The Effects of Social Context on Youth Outcomes: Studying Neighborhoods and Schools Simultaneously

NOLI BRAZIL

Yale University

Background/Context*: A long line of research has empirically examined the effects of social context on child and adolescent well-being. Scholars have paid particular attention to two specific levels of social context: the school and neighborhood. Although youths occupy these social contexts simultaneously, empirical research on schools and neighborhoods has largely been conducted independently of one another.*

Purpose/Objective/Research Question/Focus of Study*: This study reviews neighborhood and school effects studies conducted between 2005 and 2013 to determine the degree to which these research domains have exclusively examined a single context. The study then uses nationally representative data to compare estimates of school and neighborhood effects across a variety of youth outcomes. The comparison reveals how much estimates of school and neighborhood effects change after accounting for both levels of context.*

Research Design*: Cross-classified random effects models are used to estimate the effects of school and neighborhood disadvantage on a variety of youth outcomes. For each youth outcome, I compare the effects of concentrated disadvantage and the percent of variation explained at the school and neighborhood levels across two models: a single context effects model that includes only the school or neighborhood and a model including characteristics of both contexts.*

Findings/Results*: Of the 238 school and neighborhood effects studies examined in the review, only 46, or 21%, account for both neighborhoods and schools in the analysis. The multivariate regression results indicate that excluding a level of context has greater consequences on the estimates of neighborhood effects than on school effects. However, ignoring the neighborhood obscures its independent effects on key adolescent outcomes.*

Conclusions/Recommendations*: An empirical analysis of context effects on youth well-being should account for both neighborhoods and schools in order to minimize bias in parameter estimates. Furthermore, simultaneously analyzing schools and neighborhoods will move the study of school and neighborhood effects forward by illuminating policies and strategies in which neighborhoods and schools can work together to increase the overall well-being of children and adolescents.*

Teachers College Record Volume 118, 070307, July 2016, 30 pages

0161-4681

INTRODUCTION

Scholars have identified childhood and adolescence as the stages in the life course during which individuals are most susceptible to social and environmental factors (Duncan et al., 2007; Huston & Ripke, 2006). While research on social context has primarily focused on the family, there has been growing concern over the roles that schools and neighborhoods play in shaping youth outcomes. This growing concern, along with the development of more sophisticated statistical methods, increased computing power, and the growing availability of large data sets containing information on schools and neighborhoods, has established two closely related but distinct research domains: the quantitative estimation of school and neighborhood effects.

A review of the empirical literature reveals that the dominant research approach in both domains involves examining schools and neighborhoods separately (Leventhal & Brooks-Gunn, 2000). This may come as a surprise given that the two domains emanate from analogous theoretical perspectives, use comparable methodological procedures, and investigate similar youth outcomes. Moreover, the few studies that consider both neighborhoods and schools find that estimates from single-level models change after including characteristics of both contexts (Ainsworth, 2002; Condron, 2009; Owens, 2010; Rendon, 2013). Ignoring a nested level of context (children are nested within both schools and neighborhoods) violates the independence assumption that is required for typical regression procedures. Furthermore, ignoring a level that jointly affects the outcome and the included levels leads to biased results.

One can minimize these issues by adding controls for the excluded context. However, treating the school or neighborhood as merely a factor to control for obscures the complex relationship between the two institutions. If scholars are interested in fully understanding the role that social context plays in child and adolescent development, they must consider not only how schools and neighborhoods independently affect youth well-being, but also how they substitute for, moderate, and mediate one another. For example, neighborhood collective efficacy may not just have a direct, independent effect on adolescent delinquency, but it may also work through and be augmented by certain schooling mechanisms, such as the disciplinary climate of the school. Thus, examining single context effects by controlling for other environments is valid only if the different context effects are considered to be theoretically independent.

The aim of this paper is to delineate the problems with ignoring a level of context in the estimation of neighborhood and school effects on youth outcomes. Drawing from a large collection of studies conducted between 2005 and 2013, I summarize the recent quantitative literature

on neighborhood and school effects on child and adolescent outcomes to determine the extent to which these research domains have exclusively examined a single context. The paper then outlines the theoretical and methodological reasons for including both neighborhoods and schools in a single model. Finally, data from the National Longitudinal Study of Adolescent to Adult Health (Add Health) are used to compare school and neighborhood effects across a variety of youth outcomes. The comparison illuminates the degree to which empirical estimates of school and neighborhood effects change after accounting for both levels of context.

REVIEW OF THE EMPIRICAL RESEARCH ON SCHOOL AND NEIGHBORHOOD EFFECTS

Many trace the modern development of school effects research to the Equality of Educational Opportunity Report, published in 1966. The report investigated the association between a variety of school-level inputs and children's academic performance (Coleman et al., 1966). Likewise, a series of seminal works, most notably by William Julius Wilson (1987) and Jencks and Mayer (1990), sparked the modern movement in neighborhood effects research, which has focused primarily on outcomes measured during childhood and adolescence because it is at these stages of the life course when individuals are most vulnerable to external social factors and contexts (Duncan et al., 2007). The evidence from these two streams of research suggests that schools and neighborhoods have non-trivial, independent effects on a variety of youth outcomes, including academic achievement, physical health, goal setting, expectations, and mental well-being (Borman & Dowling, 2010; Dietz, 2002; Dreeben, 1994; Jencks & Mayer, 1990; Johnson, 2012; Sampson, Morenoff, & Gannon-Rowley, 2002; Rumberger & Palardy, 2005).

More generally, scholars of human development argue that a variety of social contexts influences development and that the interdependency of these contexts impacts the shape of human lives (e.g., Bronfenbrenner, 1979, 1994). However, recent articles have brought to light that neighborhood and school effects research are often conducted separately despite being grounded in similar theories of social context (Kirk, 2009; Owens, 2010; Rendon, 2013). In a review of 42 empirical neighborhood effects studies published between 1990 and 1998, Leventhal and Brooks-Gunn (2000) found only two articles that examined neighborhood and schools simultaneously. In the 14 years since this review, have empirical researchers been more cognizant of the possible dual influence of schools and neighborhoods on children? A review of neighborhood and school effects studies from 2005 to 2013 offers an answer.

For this review, I identified and selected studies in three stages. In the first stage, I followed the sampling procedure described by Fletcher, Bonell, and Hargreaves (2008), which uses a keyword search on appropriate free-text and thesaurus terms relating to "neighborhood" (e.g., community, census tract, locality) and "school" (e.g., secondary school, high school, elementary) using three electronic databases: ERIC, JSTOR, and Google Scholar. In the second stage of the selection process, I used the snowball sampling strategy employed by Johnson (2010), which uses the references of articles found in the first stage to identify additional studies.

In the final stage of selection, I included research that met the following six criteria. First, because the focus of this study is on the empirical estimation of neighborhood and school effects, I exclude studies introducing new statistical methods, literature reviews, and analyses based on qualitative, purely theoretical, mixed methods, and ethnographic work. Given this restriction, the review cannot speak to the qualitative literature on schools and neighborhoods. Second, because I am only concerned with contextual effects on youths, I include only studies that examine outcomes focused on children or adolescents. This criterion excludes analyses that use outcomes measured at the parent, teacher, administrator, school, or neighborhood levels. Third, I limit the review to studies that restrict their analytic populations to school-age children,[1] who are simultaneously exposed to schools and neighborhoods and most susceptible to context effects. Fourth, I include only studies published in peer-reviewed journals, which excludes dissertations, working papers, and policy reports, which are often not publicly accessible. Fifth, I exclude studies using data from quasi and randomized control experiments. Studies relying on these research designs and statistical procedures argue that all contexts, including individual, family, school, and neighborhood, are controlled for. However, assessing this argument is often difficult. For example, several researchers have questioned the validity of estimating neighborhood effects using randomized housing mobility programs given the noncompliance of selected families and the ambiguity of the treatment (Clark, 2008; Sampson, 2008). In the case of the Moving to Opportunity experiment, a federally funded housing mobility voucher and assistance program, some families elect to keep their children enrolled in their previous schools, which brings into question whether the experiment fully controls for school context (Briggs, Ferryman, Popkin, & Rendón, 2008). Finally, I include research analyzing only United States data.

