income relative to that of the surrounding metropolitan area. On one hand, the model using absolute measures of poverty allows for the testing of hypotheses of concrete, universally recognized standards of collective quality-of-life in urban communities and is often commonly used in research on neighborhood context (Leventhal and Brooks-Gunn 2000). On the other hand, the relative approach of using median income ratio accounts for the fact that a neighborhood's economic trajectory is unlikely to occur in a vacuum removed from adjacent communities or the region (Ellen and O'Regan 2008). Neighborhoods often evolve in conjunction with or in response to their surrounding areas, and so it is important to account for the fact that while the overall economy may have been rising (and poverty rates falling) in the 1990s, some neighborhoods may have remained disadvantaged in comparison to those around them (Fischer and Kmec 2004; Sampson and Morenoff 1997).

This study utilizes Add Health data, which is well suited for an investigation into the relationship between neighborhood economic growth and educational attainment. This dataset allows for the study of economic trajectories of urban neighborhoods during the 1990s, a decade that saw economic gains occurring in many previously blighted urban communities across the United States (Ellen and O'Regan 2008; Jargowsky 2003; Kingsley and Pettit 2003). Furthermore, the size of the Add Health sample supports the estimation of differential associations that may exist across gender- and race-based subgroups while also allowing for the accounting of potential bias due to self-selection into and out of economically changing neighborhoods.

Based on the literature discussed in the preceding sections, neighborhood economic

improvement is expected to have a positive association with educational attainment for the sample as a whole. In other words, those who reside in neighborhoods that experienced economic growth will have higher graduation rates as well as greater total years of schooling completed in comparison to their peers from stable or economically declining communities. However, the magnitude of the association is expected to differ as a function of race, with White adolescents possibly reaping greater benefits from the elevated neighborhood socioeconomic conditions of their communities in comparison to their Black peers. Finally, in line with multiple theoretical rationale for why one gender would fare better than another in economically improving neighborhood contexts, it is expected that there will be some sort of gender-based difference, perhaps as a function of differing socialization processes or nation-wide trends in gender-based graduation rate gaps, but the direction of these differences is unclear.

Research Design

Data

The sample was drawn from the National Longitudinal Study of Adolescent Health (Add Health), a nationally representative study that began in 1994 with a sample of adolescents in grades 7 through 12 at Wave I (N=26,666). The sample has been followed for eight years with subsequent in-home surveys that measure respondents' social, economic, educational, psychological, and physical well-being. Wave I baseline measures were collected via in-school and at-home interviews during the 1994-1995 school year, and outcome measures were collected during in-home interviews at Wave III during the 2001-2002 school year.

Add Health includes a variety of census-derived neighborhood-level indicators that are delineated at the county, census tract, and block group level of detail.[2] All neighborhood contextual data such as poverty rate, median income, racial proportions, average educational attainment and employment information are based on census data relating to the respondents' geocoded address. Neighborhood trajectories were determined by a comparison of neighborhood poverty and median levels at Wave I and Wave III, with Wave I measures based on the respondents' address during the 1990 census, and Wave III measures based on the 2000 census.[3]

Sample

This study is primarily concerned with the impact of urban neighborhood economic change on the educational attainment of adolescents growing up in these transitional contexts. Thus, the analytic sample for this study was more narrowly defined than the entirety of the Add Health sample, which was intended to be nationally representative across all types of communities— urban, rural, and suburban. First, I reduced the sample to the youngest third of the Add Health respondents–those who were in grades 7 and 8 at Wave I and would be expected to be just one or two years out of high

[2] In order to maintain some consistency with prior research on neighborhood change and developmental outcomes, this study uses the census tracts as the operational definition of neighborhood. Census tracts contain approximately 3,000 to 8,000 individuals and have boundaries that are informed by local community input, physical features such as major streets or railroads, and social and ethnic divisions (Duncan and Aber 1997; Leventhal and Brooks-Gunn 2000).

[3] Both the restricted and public-use portions of the Add Health data provide neighborhood identifiers at the block group, census tract and county levels. However, these data do not include identifying information about the actual location of any of the respondents. This limitation makes it difficult to account for the political climate or pre-existing neighborhood trends that were occurring during or before the onset of data collection. More information on this limitation can be found in the Discussion section.

school by Wave III. This restriction helps to ensure that the individuals in the analytic sample were experiencing the bulk of their teenage years during the time period under investigation and were not already very close to graduating from high school and possibly moving away from their childhood homes at the onset of the study period. Second, because this analysis is focused on the consequences of urban neighborhood socioeconomic improvements in areas previously plagued by high poverty, a second major restriction was to exclude individuals from neighborhoods with poverty rates below 30% at Wave I[4]. If any benefit is to be gained from economic improvement, it is most likely to be seen in high poverty neighborhoods. Finally, I excluded respondents from predominantly rural census tracts as well as those who did not have neighborhood data due to missing or improperly geocoded Wave I addresses. These restrictions result in the analytic sample consisting of 464 individuals from 133 census tracts.

Outcome Measures

Two self-reported measures of educational attainment were used in this analysis: whether or not the student has graduated from high school with a traditional diploma and the total number of years of schooling completed. Although other achievement- and aspiration-oriented dimensions of adolescents' educational experiences were important to consider, narrowing the focus to attainment allowed for a more parsimonious analysis and also followed extant research on the relationship between neighborhoods and adolescent educational outcomes (Duncan 1994; Leventhal, Dupere, and Brooks-Gunn

[4] This is a threshold that has been used to denote low poverty neighborhoods from those with moderate and high poverty levels (Kingsley and Pettit, 2003; Leventhal and Brooks-Gunn, 2011).

2009; Harding 2003; Owens 2011). The sample was in grades 7 and 8 in the 1994-1995 school year at Wave I, so the standard expectation would be for these students to have graduated from high school by Wave III and possibly completed some post-secondary coursework as well. Approximately 83% of them graduated by the Wave III data collection during the 2001-2002 school year. The mean total years of schooling completed by Wave III was 13.21 years, with a standard deviation of 1.95.