Meeting the criteria outlined above were 238 studies.[2] Of these studies, only 46 or 21% account for both neighborhoods and schools, which is a relatively small percentage given the rapid rise in the number of school and neighborhood effects studies conducted in recent years. These studies

explicitly model both contexts by including either school and neighborhood random or fixed effects, or variables measuring characteristics of the neighborhood and school.

Table 1 breaks down the 238 studies by outcome variable and method of analysis. Note that the total number of studies represented in this table is greater than 238 because several articles examine more than one type of outcome. The *achievement* category includes studies of cognitive and academic-related variables, such as grades, standardized test scores (including growth scores), enrollment, graduation, and dropout status. The *health* category includes measures of both physical (e.g., BMI) and mental (e.g., stress) health and well-being. The *behaviors* category contains studies examining risk-taking behaviors, such as smoking, alcohol intake, sexual activity, and violence towards peers. The *attitude/goals/expectations* category includes studies examining variables measuring a child's evaluation of him or herself (e.g., self-efficacy, self-esteem), others (e.g., friendships, teachers), future outcomes (e.g., expectations for college enrollment), and the neighborhood or school (e.g., safety, connectedness). The *adult-related* category includes analyses of outcomes measured after adolescence, such as college enrollment and achievement, labor market outcomes, marriage, and fertility.

Table 1. School, Neighborhood and School-Neighborhood Studies by Outcome and Method of Analysis

	School	Neighborhood	Both
Youth Outcome			
Achievement	66.7%	21.3%	43.5%
Attitude/Goals/Expectations	15.3%	3.8%	2.2%
Health	5.4%	18.8%	8.7%
Behaviors	11.7%	57.5%	41.3%
Adult-Related	6.3%	2.5%	13.0%
Multilevel	64.9%	55.0%	78.3%
Total	112	80	46

Percentage values reflect proportion of total

Table 1 shows that studies that include only the school level typically analyze achievement-related outcomes (66.7%) while articles that include only the neighborhood level often examine behavior-related outcomes (57.5%). A larger percentage of neighborhood-only studies examine adolescent health (18.8% vs. 5.4%) while a larger percentage of school-only studies examine attitude-related measures (15.3% vs. 3.8%). The majority

of studies that include both the neighborhood and school levels examine outcomes related to either academic achievement (43.5%) or behavior (41.3%). Although the majority of school-only and neighborhood-only effect studies utilize multilevel modelling, a much larger percentage of studies accounting for both levels rely on this technique. Studies accounting for both contexts that do not use multilevel models typically rely on structural equation models or some variant of ordinary least squares regression.

The results reveal that while researchers have become more diligent in including both schools and neighborhoods in their analyses, the overwhelming majority of studies in these domains still do not account for the influence of both contexts despite examining a similar set of child and adolescent outcomes and utilizing comparable empirical methods. Why do studies neglect to account for both school and neighborhood effects? What are they assuming when they ignore a level of context, and do they have the theoretical and empirical grounds for doing so? The following section outlines the reasons why neighborhood and school effects studies are often done in isolation from one another and examines the validity of these reasons.

MOTIVATION FOR STUDYING SCHOOLS AND NEIGHBORHOODS UNDER A SINGLE FRAMEWORK

Models of neighborhood and school effects on youth outcomes that do not incorporate measures of both levels of context implicitly assume that:

(1) Children with similar characteristics do not cluster in the excluded level;

(2) Variation in the excluded context does not explain variation in the outcome; and

(3) If it does, it is solely a function of the demographic and organizational characteristics of the included context.

Most school effects studies make no mention of possible neighborhood influence, thus implicitly assuming either (2) or (3). Studies that dismiss neighborhood influence argue that neighborhoods have little to no effect on child outcomes because their mechanisms are ill-defined and they have limited control and investment over child behavior (Johnson, 2008). Furthermore, some scholars argue that neighborhood influence is largely dependent on local school characteristics. For example, Bayoh, Irwin, and Haab (2006) find that school quality heavily factors into parental neighborhood choice, and Brunner and Sonstelie (2003) find that local housing prices are largely a function of school quality. However, we can conceive of the neighborhood as an isolated context that has a non-trivial influence

on the well-being of its residents. Scholars have identified several neighborhood characteristics that are partially or entirely outside the domain of the school, such as the strength of the local labor market and the types of adult role models students are exposed to in their neighborhoods (Arum, 2000; Bowen & Richman, 2002; Johnson, 2012; Warren, 2005). Additionally, recent work in urban sociology has made considerable strides in specifying the mechanisms linking neighborhoods to resident outcomes (Galster & Santiago, 2006; Sampson, 2001; Sampson et al., 2002).

Although most neighborhood effects studies do not entirely dismiss the impact of the school, they often refer to schools as institutions within the neighborhood (Ainsworth, 2002; Dupere, Leventhal, Crosnoe, & Dion, 2010; Jencks & Mayer, 1990; Rendon, 2013). Under this viewpoint, rather than having an independent influence on youths, schools are merely mechanisms or mediators of neighborhood influence. There is some evidence in the literature that supports this perspective. For example, several studies have found that school composition mirrors neighborhood composition along a number of important dimensions, including race, social class, and educational preparedness (Lee & Burkham, 2002; Massey & Denton, 1993; Saporito & Sohoni, 2007). However, Arum (2000) outlines the various ways schools are embedded not simply in local ecological communities, but in larger organizational fields, such as state regulations, professional associations, and market competitions that decouple schools from neighborhoods. He argues that defining the school in ecological terms at the neighborhood level "misses the extent to which school practices are shaped by larger sets of institutional forces" (Arum, 2000, p. 400). For example, variations in educational outcomes can be created by distinct school communities not solely based on residential neighborhood enrollment but through political factors such as court-ordered desegregation. Bronfenbrenner (1979) also argues that schools have become more isolated from the neighborhood because they have become larger, farther away from the homes of students, populated by youth from different neighborhoods, and staffed by nonlocal employees.

The empirical evidence from the few studies that simultaneously account for the influence of schools and neighborhoods suggests that both contexts have independent effects on adolescents. For example, Rendon (2013) finds that school type, size, proportion Black and Hispanic, and neighborhood median age affect the probability of dropping out of high school when simultaneously controlling for school and neighborhood characteristics. In his analysis of family, school, and neighborhood influences on adolescent delinquency, Kirk (2009) finds joint and independent effects of neighborhood and school characteristics on student suspension and juvenile arrest. He concludes "that it is not the case that

neighborhoods characterized by concentrated poverty and a deficit of collective efficacy necessarily contain dangerous schools and unstable families" (Kirk, 2009, p. 507). The modest correlation between neighborhood and school characteristics corroborates earlier findings from Cook, Herman, Phillips, and Settersten (2002), who find a weak coupling of the two institutions across a variety of characteristics.

Another argument for excluding the school or neighborhood is that there is considerable overlap in the youth populations that neighborhoods and schools draw from. However, there is evidence suggesting that schools are not completely nested within neighborhoods and vice versa. In fact, of the 132 schools sampled in the National Longitudinal Study of Adolescent to Adult Health (Add Health), a nationally representative sample of adolescents in grades 7–12 in the United States, 130 of them draw their students from as few as two neighborhood census tracts to as many as 224. Of the 2,344 census tracts included in the sample, 530 of them send adolescents to more than one school. This cross-classified structure means that not all students from the same neighborhood attend the same school. Similarly, not all students from the same school live in the same neighborhood. Therefore, through mechanisms like personal interactions, parents and children are exposed to different neighborhood and school norms and structural characteristics that may affect behaviors and personal values. For example, through their child's school, parents from low collective efficacy neighborhoods may meet parents from high collective efficacy neighborhoods who can provide the type of monitoring activities, such as after-school care and transportation to extracurricular activities, that are not found in their own neighborhoods. In these situations, although the child lives in a low collective efficacy neighborhood, which is associated with higher levels of adolescent crime, teenage pregnancy, and drug use, adult supervision reduces the risk of delinquent behavior (Sampson et al., 2002).