Measures of Neighborhood Economic Change

I ran separate sets of models based on two distinct ways of operationalizing neighborhood economic growth. The first model, which is referred to as the Poverty Model, was based on changes in neighborhood poverty rates between 1990 and 2000. The poverty rate was measured as the proportion of a neighborhood's residents living below the poverty line at each wave. The average change in neighborhood poverty rate during this time period was 0.983% with a standard deviation of 12.343. I defined an economically improving community as one in which the poverty rate declines by at least .5 standard deviations, which is comparable in magnitude to thresholds that has been used in other studies of neighborhood economic change (Ellen and O'Regan 2008; Galster et al. 2003; Leventhal and Brooks-Gunn 2011; McKinnish et al., 2010).

The second model, hereafter referred to as the Income Model, follows the approach taken by Ellen and O'Regan (2008). In this model, I first determine each census tract's relative median income by taking the ratio of the tract's median income to that of the larger metropolitan area (represented by county-level data for urban areas in the Add Health data). I did this calculation at Waves I and III and then determined the percentage

change in the ratio between the two periods as the measure of change. The average change in income ratio for the census tracts in the study was 0.206% with a standard deviation of 0.387. Neighborhoods with a change of 5% or more were considered to be economically improving and those with less positive growth are in the comparison group of stable and declining communities. This notion of relative income accounted for differences in cost of living between metropolitan areas that would not be captured by measuring tract-level metrics of income. However, one potential drawback of using this measure of relative gain was that it may understate economic gains in neighborhoods located in metropolitan areas that are also experiencing economic growth. Thus, this approach may represent a conservative measure of neighborhood economic improvements.

Control Variables

For both the Poverty and Income Models, I estimated the association between neighborhood economic change and educational attainment by comparing pairs of individuals who were nearly identical across a combination of individual- and neighborhood-level covariates. Individual variables included Wave I parental reports of the child's gender, race/ethnicity, mother's education, household income, and whether or not the family receives public assistance. I also included neighborhood-level covariates such as poverty rate, proportion White, proportion Black, median household income, and the proportion of people employed in professional or managerial fields. These individual- and neighborhood-level covariates were consistent with those frequently included in neighborhood research concerned with youth outcomes (Harding 2003;

Leventhal and Brooks-Gunn 2000; Leventhal and Brooks- Gunn 2011; Owens 2011; Sampson, Morenoff, and Gannon-Rowley 2008). I present pre-and post-matching means and standard deviations for all of these variables in Tables 1 and 2, respectively.

Another key variable included in the final models was the estimated probability that an individual was living in a neighborhood at Wave I that eventually experienced economic improvements by Wave III. This propensity score was estimated through a logistic regression estimating the probability of living in an economically improving community, as opposed to living in an stable or declining context. The predicted probability was estimated as a function of the individual- and neighborhood covariates listed above as well as a binary indicator of whether or not the family lived in their current residential location for economic reasons. This predictor was a dichotomous variable indicating whether or not the head of household reported that the most important reason for choosing to live in the current neighborhood was access to affordable housing or proximity to employment opportunities.

Analytic Strategy

The covariates described above all factor into an estimation of the relationship between educational attainment and neighborhood economic growth. The estimation reflected a comparison of the average values of the two indicators of educational attainment for individuals from economically improving communities with the average values for individuals from stable or declining neighborhoods. However, because the Add Health study was not a random-controlled trial in which adolescents were randomly placed into neighborhoods, it was important to account for potential violations of the

assumption that the two groups were equal in every way *except* for their respective neighborhoods' economic fortunes. Therefore, I matched individuals to limit my analysis to a comparison between subsamples that were nearly identical on a substantively important set of covariates.

To isolate the role of neighborhood economic change and account for potential selection bias among the participants, I created matched subsamples with minimal differences on potential confounders. I generated these matches using a combination of the propensity score[5] and the Mahalanobis distance measure[6]. Following the matching procedure, I ensured that the matched groups are balanced on all covariates. Attaining balance is an iterative process whereby each step of matching involved an analysis of balance on each covariate across the two subsamples. The covariates were sorted based on the level of discrepancy between cases from each group, and different weights will be assigned to the covariates that adjust their degree of importance in the matching algorithm. Each step of the process involved a slight adjustment in the weighting scheme that was repeated until a solution with the smallest overall discrepancy was found. This discrepancy was measured by the *t*-statistics and corresponding p-values from means comparison tests for each of the covariates (Sekhon 2011).

Matches were made with replacement to reduce potential bias (Abadie and Imbens 2006; Sekhon 2011). The matches were exact for all dichotomous variables, such that each matched pair consisted of individuals who are identical across all of these

[5] The propensity score is the predicted probability of living in a neighborhood that experiences economic growth. Individuals can only be matched with someone that has a propensity that is within .25 standard deviations of his or her estimated propensity score.
[6] This is a composite indicator of the difference between individuals based on several covariates. A small Mahalanobis distance measure indicates that two individuals are similar or identical on the included variables.

variables. I set restrictive calipers for the seven continuous variables so that an individual could only be matched with someone very similar on the spectrum of values for each of these variables. See Table A1 in the Appendix for a summary of the variables and techniques used in the matching process. Once the matches were set, the means of the outcomes (high school graduation and years of completed schooling) were estimated and then compared, with the difference representing the average difference in the outcome associated with the differing neighborhood trajectories.

The estimated relationship between educational attainment and neighborhood economic improvement can be expressed as:

$$\tau \mid (T = 1) = E\{E(Y_i|X_i, T_i = 1) - E(Y_i|X, T_i = 0)|T_i = 1\},$$

where τ was the average mean difference between individuals from the different types of neighborhoods. Y_i was the mean of the outcome variables of high school graduation and years of schooling completed, T_i represented whether or not the individual's Wave I neighborhood is economically improved (T_i =1) or not (T_i =0), and X_i was the vector of observed covariates for individual *i* (Rosenbaum and Rubin 1983; Rubin 1974; Sekhon 2011). The final estimate, τ, was an aggregation of the result from multiple subtractions, whereby the mean outcome for an individual from neighborhoods where T_i =0 was subtracted from the mean outcome for an individual from a neighborhood where T_i =1. These two individuals were matched based on their observed values for the X_i covariates.

Missing Data

Like much large-scale longitudinal research, the Add Health data had missing information on many covariates that needs to be handled accordingly to avoid a risk of

bias. I treated missing data in a manner suggested by Rosenbaum and Rubin (1984) whereby data missingness was considered useful information in and of itself. In this approach, covariates with missing values are included in the matching algorithm as two variables, one that contained the observed values and another dichotomous indicator that stated whether or not the value for that variable is missing for each individual in the study (1 = missing, 0 = not missing). Missing values were replaced with the mean to allow for propensity score estimation and matching, but because this imputed value was included alongside the dichotomous missing indicator there was no effect on the fitted propensity scores or matching procedure (Haviland et al. 2007). Thus, individuals were matched not only based on their observed characteristics but also on whether or not they have missing values for any of these variables.

The final analysis was based on an aggregation of the estimated mean differences between matched pairs who were identical or very similar across 31 criteria. These criteria consisted of fifteen substantively important covariates (summarized earlier), fifteen dichotomous "missingness" variables that indicated whether each person had a missing value for each of the fifteen covariates, and a fitted propensity score representing the predicted probability that the individual resided in an economically growing neighborhood. Individuals must exactly match on all dichotomous covariates, including all fifteen missingness indicators. For the continuous variables a variety of calipers were set within which matches are allowed. I summarize the caliper sizes for all non-dichotomous variables in Table A1 of the Appendix.

Results

Baseline Descriptive Statistics

Table 1 presents the means of individual- and neighborhood-level characteristics for individuals residing in economically improving vs. non-improving neighborhoods. Because I operationalized neighborhood economic change in two distinct ways, I present these descriptive statistics separately for each definition—the left two columns present the results for when poverty rate was the metric of neighborhood economic well-being (the Poverty Model), and the right two columns show the results for when median income ratio was the metric (the Income Model).

These values in Table 1 are representative of the sample before matching was employed, so some differences between the groups at this stage were expected. As Table 1 shows, there were indeed several statistically significant differences between individuals from the economically improving vs. non-improving neighborhoods. For the Poverty Model, youth from neighborhoods with declining poverty rates were marginally more likely to be White and marginally less likely to be Black than their peers from non-improving communities. In addition, the neighborhoods they resided in during Wave I had higher proportions of White residents, lower proportions of Black residents, and marginally fewer people working in professional and managerial professions when compared to the non-improving neighborhoods.

For the Income Model, youth whose Wave I neighborhoods experienced an increase in median income ratio relative to the surrounding metropolitan area tended to be somewhat less advantaged than their peers from more stable or declining communities. These individuals were slightly more likely to be White, have a mother who is married, and also have a higher household income. In addition, the individuals

from improving communities resided in neighborhoods with statistically significantly lower median income levels than the neighborhoods that did not experience economic growth. These differences highlight the need to statistically account for potential confounding due to individual and family characteristics.

Matching Results

To account for potential bias due to baseline differences among individuals being compared in this study, I created matched subsamples that were nearly identical in all ways except for the economic trajectories of their neighborhoods (Sekhon 2011). The results of the matching procedure are presented in Table 2.

For the Poverty Model, 178 individuals were successfully matched across the 31 criteria, which was a substantial reduction in sample size from the original participants eligible to be matched and is indicative of the stringent nature of the matching process I employed. Nonetheless, this reduced sample size still provided moderate statistical power to enable reliable inference at standard levels of statistical precision (Murnane and Willett 2011).

In contrast to the pre-matching mean differences reported earlier, the post-matching comparisons suggest that the two groups being compared were very similar. Individuals were identical on all of the dichotomous individual-level covariates such as gender, race, mother's marital status, mother's education, and receipt of public assistance. The differences on the single caliper-based individual characteristic (household income)

were very small and also not statistically significant (D_n.=1311, p=0.0.422)[7]. The two groups were also very similar in terms of the four baseline neighborhood characteristics, with the two groups' Wave I neighborhoods being within a percentage point on proportion White (D_n=0.012, p=0.035), proportion Black (D_n=0.012, p=0.006), and proportion employed in managerial and professional careers (D_n =0.005, p=0.006). In addition, the median household income is only $250 different between the two groups (p=0.022). Although these differences were statistically significant, the small size of these estimates suggest that the practical significance of these differences was negligible and likely related to the differing economic trajectories of their neighborhoods.

For the Income Model, as seen in Table 3, 138 individuals were successfully matched on the 31 criteria. Like in the Poverty Model, the individuals compared in the Income Model were very similar in terms of Wave I characteristics. In addition to being identical on all dichotomous individual-level covariates, these two groups were very similar on the five covariates in which matches were performed within calipers. As Table 2 shows, there was no statistically significant difference for household income (D_n =388, p=0.173). The estimated mean difference for median household income was larger that that found in the Poverty Model (D_n=1876, p=0.003), but this value is still substantively negligible. Finally, all of the estimated differences for the remaining neighborhood-level variables followed the pattern seen in the Poverty Model whereby their estimated mean differences are statistically significant yet practically negligible: D_n=0.004 (p=0.007) for proportion White, D_n=0.016 (p=0.002) for proportion Black, and

[7] D_n represents the common notation for the test statistic for the Kolmogorov-Smirnov sample comparison test, which is the appropriate statistical test for comparing means when are possible point masses in the distribution of the variables (Abadie 2002; Sekhon 2011).

D_n=0.001 ($p<0.001$) for proportion in managerial and professional careers.