The assumption that there is significant overlap in neighborhood and school characteristics, mechanisms, and student populations is often used as a justification for excluding either institution in a model of social context. However, as described above, there is ample evidence that suggests that schools and neighborhoods independently influence youth development. In other words, neighborhoods are not simply a reflection of local schools and, as Reiss (1995, p. 307) notes, "schools are rarely a microcosm of the communities in which they are located." There are serious methodological and theoretical consequences for ignoring either schools or neighborhoods if both contexts independently and interdependently influence youth development. The following sections outline these consequences.

METHODOLOGICAL CONSEQUENCES OF IGNORING A LEVEL OF CONTEXT

Suppose we want to estimate the effect of some neighborhood level k characteristic D_k on an individual level i child outcome Y_{ik}. We can model the relationship between D_k and Y_{ik} using the following equation:

$$Y_{ik} = \beta_1 X_{ik} + \beta_3 Z_k + \theta D_k + z_k + \varepsilon_{ik}, \quad (1)$$

where X_{ik} denotes individual-level characteristics for individual i in neighborhood k, Z_k denotes neighborhood-level characteristics for neighborhood k, z_k is the unobserved neighborhood effect, and ε_{ik} is the unobserved individual effect.

Statistically, the presence of z_k creates a correlation between individuals within the same neighborhood, breaking the Gauss-Markov assumption that units are independent. If a correlation exists between sampled units, there is less information compared to a simple random sample of non-clustered individuals of a similar size. Ignoring this autocorrelation can result in an increased risk of finding a relationship where none exists (Skinner, Holt, & Smith, 1989). A common way of dealing with such issues is to use a multilevel model, which treats z_k as a random term with a (normal) probability distribution. In fact, as the review from the previous section revealed, most neighborhood and school effects researchers employ multilevel techniques to analyze their data. Rather than treating z_k as a nuisance to be controlled for, a multilevel framework models the term by using between-neighborhood variation, which assumes that neighborhoods are independent units, and thus leverages the correlated structure of the data to produce coefficient estimates with correct standard errors.

Many studies of neighborhood and school effects on youth-related outcomes estimate two-level (individual and neighborhood or school) multilevel models but stop there. However, other levels of context may be affecting the outcome of interest. By excluding an important level of context, we obtain biased model parameters due to two serious methodological issues: clustering and confounding. With regard to clustering, because children are not randomly sorted into schools or neighborhoods, students in the same school or neighborhood are likely similar across a broad range of characteristics, violating the Gauss-Markov assumption described earlier. By excluding a level, we ignore clustering within that level. Following the example from above, if students within schools are not independent, a school-level error term s_{jk} enters Equation 1, which causes correlation between individuals within the same school j. To solve these issues, we can use a three-level model to estimate the effects of D_k on Y_{ijk}. The first level is at the individual i:

$$Y_{ijk} = \beta_1 X_{ijk} + s_{jk} + \varepsilon_{ijk} \quad (2)$$

We assume that ε_{ijk} is normally distributed with mean s_{jk} and variance σ_i . The second level is at the school *j*:

$$s_{jk} = \beta_2 S_{jk} + z_k + \gamma_{jk} \quad (3)$$

We assume the school specific mean is distributed normally with mean z_k and σ_s. The third level is at the neighborhood *k*:

$$z_k = \alpha + \beta_3 Z_k + \theta D_k + \mu_k \quad (4)$$

Furthermore, we assume the neighborhood specific mean is also distributed normally with mean α and variance σ_n. Substituting Equations 3 and 4 into 2, we obtain the following:

$$Y_{ijk} = \alpha + \beta_1 X_{ijk} + \beta_2 S_{jk} + \beta_3 Z_k + \theta D_k + \mu_k + \gamma_{jk} + \varepsilon_{ijk}, \quad (5)$$

where μk is the neighborhood-level random error, γjk is the school-level random error and εik is the individual-level random error.

Ignoring clustering in a level will lead to an overestimation of the individual- and neighborhood- or school-level variances. For example, if we are interested in measuring the effects of neighborhood socioeconomic status on student test scores, the amount of variation in test scores related to differences between neighborhoods may be inflated if some of that variation can be explained by the schooling climate or the type of curriculum adopted by the school. Assuming a balanced sample, no random slopes and using a General Least Squares (GLS) estimation procedure, the estimates of the individual- and neighborhood-level variance components when ignoring the school level in a multilevel model are (Moerbeek, 2004):

$$\sigma_i = \sigma_i + \frac{n_i - 1}{n_i n_s - 1}\sigma_s$$

$$\sigma_n = \sigma_n + \frac{n_i n_s - n_i}{n_i n_s - 1}\sigma_s,$$

where n_i and n_s are the number of students and schools, respectively. Ignoring the school level distributes the school-level variance to the individual and neighborhood levels according to the number of units in the sample at each level. Similarly, ignoring the neighborhood level in a

school effects analysis also affects the proportion of variance explained at the level of interest, in this case the school level. The variance component at the individual level remains the same, but the variance at the school level is biased upwards (Moerbeek, 2004):

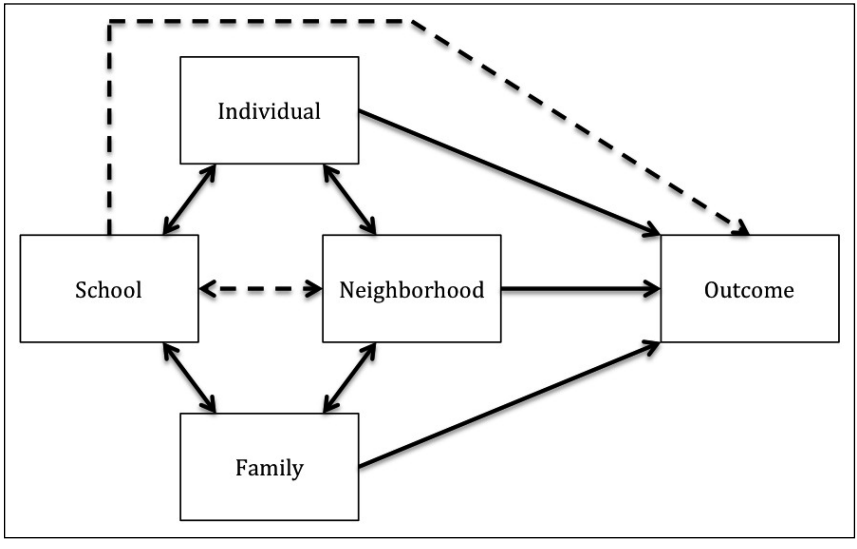
$$\sigma_i = \sigma_i$$
$$\sigma_s = \sigma_n + \sigma_s$$

The calculation for an unbalanced sample is not as straightforward; however, the general conclusion is that the explanatory power attributed to the included contexts is inflated when ignoring the school or neighborhood.

Ignoring levels will also alter coefficient estimates and their standard errors. Van den Noortgate, Opdenakker, and Onghena (2005) show that ignoring an intermediate level leads to an increased probability of type I error. Although the coefficient estimates at the neighborhood level remain consistent, their standard errors are artificially lowered, thus increasing the size of the test statistic and lowering the associated *p* value. This leads researchers to designate an explanatory (potentially causal) interpretation of the effects of specific neighborhood characteristics on an individual outcome when in reality there are either weaker or no relationships present. Moerbeek (2004) shows that ignoring a higher level such as the neighborhood results in greater variance of the coefficients at the next lowest level, such as the school, and thus in lower statistical power.