Although the matching procedure shrunk the size of the sample that was included in this analysis, the potential threat of bias due to neighborhood self-selection was drastically reduced. While I do not claim that this strategy accomplished the same level of bias reduction as a randomized experiment, the post-matching descriptive statistics suggest that the groups being compared were equal in every theoretically meaningful way except for the differences in the economic trajectories of their Wave I neighborhoods.

Educational Attainment and Neighborhood Economic Improvements

In order to estimate the magnitude of the relationship between neighborhood economic growth and educational attainment, models were run with the full matched sample. In addition, hypotheses of subgroup-specific associations were tested by estimating models for four separate subgroups: males only, females only, Whites only, and Blacks only[8]. Four separate models were estimated across each of these five samples—differences in high school graduation years of schooling completed as a function of declines in neighborhood poverty (the Poverty Model) and then again as a function of increases in median income ratio (the Income Model). In all, twenty models were estimated, with all of the results appearing in Table 3.

Full Sample. For the full matched sample, all four models indicate a positive association between neighborhood economic ascent and educational attainment. In the Poverty

[8] Sample size limitations prevented the estimation of subgroup-specific models for other ethnic groups. These limitations also prevent the estimation of gender-by-race subgroup analysis, such as a model that specifically estimates the mean differences for Black males.

Model (n=178), the estimated difference in high school graduation rates between those residing in neighborhoods with declining poverty rates and those in neighborhoods that saw stable or increasing poverty between Waves I and III was approximately 12.6% (τ =0.126, p<0.001). This positive association held when also looking at total years of schooling as the outcome, as individuals from neighborhoods with declining poverty rates completed approximately 0.241 more years of schooling than the matched sample from neighborhoods with stable or increasing poverty rates (τ =0.241, p<0.05).

A similar pattern emerged for the full sample in the Income Model (n=138), as the difference in high school graduation rates between individuals from neighborhoods that experienced an increase in relative median income compared to those from neighborhoods with stable or declining relative income measures was approximately 9% (p<0.001). In addition, there was a positive association between increased median income ratio and total years of schooling completed, with a magnitude similar to that found in the Poverty model (τ =0.254, p<0.007).

Gender-based Subsamples. Similar to the pattern that emerged for the full matched sample, the association between neighborhood economic improvements and educational attainment were consistently positive for the female subsample. In the Poverty Model, the graduation rate for females from neighborhoods that experienced declines in poverty was 23.5% higher than that of their female peers from neighborhoods with stable or increasing poverty rates (τ =0.235, p<0.001). Furthermore, this positive association was found when considering total years of schooling completed (τ =0.627, p=0.003). Although somewhat lower in magnitude, this pattern was consistent in the Income Model,

where the estimated mean difference was 11.1% (p=0.016) for graduation rates and 0.583 (p<0.001) for total years of schooling.

In contrast to the findings for females, the estimated associations between neighborhood economic improvement and educational attainment were inconsistent for the male subsample. In the Poverty Model, there were no statistically significant differences between males from neighborhoods with declining poverty rates compared to their matched peers from neighborhoods with stable or increasing poverty rates. However, there were positive associations found when comparing based on relative income, as males from neighborhoods that experienced increases in relative median income had a graduation rate that was 20.7% (p=0.004) higher that that of their peers from stable or declining relative income levels. In addition, males from economically improving communities (as measured by relative income) completed, on average, 0.414 more years of schooling than their counterparts from stable or declining neighborhoods (p<0.001).

Race-based Subsamples. The last two columns of Table 3 present the estimated mean differences for the models for the White and Black subsamples. For Whites, a consistently positive association emerged across the four different models. For the Poverty Model, I found that White adolescents residing in neighborhoods that experienced a decline in poverty had a high school graduation rate that was 14.3% (τ =0.143, p<0.001) higher than individuals from neighborhoods where poverty rates remained stable or increased. This positive association was also found when considering total years of schooling completed (τ =0.343, p=0.011). For the Income Model, I found

that Whites who resided in a neighborhood where median income ratios increased between Waves I and III had a higher graduation rate (τ =0.119, p=0.007) and averaged a half-year more of schooling completed (τ =0.500, p<0.001) than that of their peers from neighborhoods with stable or declining relative income. For the Black subsample, however, there are no statistically significant differences on either outcome in both the Poverty and Income Models. The null result for the Income Model could potentially be attributed to the very low number of matches (n=38).

Discussion

The results of this study suggest that neighborhood economic improvements, whether measured by declines in poverty rates or by increases in income levels, are not universally associated with greater educational attainment among adolescents growing up in poor communities. Furthermore, the results from models using race- and gender-based subsamples indicate that the direct and magnitude of the estimated association largely depends on the demographic characteristics of the individuals being compared.

Regarding my first hypothesis that neighborhood economic ascent would have a positive relationship with educational attainment, the results suggest a positive association among the full sample. This association was observed across both methods of operationalizing neighborhood economic ascent (declines in poverty rate of at least 5% or increases in median income ratio of 5% or more) and both outcome measures (high school graduation and total years of schooling completed). Although the findings for the full matched sample may be statistically significant across both models, the limited practical significance of these associations should be noted. For example, the estimates

that adolescents from economically improving neighborhoods complete approximately a quarter-year of additional schooling may be encouraging for those who wish to link neighborhood economic growth with improvements in educational outcomes, but it may not represent a dramatic difference in educational attainment in real-world terms. If the analysis were to end here, these findings would provide some support to the notion that experiencing an improvement in neighborhood economic conditions might have a *slight* positive educational payoff for adolescents, which would provide some empirical support to the protective models of neighborhood influence (Kupersmidt et al. 1995). However, findings from the gender- and race-based subgroup models paint a more equivocal light on the nature and magnitude of the association.