If schools and neighborhoods are separate entities that have independent effects on Y_{ijk}, then we just have a clustering problem when we ignore a level. However, schools and neighborhoods are not separate entities. By not controlling for the school variables that simultaneously correlate with the neighborhood and Y_{ijk}, we obtain biased estimates of the neighborhood effect Θ. This phenomenon is known as confounding and Figure 1 diagrams this problem. A majority of the neighborhood effects studies reviewed in the previous section control for individual- and family-level factors that correlate with both the neighborhood and the outcome of interest. However, if we do not account for the school, we incorrectly estimate Θbecause we include the dashed pathway shown in Figure 1, which represents the correlated relationship between the neighborhood, the school, and the outcome. An example of this phenomenon can be seen when a poor performing school simultaneously reduces neighborhood quality and a student's academic performance, the former through such mechanisms as reduced housing prices. We are essentially dealing with an omitted variables problem where some of Θ is driven by school characteristics, which are omitted from the analysis, that are simultaneously correlated with the neighborhood and the outcome of interest.

Figure 1. Modeling the effects of school and neighborhoods



THEORETICAL CONSEQUENCES OF IGNORING A LEVEL OF CONTEXT

Along with the methodological reasons outlined in the previous section, there are also theoretical incentives for including schools and neighborhoods in a single model. First, we may be interested in determining which of the two contexts, neighborhood or school, has a greater impact. We can only do this by including both levels of context in a model and statistically comparing σ_s and σ_n. In a similar vein, a number of studies have shown that some school and neighborhood mechanisms have different effects on varying indicators of youth well-being, supporting a differential perspective of effective schools and neighborhoods. That is, the mechanisms that promote learning may not be the ones that promote behaviors or attitudes. Boardman and Saint Onge (2005) measure the extent to which variation across 34 characteristics is due to variation among adolescents' neighborhoods or among adolescents within neighborhoods. They find that neighborhoods explain a non-trivial amount of variation in adolescent risk-taking behavior, educational outcomes, and integration within their families, schools, and churches. However, they find no evidence that neighborhoods are associated with physical or emotional well-being. In an examination of family, peer, school, and neighborhood influences on adolescent well-being and success, Cook et al. (2002) find that the cumulative and joint effects of schools and neighborhoods matter more in determining how adolescents

develop than their single independent influences, and that each setting affects a different set of outcomes, with schools having a greater effect on academic achievement and neighborhoods having a greater influence on school attendance and social activities.

Second, schools and neighborhoods are not completely independent of one another, but likely interact in complex ways to influence youth development. The ways in which these two institutions interact to affect children and adolescents is further complicated by the fact that their relationship likely changes depending on the outcome under study and whether or not school is in session (Condron, 2009). Ignoring the school or neighborhood prevents researchers from capturing these complex relationships.

The few studies that simultaneously examine neighborhood and school effects yield results that indicate significant interactions of the two contexts (for a complete review, see Johnson, 2012). For example, Ainsworth (2002) finds that school atmosphere mediates the relationship between student test scores and the proportion of high-status residents in a neighborhood. Sykes and Musterd (2011) and Rendon (2013) find that school socioeconomic status (SES) and racial composition fully mediate the relationships between neighborhood SES and test performance, and neighborhood racial composition and the probability of dropping out. Teitler and Weiss (2000) find that while the effects of school context on sexual activity does not change after accounting for the neighborhood, the effect of the neighborhood disappears after including school context.

A primary reason why many studies fail to account for both contexts is because there have been few attempts to integrate schools and neighborhoods under a single theoretical framework. We should not depend on theories or empirical models that ignore the school or neighborhood or capture only one aspect of their relationship. Instead, we need to rely on a theoretical framework that allows for the flexible testing of independent and interrelated school and neighborhood effects. Urie Bronfenbrenner's Ecological Systems Theory offers such a framework.

AN ECOLOGICAL FRAMEWORK OF NEIGHBORHOOD AND SCHOOL EFFECTS

Scholars from a variety of disciplines have developed a bevy of theoretical models to study the influence of social context on individuals (Johnson, 2012). Although they allude to the same underlying concepts, there have been few attempts to situate both neighborhoods and schools within these models. In this section, I draw from Bronfenbrenner's (1979, 1994, 2005) Ecological Systems Theory to fold the study of neighborhood and school effects under a single theoretical framework.

According to Bronfenbrenner's theory (1994), understanding individual developmental processes in isolation is impossible because the individual simultaneously shapes his environment and is shaped by those around him. In his ecological model, Bronfenbrenner situates the individual within a hierarchy of systems. The individual is the focal point because personal characteristics, such as age, race, and gender, play crucial roles in shaping the nature of the individual's relationship with his environment. Bronfenbrenner then builds a system of concentric layers surrounding the individual. The first layer is the microsystem, which refers to all the settings that a child interacts in and is influenced by. The direct effects of the neighborhood and school reside in this layer. Examples include aspects of the school and neighborhood that the child actively participates in, such as the child's classroom or the neighborhood park.

The second layer is the mesosystem, which includes the connections among the microsystems. In other words, a mesosystem is a system of microsystems. This is where the school and neighborhood interact to directly or indirectly affect the child. For example, an interaction of the socioeconomic conditions within neighborhoods and schools may show that attending a school with high-SES peers is most beneficial for students residing in low-SES neighborhoods.

The next layer, the exosystem, comprises the linkages taking place between two or more settings, at least one of which the child is not an active participant. The exosystem has an indirect effect on the child because the influence from the exosystem trickles down through other people in the child's life. New laws, government reform, and social unrest are a few examples of contexts that can dramatically affect a child's life and experiences even though the child may know nothing about them. The indirect or mediating effects of a neighborhood and school reside in this layer. Examples include neighborhood-level poverty, which affects the school resources the child has access to, and the overall quality of the school, which affects the types of families moving into a neighborhood. Bronfenbrenner's final layer is the macrosystem, which contains the cultural and societal norms that influence how children filter the information they receive from their environments.

Bronfenbrenner's model is meant to be a general framework for understanding ecological influences on individual development. He left his model as a skeleton for researchers interested in specific ecologies to fill in. Therefore, scholars interested in understanding the dual and separate influence of neighborhoods and schools need to position both literatures within his framework, situate within the model the general mechanisms that schools and neighborhoods work through to affect youth outcomes, and delineate the ways these mechanisms interact to produce different types of effects.

In the preceding sections, I found that a review of the recent empirical literature suggests that most neighborhood and school effects analyses only account for a single context, outlined the assumptions made when excluding either the school or neighborhood and why these assumptions may not be valid, described the theoretical and methodological consequences of ignoring an important level of context, and used Bronfenbrenner's Ecological System's Theory to establish a theoretical grounding for incorporating schools and neighborhoods under a single framework. In the following section I empirically estimate the changes in regression parameters, such as coefficient sizes, standard errors, and explained variation, from models accounting for just the school or neighborhood to models simultaneously accounting for both contexts.

DATA AND METHODS

To estimate the changes in empirical estimates of neighborhood and school effects, I use data from Add Health (Udry, 2003). Add Health is a nationally representative, probability-based survey of U.S. adolescents in grades 7 through 12 between 1994 and 1996 (Harris et al., 2003). The survey is based on a multistage cluster design in which the clusters were sampled with an unequal probability. At the first stage, 80 high schools and 52 middle schools were sampled with replacement in 1994 and 1995. Every student present in each sampled high school completed an in-school survey that collected information on demographic characteristics, family relationships, school activities, and attitudes, resulting in a census of the student body. At the second stage of sampling, 20,700 adolescents were sampled from the school rosters and were administered the Wave I in-home questionnaire in 1995. Contextual information for those taking the in-home survey was obtained by linking schools and geocoded student addresses to the 1990 census, the National Center for Education Statistics (NCES) Common Core of Data, and other national datasets. Approximately 14,700 Wave I students were reinterviewed in 1996 (Wave II) and 15,197 were reinterviewed in 2001–2002 (Wave III). The Add Health data set is one of the few social science data sets that contains a nationally representative sample of adolescents and provides information about multiple social contexts, allowing for an examination of family background, school, and neighborhood influences.