Gender- and Race-based Differences

The second hypothesis of this paper was that associations between neighborhood economic improvements and youth's educational attainment would be shaped by gender and race differences. Regarding the gender differences, the results suggest that females reaped more benefits of the neighborhood change compared to males, as the results for females were consistently positive across all four of the models. Furthermore, the magnitude of the estimated mean differences was notably larger for the female-only sample compared to the results for the full sample. Thus, the positive association for the full sample may be driven by a positive relationship that exists for females only. Taken as a whole, these results reinforce the notion that the associations may differ by gender, with girls reaping the benefits more often than boys, who tended to have less consistent associations with neighborhood influences (Clampet-Lundquist et al. 2011; Entwistle et

al., 1994; Leventhal, Dupere, and Brooks-Gunn 2009; Sampson and Morenoff 1997).

Similar to the findings from the gender-based subgroup analysis, the results of the two race models support the hypothesis that the association between neighborhood economic improvement and educational attainment differs for adolescents of different races. Across both outcomes and both methods of operationalizing neighborhood economic change, White individuals from economically improving neighborhoods had higher educational attainment compared to their peers in stable or declining communities. The consistently positive results for White individuals, contrasted with the non-significant findings for Black individuals, suggest that the general story of positive findings for the full sample may be an artifact of the findings for the White subsample. These results are in line with numerous studies that have shown educational attainment to be more positively associated with high neighborhood SES for Whites compared to Blacks (Brooks-Gunn et al. 1993; Halpern-Felsher et al. 1997; Lopez Turley 2003; Vartanian and Gleason 1999).

Additional Considerations

Although great care has been made to ensure the results of this study are informative and robust against potential threats to validity, substantive and methodological limitations that should be noted. First, the differential associations described above signal the need for an analysis of the mechanisms that might be driving the differences across gender and race groups. While it is useful to know who does and does not benefit from neighborhood economic improvements, policymakers are likely to ask many *why* questions as they develop targeted interventions to help all adolescents.

Why do girls benefit more than boys, and why do Whites benefit more than Blacks? What are the social mechanisms that link the structural changes at the neighborhood level to the educational outcomes that were observed at the individual? Leventhal and Brooks-Gunn (2000) refer to these links as pathways of influence, and modeling their structure and salience is an essential direction for future research.

Second, a potential threat to the validity of these findings is the possibility that pre-existing neighborhood trends could have shaped where families chose to live prior to 1990. Because Add Health does not provide the actual census tract information for these neighborhoods, it is impossible to look at prior census data. Although controlling for Wave I neighborhood measures as I do here may account for some degree of history and trends, there remains the possibility that enterprising parents with high educational aspirations could have known that certain neighborhoods were on the rise and therefore chose to move to these upwardly mobile neighborhoods. However, if this selection bias were present, the results would be biased upward, perhaps amplifying the positive estimates for females and diminishing the negative estimates for males.

Third, a study of neighborhood change must also consider the extent to which neighborhood changes, and the educational outcomes associated with them, may be the result of nonrandom selection *out of* neighborhoods (Sharkey 2012). The analytic strategy employed in this study was primarily based around an accounting for potential bias due to nonrandom selection into neighborhoods. Individuals were included in the study whether they remained in their Wave I neighborhood or not, thus approximating an intention-to-treat (ITT) analysis whereby the *prospect* of living in an economically improving neighborhood is the predictor of interest (Murnane and Willett 2011).

Nonetheless, post-hoc comparisons were made between "stayers" and "movers" from the economically improving neighborhoods and those from the stable or declining communities, with only minor differences found across the different subsamples (results available from author upon request).

Finally, an additional threat to the validity of any analysis involving matched samples is the potential confounding influence of omitted variables. Although individuals were matched based on a wide range of individual- and neighborhood-level covariates, these matches are only as good as the covariates available. Sensitivity analysis for omitted variable bias is one method for accounting for this (Rosenbaum2002; Harding 2003; Altonji et al. 2005; Keele 2010). The basic question of a sensitivity analysis is how would inferences about associations (such as the connection between neighborhood economic change and educational attainment) be altered by varying magnitudes of hidden influence from an unobserved factor? However, this analysis assumes that the matching is done without replacement, which is not appropriate for the combined exact and caliper matching process used in this study (Sekhon 2011). Matching with replacement reduces bias by increasing the pool of possible matches and decreasing the possibility of inexact matches (Abadie and Imbens 2006). Thus, I acknowledge that there could be potential confounders that may bias the results, but hold that the stringent nature of the matching procedure and the detailed analysis of balance between the matched subsamples should ensure minimal bias at most.

Conclusion and Implications

This study is significant in that it represents one of only a few recent efforts to

link neighborhood economic improvement and adolescents' educational outcomes. My findings that neighborhood economic improvements are positively associated with educational attainment in general, but particularly for females and White adolescents are consistent across distinct analyses with different outcome measures pertaining to educational attainment. In addition, these results account for potential bias for non-random selection into as well as out of the neighborhoods in the sample data.

These results indicate that an educational payoff of neighborhood economic growth is not a given, as some individuals appear to not reap any educational benefit from the neighborhood-level economic improvements. Although declines in poverty and increases in household incomes are most likely going to be seen as good news for most residents, this study reinforces concerns that the benefits may not include educational outcomes and also may not be experienced equally by all of those involved.

These findings are informative for the development of neighborhood-based policy interventions that strive to have an educational impact for the residents of the targeted communities. As recent evidence from the Harlem Children's Zone has suggested that specific school-based components are needed in order for neighborhood interventions to influence educational outcomes (Curto, Fryar, and Howard 2010), the results of this study show how neighborhood economic growth, on its own, has an inconsistent relationship for youth with different demographic profiles. Thus, it is important for urban redevelopment to consider educational components to their efforts, and it may be particularly efficacious to develop educational interventions that target males and students of color. If a goal of place-based neighborhood development policy is the improvement of educational opportunities for all children, then simply assuming that a

rising economic tide will lead to greater educational attainment for all residents would be naïve and unproductive.

Table 1. Mean baseline characteristics and outcomes, by neighborhood economic trajectory.

	Poverty Model		Income Model	
	Not Improving *n = 272*	Improving *n = 322*	Not Improving *n = 274*	Improving *n = 320*
Individual Level				
Female	0.474	0.491	0.453	0.516
Hispanic	0.223	0.235	0.194	0.269
White	0.381	0.618~	0.467	0.576~
Black	0.439	0.206~	0.363	0.238
Native American	0.030	0.064~	0.043	0.056
Asian American	0.040	0.022	0.048	0.010*
Mother Married?	0.480	0.573	0.483	0.588~
Mother HS Diploma?	0.677	0.625	0.642	0.652
On public assistance?	0.534	0.490	0.525	0.490
HH Income	25358	23739	21491	27,333~
N'hood choice	0.469	0.475	0.474	0.471
Neighborhood Level				
Proportion White	0.451	0.682*	0.565	0.629
Proportion Black	0.444	0.229*	0.342	0.272
Median HH income	17712	17780	19045	16,254*
Prop. In prof. jobs	0.143	0.128~	0.140	0.127
Outcomes (measured at Wave 3)				
High school diploma	0.618	0.688	0.640	0.682
Yrs. of school completed	11.788	11.735	11.670	11.902~

*Statistically significantly ($p < 0.05$) or ~marginally significantly ($p < 0.10$) different from mean (t test) or proportion (χ^2) of same variable in non improving group

Table 2. Estimated mean differences between matched pairs with corresponding bootstrapped p-values derived from the Kolmogorov-Smirnov sample comparison test.[a]

	Poverty Model *n = 178*		Income Model *n = 98*	
	Estimated Mean Difference	p-value	Estimated Mean Difference	p-value
Individual Level				
Household Income	1311	0.422	388	0.1726
Neighborhood Level				
Proportion White	0.012	0.035	0.004	0.007
Proportion Black	0.012	0.006	0.016	0.002
Median household income	250	0.022	1876	0.003
Proportion in mgrl. / prof. jobs	0.005	0.006	0.001	<0.001

[a]Balance statistics for all dichotomous predictors are not included since all matches were exact on each of these predictors

Table 3. Estimated mean differences (ITT) between matched samples of individuals from economically improving neighborhoods and those from stable or declining neighborhoods.

	Poverty Model				
	Full	*Male*	*Female*	*White*	*Black*
	n=178	*n=64*	*n=102*	*n=70*	*n=92*
Graduation Rate	0.126***	0.031	0.235***	0.143***	0.023
Years of Schooling	0.241*	-0.125	0.627**	0.343*	-0.182
	Income Model				
	Full	*Male*	*Female*	*White*	*Black*
	n=138	*n=58*	*n=72*	*n=84*	*n=38*
Graduation Rate	0.090***	0.207**	0.111*	0.119**	0
Years of Schooling	0.254**	0.414***	0.583***	0.500***	-0.176

*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$

Table A1. Summary of matching variables and techniques, with size of calipers for each non-dichotomous variable

	Standard Deviation	Type of Match
Individual Level		
Female	0.500	Exact
Hispanic	0.406	Exact
White	0.489	Exact
Black	0.499	Exact
Native American	0.237	Exact
Asian	0.166	Exact
Other	0.327	Exact
Mother Married	0.499	Exact
Mother HS Graduate?	0.456	Exact
Public Assistance Receipt	0.500	Exact
Household Income	32,705	Caliper (.5 s.d.)
Economic Reason for Nhood	0.500	Exact
Neighborhood Level		
Proportion White	0.322	Caliper (1 s.d.)
Proportion Black	0.352	Caliper (1 s.d.)
Median household income	4,787	Caliper (1 s.d.)
Proportion in mgrl. / prof. jobs	0.060	Caliper (2 s.d.)
Fitted Propensity Score	0.272	Caliper (1 s.d.)

References

Abadie, Alberto. 2002. "Bootstrap Tests for Distributional Treatment Effects in Instrumental Variable Models." *Journal of the American Statistical Association* 97(457):284–92.

Abadie, Alberto, and Guido W. Imbens. 2006. "Large sample properties of matching estimators for average treatment effects." *Econometrica* 74(1):235–67.

Altonji, Joseph G., and Richard K. Mansfield. 2011. "The role of family, school, and community characteristics in inequality in education and labor-market outcomes." in *Whither opportunity?: Rising inequality, schools, and children's life chances*, edited by Greg J. Duncan and Richard J. Murnane. New York: Russell Sage Foundation.

Boyle, Michael H., Katholiki Georgiades, Yvonne Racine, and Cameron Mustard. 2007. "Neighborhood and family influences on educational attainment: results from the Ontario child health study follow-up 2001." *Child development* 78(1):168–89.

Bronfenbrenner, Urie. 1979. "Contexts of child rearing: Problems and prospects." *American Psychologist* 34(10).

Brooks-Gunn, J., Guang Guo, and Frank F. Furstenberg. 1993. "Who Drops Out of and Who Continues Beyond High School? A 20-Year Follow-Up of Black Urban Youth." *Journal of Research Adolescence* 3(3):271–94.

Burdick-Will, Julia et al. 2011. "Converging evidence for neighborhood effects on children's test scores: An experimental, quasi-experimental, and observational comparison." in *Whither opportunity?: Rising inequality, schools, and children's life chances*, edited by Greg J Duncan and Richard J Murnane. New York: Russell Sage Foundation.

Clampet-Lundquist, Susan, Jeffrey R. Kling, Kathryn Edin, and Greg J. Duncan. 2011. "Moving teenagers out of high-risk neighborhoods: how girls fare better than boys." *American journal of sociology* 116(4):1154–89.

Connell, James P., and Bonnie L. Halpern-Felsher. 1997. "How neighborhoods affect educational outcomes in middle childhood and adolescence: Conceptual isues and an empirical example." in *Neighborhood poverty: context and consequences for children (Vol. I)*, edited by Jeanne Brooks-Gunn, Greg J Duncan, and J. Lawrence Aber. New York: Russell Sage Foundation.