In the analysis below, I rely on data from all three waves. All family background, school, and neighborhood data are taken from the Wave I survey, while outcome variables are taken from Wave II and III data. After eliminating respondents who have a missing value on wave-specific sampling weights, tract identification, and any of the outcome variables, 11,615 and

13,490 adolescents remain for the Wave II and Wave III samples, respectively. The final Wave II sample consists of 122 schools and 1,594 neighborhoods while the final Wave III sample consists of 123 schools and 1,749 neighborhoods.

SCHOOL AND NEIGHBORHOOD DISADVANTAGE

A major goal of this study is to evaluate the changes in the coefficient sizes and standard errors of neighborhood and school characteristics after including both contexts into a single model. In the analysis, I focus on the effects of neighborhood and school disadvantage. As a proxy for structural characteristics, disadvantage is a commonly used indicator of neighborhood and school effects. The measure is highly correlated with the quality and quantity of resources in a school or neighborhood and reflects the type of socioeconomic composition that serves to buffer against poverty and negative norms and behaviors (Wilson, 1987). Drawing on variables used in past research, the neighborhood disadvantage index is based on the following 1990 census characteristics measured at the tract level: percent Black, percent of female-headed households, percent receiving public assistance, percent of individuals under the poverty line, and the unemployment rate. Higher values on this index reflect greater neighborhood disadvantage. I define students' neighborhoods as the 1990 census tract to which their residential address was geocoded at Wave I.

The school disadvantage index is composed of the following four school-level variables: the proportion of students living with two parents, the proportion Black, average highest parental educational attainment, and the percent of students enrolled in a free and reduced-price meal program. The first three variables are taken from the Wave I in-school survey, and the free and reduced-price meal variable is taken from the 1994 NCES common core. Higher values on this index indicate greater levels of disadvantage within a school. I construct the two indices using a principal components factor analysis with a varimax rotation.

OUTCOMES

In the analysis, I examine the effects of school and neighborhood disadvantage on measures of adolescent academic achievement, behavior, attitude, and mental health. I measure academic achievement using two variables: the student's Wave II self-reported grade point average (GPA) and whether or not the student graduated from high school by Wave III. GPA is measured by averaging self-reported grades from the in-home survey for four subjects: English, Math, Science and History/Social Studies. Each grade is measured on a four-point scale with A = 4, B = 3, C = 2, and

D/F = 1. A recent study found that correlations between actual and self-reported GPAs range from a low of 0.45 to a high of 0.98, and over-reporting is more frequently found among students with lower GPA than those with higher GPA (Kuncel, Crede, & Thomas, 2005); thus, the results likely produce upwardly biased estimates, specifically for low-performing groups.

I use the propensity towards violence and adolescent premarital sex to measure youth behavior. Violent behavior was assessed by five survey items addressing participation in various acts of violence. The premarital sex variable measures (0 = No, 1 = Yes) whether the adolescent engaged in premarital sex between Wave I (when almost all respondents are age 13 to 18) and Wave II (about a year later on average).

I use a measure of depression to capture student health. A modified version of the Center for Epidemiologic Studies Depression scale (CES-D) was used to assess depressive symptoms. The CES-D is a well-validated epidemiological screening tool widely used in adult and adolescent populations (Radloff, 1977). Depressive symptoms are assessed by nine items measuring dysphoric mood, vegetative symptoms, and hopelessness within the past week of taking the survey. My measure of attitude captures an adolescent's self-esteem, which was assessed by six items addressing feelings of self-worth and acceptance. Answers are coded such that higher values on the index capture lower self-esteem. Table 2 lists the variables and items used to construct the indices.

Table 2. Composite Measures for School, Neighborhood, and Outcome Variables

	Scale	Variable or Survey Item
Neighborhood	Disadvantage[a]	-Percent Black
		-Percent female-headed households
		-Percent households receiving public assistance
		-Percent of individuals under the poverty line
		-Unemployment Rate
School	Disadvantage	-Percent of students living with two parents[b]
		-Percent Black[b]
		-Parental highest level of education[b]
		-Percent enrolled in a Free and Reduced-Price Meal Program[c]
Outcomes	Violent Behavior (in the past 12 months)[d]	-Use or threaten to use a weapon to get something from someone (0 = never, 3 = 5 or more times)

Scale	Variable or Survey Item
	-Take part in a group fight (0 = never, 3 = 5 or more times)
	-Get into a serious physical fight (0 = never, 3 = 5 or more times)
	-Pulled a knife or gun on someone (0 = never, 2 = more than once)
	-Shot or stabbed someone (0 = never, 2 = more than once)
Depression (in the past seven days; 0 = never or rarely, 3 = most of the time or all the time) [d]	
	-Felt sad
	-Felt depressed
	-Felt lonely
	-Felt fearful
	-Bothered by things -Had a poor appetite -Had the blues -Felt life was not worth living -Thought life had been a failure
Self-Esteem (1 = strongly agree, 5 = strongly disagree)[d]	-I have a lot to be proud of
	-I have a lot of good qualities
	-I like myself the way I am
	-I feel I do everything just right
	-I feel socially accepted
	-I feel loved and wanted

[a]From 1990 decennial census
[b]From Add Health Wave I in-school survey
[c]From 1994 NCES Common Core
[d]From Add Health Wave II in-home survey

Composites are constructed using principal components factor analysis with a varimax rotation.

Source: National Longitudinal Study of Adolescent Health

CONTROL VARIABLES

To minimize selection bias due to differences among adolescents across neighborhoods and schools, I include several individual- and family-level controls that are associated with child and adolescent well-being (Owens, 2010; Rumberger & Palardy, 2005). Measured at Wave I, these controls include race and ethnicity, household income, whether the adolescent lives with both of his biological parents, gender, highest parental educational attainment, grade level, the adolescent's Wave I score on an abridged version of the Peabody Picture Vocabulary Test (PPVT), and the number of years lived in the Wave I neighborhood. Grade levels for students' missing grade data were calculated based on age, with 12-year olds assigned to 7th grade, 13- and 14-year olds to 8th grade, 15-year olds to 9th grade, 16-year olds to 10th grade, 17-year olds to 11th grade, and 18-year olds and older to 12th grade. I imputed missing values on other control variables using multiple imputation with 10 replications. I also control for a set of neighborhood and school background characteristics, including the proportion of neighborhood residents 25 and older with a college degree, the proportion of residents with a managerial/professional job, school type (Public or Private), school region (South versus other), and school location (urban, suburban or rural). Table 3 presents unweighted descriptive statistics of the independent and dependent variables.

ANALYTIC STRATEGY

The current analysis is not meant to be a comprehensive examination of school and neighborhood influences on child well-being. Instead, the goal of the analysis is to provide answers to the following three questions:

(1) Does the percent of variation in youth outcomes explained by variation between neighborhoods and schools change after accounting for both schools and neighborhoods?

(2) Do the effects of school and neighborhood disadvantage change after accounting for both schools and neighborhoods?

(3) Do the answers to Questions 1 and 2 vary by outcome?

Answers to these questions will shed light on the amount of bias introduced in the estimates of neighborhood and school effects when ignoring either context.