Crane, Jonathan. 1991. "The epidemic theory of ghettos and neighborhood effects on dropping out and teenage childbearing." *American journal of Sociology* 96(5):1226–59.

Crowder, Kyle, and Scott J. South. 2003. "Neighborhood distress and school dropout: the variable significance of community context." *Social Science Research* 32(4):659–98.

Curto, Vilsa E., Roland G. Fryer, and Meghan L. Howard. 2010. "It may not take a village: Increasing achievement among the poor." *Unpublished paper (Harvard University)* 1–35.

DeLuca, Stefanie, and Elizabeth Dayton. 2009. "Switching Social Contexts: The Effects of Housing Mobility and School Choice Programs on Youth Outcomes." *Annual Review of Sociology* 35(1):457–91.

Dobbie, Will, RG Fryer, and G. Fryer Jr. 2011. "Are High-Quality Schools Enough to Increase Achievement Among the Poor? Evidence from the Harlem Children's Zone." *American Economic Journal: Applied Economics* 3(July):158–87.

Dornbusch, S. M., P. L. Ritter, and L. Steinberg. 1991. "Community influences on the relation of family statuses to adolescent school performance: differences between African Americans and Non-Hispanic Whites." *American Journal of Education* 38:543–67.

Duncan, GJ. 1994. "Families and Neighbors as Sources of Disadvantage in the Schooling Decisions of White and Black Adolescents." *American Journal of Education* 103(1):20–53.

Duncan, Greg J., and J. Lawrence Aber. 1997. "Neighborhood models and measures." in *Neighborhood poverty: context and consequences for children (Vol. I)*. New York: Russell Sage Foundation.

Ellen, Ingrid Gould, and Katherine O'Regan. 2008. "Reversal of Fortunes? Lower-income Urban Neighbourhoods in the US in the 1990s." *Urban Studies* 45(4):845–69.

Ellen, Ingrid Gould, and Margery Austin Turner. 1997. "Does neighborhood matter? Assessing recent evidence." *Housing Policy Debate* 8(4):833–66.

Elliott, Delbert S. et al. 1996. "The effects of neighborhood disadvantage on adolescent development." *Journal of Research in Crime and Delinquency* 33(4):389–426.

Entwisle, Doris R., Karl L. Alexander, and Linda S. Olson. 1994. "The gender gap in math: Its possible origins in neighborhood effects." *American Sociological Review* 59(6):822–38.

Fischer, MJ, and JA Kmec. 2004. "Neighborhood Socioeconomic Conditions as Moderators of Family Resource Transmission: High School Completion among At-Risk Youth." *Sociological Perspectives*.

Freeman, Lance. 2006. *There goes the 'hood: Views of gentrification from the ground up*. Philadelphia: Temple University Press.

Galster, George C., Roberto G. Quercia, Alvaro Cortes, and Ron Malega. 2003. "The Fortunes of Poor Neighborhoods." *Urban Affairs Review* 39(2):205–27.

Ginther, Donna, Robert Haveman, and Barbara Wolfe. 2011. "Neighborhood Attributes as Determinants of Children's Outcomes : How Robust Are the Neighborhood Attributes as Determinants of Children's Outcomes How Robust are the Relationships?" *The Journal of Human Resources* 35(4):603–42.

Grogan, Paul S., and Tony Proscio. 2002. *Comeback cities: A blueprint for urban neighborhood revival*. 2nd ed. Boulder, CO: Westview Press.

Hackworth, Jason. 2007. *The Neoliberal City: Governance, Ideology, and Development in American Urbanism*. Ithaca, NY: Cornell University Press.

Halpern-Felsher, Bonnie L. et al. 1997. "Neighborhood and Family Factors Predicting Educational Risk and Attainment in African American and White Children and Adolescents." Pp. 146–73 in

Neighborhood Poverty, edited by Jeanne Brooks-Gunn, Greg J Duncan, and J. Lawrence Aber. New York: Russell Sage Foundation.

Harding, DJ. 2003. "Counterfactual Models of Neighborhood Effects: The Effect of Neighborhood Poverty on Dropping Out and Teenage Pregnancy1." *American Journal of Sociology* 109(3):676–719.

Haviland, Amelia, Daniel S. Nagin, and Paul R. Rosenbaum. 2007. "Combining propensity score matching and group-based trajectory analysis in an observational study." *Psychological methods* 12(3):247–67.

Jargowsky, Paul A. 2003. *Stunning Progress, Hidden Problems: The Dramatic Decline of Concentrated Poverty in the 1990s*.

Jencks, Christopher, and Susan E. Mayer. 1990. "The social consequences of growing up in a poor neighborhood." in *Inner-city poverty in the United States*, edited by Laurence E. Lynn and Michael G.H. McGeary. Washington, D.C.: National Academy Press.

Keele, Luke. 2010. "An overview of rbounds : An R package for Rosenbaum bounds sensitivity analysis with matched data." (1):1–15.

Kingsley, G. Thomas, and Kathryn L. S. Pettit. 2003. "Concentrated Poverty : A Change in Course." (2).

Kneebone, Elizabeth, and Jane Williams. 2012. *New census data show metro poverty's persistence in 2012*. Washington, D.C.

Komro, Kelli a, Brian R. Flay, and Anthony Biglan. 2011. "Creating nurturing environments: a science-based framework for promoting child health and development within high-poverty neighborhoods." *Clinical child and family psychology review* 14(2):111–34.

Kupersmidt, Janis B., Pamela C. Griesler, Melissa E. DeRosier, Charlotte J. Patterson, and Paul W. Davis. 1995. "Childhood aggression and peer relations in the context of family and neighborhood factors." *Child Development* 66(2):360–75.

Lees, Loretta, Tom Slater, and Elvin Wyly. 2008. *Gentrification*. New York: Routledge.

Leventhal, Tama, and Jeanne Brooks-Gunn. 2000. "The neighborhoods they live in: The effects of neighborhood residence on child and adolescent outcomes." *Psychological Bulletin* 126(2):309–37.