The majority of neighborhood and school effects studies reviewed in the previous section have used multilevel models to analyze their data. Researchers rely on multilevel models not only to account for the problem of clustering, but also because the model allows researchers to identify the

Table 3. Descriptive Statistics for Dependent and Independent Variables

	Mean	SD
Dependent Variables		
Violent behavior	-0.044	(0.838)
Had premarital sex	29.5%	
Depression	-0.035	(0.902)
Self-esteem	0.029	(0.927)
GPA	2.794	(0.702)
Graduated from high school	82.4%	
Individual and Family Characteristics		
Female	51.9%	
Race: Non-Hispanic White	51.3%	
Race: Non-Hispanic Black	20.5%	
Race: Non-Hispanic Asian	6.6%	
Race: Hispanic	15.2%	
Race: Other	6.5%	
Highest Parental Education: Less than High School	11.5%	
Highest Parental Education: High School Degree	54.2%	
Highest Parental Education: College Degree	34.4%	
Lives with both biological parents	54.2%	
Household Income (in thousands)	45.941	(58.515)
PPVT Score	100.463	(13.992)
Grade Level	9.225	(1.343)
Time at residence (years)	7.476	(5.069)
School Characteristics		
School Disadvantage	0.000	(1.000)
Public	92.4%	
Location: Urban	28.6 %	
Location: Suburban	53.4%	
Location: Rural	18.0%	
Region: South	37.6%	
Neighborhood Characteristics		
Neighborhood Disadvantage	0.000	(1.000)
Residents 25 and older with college degree	22.5%	(11.7)
Residents with a managerial/professional job	19.7%	(9.1)

Individual and family control variables and school and neighborhood characteristics are measured at Wave I. All dependent variables are measured at Wave II except the indicator of high school graduation, which is measured at Wave III.

percent of variation in the outcome variable accounted for by each level. Researchers do not necessarily need to rely on multilevel models to obtain context effects. However, tradition has established such techniques as the norm in the empirical literature. As such, I use multilevel modelling techniques in this analysis.

When examining the effects of two levels, the individual and school or neighborhood, I fit a two-level linear multilevel model that includes random intercepts at the individual and school/neighborhood levels. However, studying the effects of the individual, school, and neighborhood together poses a nontrivial methodological problem. While individuals are nested within schools and neighborhoods, it may not be the case that schools are nested within neighborhoods and vice versa. Children living in the same neighborhood may be attending different schools, and students attending the same school may be living in different neighborhoods, many of which are outside of the school's attendance zone. This type of data structure does not lend itself to traditional multilevel techniques. In this analysis, forcing the data into a nested structure would mean eliminating 942 tract-school units.

In order to deal with such data structures, I employ a cross-classified random effects model (Goldstein, 1994; Raudenbush, 1993). The model specification still follows Equation 5, however the random intercepts μ_k and γ_{jk} are crossed instead of nested. The random intercept for the school is shared across all neighborhoods for a given school *j,* whereas the random intercept for the neighborhood is shared by all schools in a given neighborhood *k*. The residual error ε_{ijk} comprises both the interaction between neighborhood and school and any other effect specific to school *j* in neighborhood *k*.

RESULTS

Tables 4–6 show results for two-level and cross-classified random effects models by adolescent outcome. Each table is similarly constructed in that the first column shows results for a two-level model that includes only the individual and school, the next column shows results for a two-level model that includes only the individual and neighborhood, and the last column shows results for a cross-classified model that includes the individual and both institutions. The rows provide regression estimates for intraclass correlations and the effects of school and neighborhood disadvantage.

Table 4 shows results using student GPA and the probability of graduating from high school as the dependent variables. In a school-only model, school disadvantage has no effect on student GPA but has a negative effect on the probability of graduating from high school. In a neighborhood-only

model, neighborhood disadvantage has statistically significant negative effects on GPA and the probability of graduating. The percent of variation explained by schools for both outcomes is 6% while for neighborhoods it is 7% and 4% for GPA and the probability of graduating, respectively.

Table 4. Two-Level and Cross-Classified Random Effects Models: Education

	GPA			Graduate High School		
	School	**Neighborhood**	**Both**	**School**	**Neighborhood**	**Both**
School Disadvantage	-0.026		-0.011	-0.029***		-0.020*
	(0.018)		(0.019)	(0.007)		(0.008)
Neighborhood Disadvantage		-0.043***	-0.028**		-0.029***	-0.024***
		(0.013)	(0.013)		(0.006)	(0.006)
Intraclass Correlation						
School	0.06		0.05	0.06		0.05
Neighborhood		0.07	0.01		0.04	0.02

*$p < 0.05$. **$p < 0.01$. ***$p < 0.001$ (two-tailed test).

Values in parentheses are standard errors. All models include individual, family, school, and neighborhood control variables listed in Table 3.

I find several changes after including both schools and neighborhoods in a cross-classified model. First, the effect sizes on the neighborhood disadvantage coefficients for GPA and graduation significantly decrease. Similarly, the effect of school disadvantage on the probability of graduating also decreases. Lastly, while the percent of variation explained by the school slightly changes, the percent of variation explained by the neighborhood significantly decreases, going from 7% to 1% for GPA and from 4% to 2% for graduation.

Table 5 shows results for adolescent violent behavior and sexual activity. In the two-level models, neighborhood disadvantage has no statistically significant effects on either outcome while school disadvantage has no effect on violent behavior but significantly increases the probability of adolescent sexual activity. The neighborhood and school null effects do not change after simultaneously accounting for both institutions. However,

the school effect on sexual activity disappears. Similar to the education-related outcomes, the percent of variation in either violent behavior or sexual activity explained by the school slightly decreases after accounting for the neighborhood. However, the percent of variation explained by the neighborhood decreases substantially from the neighborhood-only to the cross-classified model. The neighborhood explains 10% of the variation in both outcomes in two-level models but only 5% and 2% for violent behavior and sexual activity, respectively, in models that also include the school.

Table 5. Two-Level and Cross-Classified Random Effects Models: Behavior

	Violent Behavior			Sexual Activity		
	School	Neighborhood	Both	School	Neighborhood	Both
School Disadvantage	0.017		0.006	0.015*		0.016
	(0.014)		(0.015)	(0.007)		(0.008)
Neighborhood Disadvantage		0.023	0.027		0.007	0.0002
		(0.014)	(0.016)		(0.007)	(0.007)
Intraclass Correlation						
School	0.07		0.06	0.03		0.02
Neighborhood		0.10	0.05		0.10	0.02

*$p < 0.05$. **$p < 0.01$. ***$p < 0.001$ (two-tailed test).

Values in parentheses are standard errors. All models include individual, family, school, and neighborhood control variables listed in Table 3.

Table 6 shows results for measures of self-esteem and depression. School disadvantage has no effect on either outcome. Neighborhood disadvantage decreases self-esteem but has no effect on depression. The null effects of the school and neighborhood persist after accounting for both institutions. The coefficient for neighborhood disadvantage in the self-esteem model remains statistically significant but its size decreases. Similar to the education- and behavior-related outcomes, the percent of variation explained in student self-esteem and depression by the school slightly reduces after including both schools and neighborhoods in a model while it significantly decreases for the neighborhood.

Table 6. Two-Level and Cross-Classified Random Effects Models: Attitudes and Health

	Self-Esteem			Depression		
	School	Neighborhood	Both	School	Neighborhood	Both
School Disadvantage	0.027		0.011	-0.0003		-0.007
	(0.016)		(0.017)	(0.015)		(0.016)
Neighborhood Disadvantage		0.054***	0.034*		0.0009	0.016
		(0.015)	(0.017)		(0.014)	(0.016)
Intraclass Correlation						
School	0.01		0.007	0.01		0.01
Neighborhood		0.01	0.005		0.01	0.001

*$p < 0.05$. **$p < 0.01$. ***$p < 0.001$ (two-tailed test).

Values in parentheses are standard errors. All models include individual, family, school, and neighborhood control variables listed in Table 3.

In summary, I find that estimates of school effects represented by the intraclass correlation coefficient and the size and statistical significance of the coefficient for school disadvantage slightly change after accounting for the neighborhood. Specifically, I find a decrease in the effect size of school disadvantage on the probability of graduating high school, a small decrease in the percent of variation explained for all outcomes, and the removal of the school's statistically significant effect on sexual activity. In contrast, I find greater changes in the estimates of neighborhood effects. After accounting for school-level influence, the effect of neighborhood disadvantage on student GPA, self-esteem, and the probability of graduating significantly decreases. Additionally, the percent of variation explained by the neighborhood decreases by at least half for all outcomes. These results suggest that by not including both schools and neighborhoods in a single model, neighborhood effects researchers significantly inflate the explanatory power of the neighborhood.

DISCUSSION AND CONCLUSION

The traditional approach to studying neighborhood effects in the empirical literature is to examine the relationship between child outcomes and neighborhood characteristics without accounting for the potential influence of schools. Researchers estimating school effects follow a similar approach by excluding neighborhood characteristics from their analyses. Implicit in this strategy is the belief that either the excluded context does not matter or is merely a reflection of the context being examined. The evidence presented in the first half of the current study suggests that there is not a one-to-one correspondence between neighborhoods and schools. Both contexts potentially draw from different adolescent populations and have mechanisms that independently and jointly affect the well-being of children. The ways in which these two institutions interact to affect children and adolescents is further complicated by the fact that their relationship likely changes depending on the outcome under examination. The empirical analysis conducted in the second half of the current study shows that excluding schools in a neighborhood effects analysis inflates the neighborhood's overall explanatory power and upwardly biases the effects of neighborhood disadvantage on certain outcomes. In contrast, the impact of excluding neighborhoods on school effects is relatively minor. The results do not suggest that school effects studies are not affected by ignoring neighborhood influence. Excluding the neighborhood obscures the finding that neighborhood disadvantage decreases certain adolescent outcomes. This may not be an issue for researchers solely interested in estimating the impact of the school, but it is a problem for those interested in fully understanding the contextual factors influencing child and adolescent development.

The results from these analyses carry several theoretical and empirical implications for school and neighborhood effects research. First, a primary obstacle to simultaneously modelling neighborhoods and schools is having the appropriate data, which contain information on both the school and neighborhood. Many of the data sets used by neighborhood and school effects studies do not have information on an individual's school and neighborhood. The availability of datasets including information on both levels is increasing (see Add Health, NCES Early Childhood Longitudinal Study), but more datasets containing detailed information of a child's school and neighborhood are needed.

Second, researchers do not need to have complete information on the neighborhood or school if they are interested in examining just one level. In this scenario, the researcher wants to examine the effects of various school or neighborhood characteristics and control for all neighborhood

and school variables that may be confounding the relationship between the level of interest and the outcome. The researcher would simply need a neighborhood or school identifier for each student. Instead of running a random effects model, the researcher would use a fixed effects model that includes an indicator variable of the child's neighborhood or school. We can account for clustering in a fixed effects model by correcting standard errors using a sandwich estimator that allows for intragroup correlation (White, 1984).

Lastly, although the current study focuses on school and neighborhood influence, the broader empirical and theoretical takeaway is that researchers should be cognizant of all social contexts that may be influencing child and adolescent well-being. Examples of other contexts besides the family, school, and neighborhoods that may affect youths include peer relations, religious organizations, after-school programs, and other social groups. While I framed Bronfenbrenner's Ecological Systems Theory using only schools and neighborhoods, we can adapt his theory to account for any social context.

Several limitations of this study deserve mention. In the review, I do not consider the qualitative literature that simultaneously examines school and neighborhood influences, which pre-dates the quantitative literature (e.g., Ogbu, 1974, 1978; Park & Burgess, 1921). The current study's findings can be applied only to empirical studies of neighborhood and school effects, which have substantially increased in recent years due to increased computing power and the availability of large, nationally representative data sets. It must also be emphasized that the empirical analysis applies only to adolescents attending middle and high schools in the mid-1990s and does not take into account student mobility across schools and neighborhoods and, in a similar vein, the temporal duration of exposure to institutions of varying quality. Lastly, the study does not attempt to capture the potential myriad of ways that schools and neighborhoods independently and jointly influence youth well-being. I cannot claim that I have identified any causal mechanisms that operate within schools and neighborhoods to bring about higher or lower well-being for the adolescents who attend and live in them. Being cognizant of the influence of both contexts, which the findings of this study suggest that future empirical studies of schools and neighborhoods should do, is simply the first step in fully understanding the role social context plays in influencing child development. The next steps include identifying the mechanisms that neighborhoods and schools independently and jointly work through to affect youth outcomes, which the current qualitative literature not examined in this study can provide guidance on. Moreover, the types of mechanisms likely differ by the outcome of interest. Policymakers and practitioners have already applied

models of school and neighborhood synergies—driven by the community schools movement—to create programs intended on improving the well-being of children (Cohen-Vogel, Golding, & Smrekar, 2010; Warren, 2005). Academic scholars can borrow from the frameworks and results of these programs to gain traction on understanding the independent and dual roles that neighborhoods and schools play in applied settings.

Despite these limitations, this research contributes to the growing empirical literature on the influence of social context on individual development by illuminating the theoretical and empirical reasons for including both schools and neighborhoods in a model and formally estimating the consequences of ignoring either context on empirical findings. The implication of the results is that deficiencies in one area of a child's environment may be exacerbated or counteracted by mechanisms in another area. In other words, neighborhoods, schools, and other social contexts can complement or counteract one another. Therefore, simultaneously analyzing schools and neighborhoods will not only move the theory of school and neighborhood effects forward, but also illuminate policies and strategies in which neighborhoods and schools can work together to increase the overall well-being of children.

NOTES

1. I include studies examining the effects of pre-college neighborhood or school conditions on post-secondary or adult outcomes.

2. The articles used in the review can be downloaded from http://demog.berkeley.edu/~nolib/review_references.docx

REFERENCES

Ainsworth, J. W. (2002). Why does it take a village? The mediation of neighborhood effects on educational achievement. *Social Forces*, *81*(1), 117–152.

Arum, R. (2000). Schools and communities: Ecological and institutional dimensions. *Annual Review of Sociology*, *26*, 395–418.

Bayoh, I., Irwin, E., & Haab, T. (2006). Determinants of residential location choice: How important are local public goods in attracting homeowners to Central City locations? *Journal of Regional Science*, *46*(1), 97–120.

Boardman, J. D., & Saint Onge, J. M. (2005). Neighborhoods and adolescent development. *Children, youth and environments*, *15*(1), 138–164.

Borman, G., & Dowling, M. N. (2010). Schools and inequality: A multilevel analysis of Coleman's equality of educational opportunity data. *Teachers College Record*, *112*, 1201–1246.

Bowen, G. L., & Richman, J.M. (2002). Schools in the context of communities. *Children and Schools*, *24*(2), 65–72.

Briggs, X., Ferryman, K. S., Popkin, S. J., & Rendón, M. (2008). Why did the moving to opportunity experiment not get young people into better schools?. *Housing Policy Debate*, *19*(1), 53–91.

Bronfenbrenner, U. (1979). Contexts of child rearing: Problems and prospects. *American Psychologist*, *34*(10), 844–850.

Bronfenbrenner, U. (1994). Ecological models of human development. In T. Husen & T. N. Postlethwaite (Eds.), *International encyclopedia of education* (2nd ed., Vol. 3, pp. 1643–1647). Oxford, UK: Pergamon Press.

Bronfenbrenner, U. (2005). *Making human Beings human: Bioecological perspectives on human development*. Thousand Oaks, CA: Sage Publications.

Brunner, E., & Sonstelie, J. (2003). Homeowners, property values, and the political economy of the school voucher. *Journal of Urban Economics*, *54*(2), 239–257.

Clark, W. A. (2008). Reexamining the moving to opportunity study and its contribution to changing the distribution of poverty and ethnic concentration. *Demography*, *45*(3), 515–535.

Cohen-Vogel, L., Goldring, E., & Smrekar, C. (2010). The influence of local conditions on social service partnerships, parent involvement, and community engagement in neighborhood schools. *American Journal of Education*, *117*(1), 51–78.

Coleman, J. S., Campbell, E. Q., Hobson, C. J., McPartland, F., Mood, A. M., Weinfeld, F. D., et al. (1966). *Equality of educational opportunity*. Washington, DC: U.S. Government Printing Office.