Leventhal, Tama, and Jeanne Brooks-Gunn. 2011. "Changes in neighborhood poverty from 1990 to 2000 and youth's problem behaviors." *Developmental psychology* 47(6):1680–98.

Leventhal, Tama, and Veronique Dupere. 2011. "Moving to Opportunity: Does long-term exposure to 'low-poverty' neighborhoods make a difference for adolescents?" *Social Science & Medicine* 73:737–43.

Leventhal, Tama, Véronique Dupéré, and Jeanne Brooks-Gunn. 2009. "Neighborhood Influences on Adolescent Development." in *Handbook of Adolescent Psychology*, edited by Richard M Lerner and Lawrence Steinberg. Hoboken, NJ: Wiley & Sons.

López Turley, Ruth N. 2003. "When do neighborhoods matter? The role of race and neighborhood peers." *Social Science Research* 32(1):61–79.

Ludwig, Jens et al. 2013. "Long-Term Neighborhood Effects on Low-Income Families: Evidence from Moving to Opportunity." *American Economic Review Papers and Proceedings* 103(3):226–31.

Lund, Terese J., and Eric Dearing. 2013. "Is Growing Up Affluent Risky for Adolescents or Is the Problem Growing Up in an Affluent Neighborhood?" *Journal of Research on Adolescence* 23(2):274–82.

Massey, Douglas S., and Nancy A. Denton. 1993. *American apartheid: Segregation and the making of the underclass*. Cambridge, MA: Harvard University Press.

McKinnish, Terra, Randall Walsh, and T. Kirk White. 2010. "Who Gentrifies Low-Income Neighborhoods?" *Journal of urban economics* 67(2):180–93.

Murnane, Richard J., and John B. Willett. 2011. *Methods matter: Improving causal inference in educational and social science research*. New York: Oxford University Press.

Murnane, Richard J., John B. Willett, and Frank Levy. 1995. "The growing importance of cognitive skills in wage determination." *Review of Economics and Statistics* 77:251–66.

Noguera, Pedro A. 2003. *City schoolds and the American dream: reclaiming the promise of public education*. New York: Teachers College Press.

Owens, A. 2010. "Neighborhoods and Schools as Competing and Reinforcing Contexts for Educational Attainment." *Sociology of Education* 83(4):287–311.

Pattillo, Mary. 2007. *Black on the block: The Politics of race and class in the city*. Chicago: University of Chicago Press.

Rosenbaum, Paul R. 2002. *Observational studies*. 2nd ed. New York: Springer.

Rosenbaum, Paul R., and Donald B. Rubin. 1983. "The central role of the propensity score in observational studies for causal effects." *Biometrika* 70(1):41–55.

Rubin, Donald B. 1974. "Estimating causal effects of treatments in randomized and nonrandomized studies." *Journal of Educational Psychology* 66(5):688–701.

Rumberger, Russell W. 2001. *Why Students Drop Out of School and What Can be Done*. Civil Rights Project.

Sampson, RJ. 2008. "Moving to Inequality : Neighborhood Effects and Experiments Meet Social Structure." *American Journal of Sociology* 114(1):189–231.

Sampson, Robert J., and JD Morenoff. 1997. "Ecological Perspectives on the Neighborhood Context of Urban Poverty: Past and PResent." Pp. 1–22 in *Neighborhood Poverty*, edited by Jeanne Brooks-Gunn, Greg J Duncan, and J Lawrence Aber. New York: Russell Sage Foundation.

Sampson, Robert J., Patrick Sharkey, and Stephen W. Raudenbush. 2008. "Durable effects of concentrated disadvantage on verbal ability among African-American children." *Proceedings of the National Academy of Sciences of the United States of America* 105(3):845–52.

Sanbonmatsu, Lisa, Jeffrey R. Kling, Greg J. Duncan, and Jeanne Brooks-Gunn. 2006. "Neighborhoods and academic achievement : Results from the Moving to Opportunity experiment." *Journal of Human Resources* 41(4):649–91.

Schott Foundation for Public Education. 2012. *The Urgency of Now: The Schott 50 State Report on Black Males and Public Education*. Cambridge, MA.

Sekhon, J. 2011. "Multivariate and Propensity Score Matching Software with Automated Balance Optimization: The Matching Package for R." *Journal of Statistical Software* 42(7).

Sharkey, P. 2012. "An Alternative Approach to Addressing Selection Into and Out of Social Settings: Neighborhood Change and African American Children's Economic Outcomes." *Sociological Methods & Research* 41(2):251–93.

Solon, Gary, ME Page, and GJ Duncan. 2000. "Correlations between neighboring children in their subsequent educational attainment." *Review of Economics and Statistics* 82(August):383–92.

Steinberg, L., and a S. Morris. 2001. "Adolescent development." *Annual review of psychology* 52:83–110.

Sum, Andrew, and Paul Harrington. 2003. *The Hidden Crisis in the High School Dropout Problems of Young Adults in the U.S.: Recent Trends in Overall School Dropout Rates and Gender Differences in Dropout Behavior*. Washington, D.C.

Swanson, Christopher B. 2009. *Closing the Graduation Gap Educational and Economic Conditions in America ' s Largest Cities*.

Vartanian, Thomas P., and Philip M. Gleason. 1999. "Do neighborhood conditions affect high school dropout and college graduation rates?" *The Journal of Socio-Economics* 28(1):21–41.

Vigdor, J. L. 2002. "Does Gentrification Harm the Poor?" *Brookings-Wharton Papers on Urban* (October).

Wilson, William Julius. 1987. *The truly disadvantaged: The inner city, the underclass, and public policy*. Chicago: University of Chicago Press.

Wodtke, G. T., D. J. Harding, and F. Elwert. 2011. "Neighborhood Effects in Temporal Perspective: The Impact of Long-Term Exposure to Concentrated Disadvantage on High School Graduation." *American Sociological Review* 76(5):713–36.