Condron, D. J. (2009). Social class, school and non-school environments, and Black/White inequalities in children's learning. *American Sociological Review*, *74*(5): 685–708.

Cook, T. D., Herman, M. R., Phillips, M., & Settersten, R.A., Jr. (2002). Some ways in which neighborhoods, nuclear families, friendship groups, and schools jointly affect changes in early adolescent development. *Child Development*, *73*(4), 1283–1309.

Dietz, R. D. (2002). The estimation of neighborhood effects in the social sciences: An interdisciplinary approach. *Social Science Research*, *31*(4), 539–575.

Dreeben, R. (1994). The sociology of education: Its development in the United States. In *Research in the Sociology of Education and Socialization* (Vol. 10, pp. 7–52). Greenwich, CT: JAI Press.

Duncan, G. J., Dowsett, C. J., Claessens, A., Magnuson, K. A., Huston, A. C., Klebanov, P., . . . & Brooks-Gunn, J. (2007). School readiness and later achievement. *Developmental Psychology*, *43*(6), 1428–1446.

Dupere, V., Leventhal, T., Crosnoe, R., & Dion, E. (2010). Understanding the positive role of neighborhood socioeconomic advantage in achievement: The contribution of the home, child care, and school environments. *Developmental Psychology*, *46*(5), 1227–1244.

Fletcher, A., Bonell, C., & Hargreaves, J. (2008). School effects on young people's drug use: a systematic review of intervention and observational studies. *Journal of Adolescent Health, 42*(3), 209–220.

Galster, G. C., & Santiago, A. M. (2006). What's the 'hood got to do with it? Parental perceptions about how neighborhood mechanisms affect their children. *Journal of Urban Affairs, 28*(3), 201–226.

Goldstein, H. (1994). Multilevel cross-classified models. *Sociological Methods & Research, 22*(3), 364–375.

Harris, K. M., Florey, F., Tabor, J., Bearman, P. S., Jones, J., & Udry. J. R. (2003). *The National Longitudinal Study of Adolescent Health: Research design.* Chapel Hill, NC: UNC Carolina Population Center.

Huston, A. C., & Ripke, M. N. (2006). *Developmental contexts in middle childhood: Bridges to adolescence and adulthood.* New York, NY: Cambridge University Press.

Jencks, C., & Mayer, S. E. (1990) The social consequences of growing up in a poor neighborhood. In L. E. Lynn, Jr. & M. G. H. McGeary (Eds.), *Inner city poverty in the United States.* Washington, DC: National Academy Press.

Johnson, O. (2008). Who benefits from concentrated affluence?: A synthesis of neighborhood effects considering race, gender and education outcomes. *Journal of Public Management & Social Policy, 14*(2), 85–112.

Johnson, O. (2010). Assessing neighborhood racial segregation and macroeconomic effects in the education of African Americans. *Review of Educational Research, 80*(4), 527–575.

Johnson O. (2012). A systematic review of neighborhood and institutional relationships related to education. *Education and Urban Society, 44*(4), 471–511.

Kirk, D. S. (2009). Unraveling the contextual effects on student suspension and juvenile arrest: The independent and interdependent influences of school, neighborhood, and family social controls. *Criminology, 47*(2), 479–520.

Kuncel, N. R., Crede, M., & Thomas, L. L. (2005). The validity of self-reported grade point averages, class ranks, and test scores: A meta-analysis and review of the literature. *Review of Educational Research, 75*(1), 63–82.

Lee, V. E., & Burkham, D. T. (2002). *Inequality at the starting gate: Social background differences in achievement as children begin school.* Washington, DC: Economic Policy Institute.

Leventhal, T., & Brooks-Gunn, J. (2000). The neighborhoods they live in: the effects of neighborhood residence on child and adolescent outcomes. *Psychological Bulletin, 126*(2), 309–337.

Massey, D. S., & Denton, N. A. (1993). *American apartheid: Segregation and the making of the underclass.* Cambridge, MA: Harvard University Press.

Moerbeek, M. (2004). The consequence of ignoring a level of nesting in multilevel analysis. *Multivariate Behavioral Research, 39*(1), 129–149.

Ogbu, J. U. (1974). *The next generation: An ethnography of education in an urban neighborhood.* New York, NY: Academic Press.

Ogbu, J.U. (1978). *Minority education and caste: The American system in cross-cultural perspective.* New York, NY: Academic Press.

Owens, A. (2010). Neighborhoods and schools as competing and reinforcing contexts for educational attainment. *Sociology of Education*, 83(4), 287-311.

Park, R. E., & Burgess, E. W. (1921). *Introduction to the science of sociology.* Chicago, IL: University of Chicago Press.

Radloff, L. S. (1977). The CES-D scale a self-report depression scale for research in the general population. *Applied Psychological Measurement, 1*(3), 385–401.

Raudenbush, S. W. (1993). A crossed random effects model for unbalanced data with applications in cross-sectional and longitudinal research. *Journal of Educational Statistics, 18*, 321–349.

Reiss, A. J. (1995). Community influences on adolescent behavior. In M. Rutter (Ed.), *Psychosocial disturbances in young people: Challenges for prevention.* Cambridge, UK: Cambridge University Press.

Rendon, M. G. (2013). Drop out and "disconnected" young adults: Examining the impact of neighborhood and school contexts. *The Urban Review*, 1–28.

Rumberger, R. W. & Palardy, G. J. (2005). Test scores, dropout rates, and transfer rates as alternative indicators of high school performance. *American Educational Research Journal*, *42*(1), 3-42.

Sampson, R. J. (2001). How do communities undergird or undermine human development? Relevant contexts and social mechanisms. *Does it take a village? Community effects on children, adolescents, and families*, 3–30.

Sampson, R. J. (2008). Moving to inequality: neighborhood effects and experiments meet social structure1. *American Journal of Sociology*, *114*(1), 189–231.

Sampson, R. J., Morenoff, J. D., & Gannon-Rowley, T. (2002). Assessing "neighborhood effects": Social processes and new directions in research. *Annual Review of Sociology*, *28*, 443–478.

Saporito, S., & Sohoni, D. (2007). Mapping educational inequality: Concentrations of poverty among poor and minority students in public schools. *Social Forces*, *85*(3), 1227–1253.

Skinner, C. J., Holt, D., & Smith, T. F. (1989). *Analysis of complex surveys.* New York, NY: John Wiley & Sons.

Sykes, B., & Musterd, S. (2011). Examining neighbourhood and school effects simultaneously what does the Dutch evidence show? *Urban Studies*, *48*(7), 1307–1331.

Teitler, J. O., & Weiss, C. C. (2000). Effects of neighborhood and school environments on transitions to first sexual intercourse. *Sociology of Education*, *73*(2), 112–132.

Udry, J. R. 2003. *The National Longitudinal Study of Adolescent Health (Add Health), Waves I & II, 1994–1996; Wave III, 2001–2002* [Machine Readable Data File and Documentation]. Chapel Hill, NC: Carolina Population Center. University of North Carolina at Chapel Hill.

Van den Noortgate, W., Opdenakker, M. C., & Onghena, P. (2005). The effects of ignoring a level in multilevel analysis. *School Effectiveness and School Improvement*, *16*, 281–303.

Warren, M. R. (2005). Communities and schools: A new view of urban education reform. *Harvard Educational Review*, *75*(2), 133–173.

White, H. (1984). *Asymptotic theory for econometricians.* San Diego, CA: Academic Press.

Wilson, W. J. (1987). *The truly disadvantaged: The inner city, the underclass, and public policy.* Chicago, IL: University of Chicago Press.

NOLI BRAZIL is a post-doctoral associate at the Center for Research on Inequalities and the Life Course at Yale University. His research interests include understanding the interrelated effects of schools and neighborhoods on child and adolescent well-being, the influence of neighborhoods on criminal activity, and the development and use of spatial methods in understanding demographic phenomena.