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Neighborhoods and Adolescent Development

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Abstract

Researchers are increasingly interested in identifying specific aspects of adolescents' lives that are positively or adversely affected by their place of residence. This body of work suggests that it is important to consider neighborhoods when examining their 1) engagement in risk-related behaviors; 2) educational outcomes; 3) physical and mental health; and 4) their integration within social institutions. To date, however, no existing work has simultaneously considered the range of outcomes in which neighborhoods are believed to be important within and across these four domains. Using data from the National Longitudinal Study of Adolescent Health, we examine the extent to which neighborhoods influence adolescent outcomes across 34 characteristics nested within these four areas. The findings suggest that for adolescents, residential area is equally important in terms of risk behaviors, educational outcomes, and their integration within their families, schools, and churches. However, we find no evidence that neighborhoods are associated with adolescents' physical health or emotional well-being.

Keywords

neighborhoods; adolescent development; neighborhood effects

Introduction

Adolescence is an important phase in the life cycle. The development of familial, interpersonal, and institutional relationships at this critical stage in life may have lasting influences throughout the life-course (Wheaton and Clarke 2003). It is a period that is characterized by the increasing importance of social contexts beyond the home. These changes include a shift in autonomy away from family-centered relationships toward institutional and peer group interactions. In order to make a successful transition into adulthood, adolescents must learn how to engage in tasks that occur both within *and* between these interrelated social contexts (Duncan and Raudenbush 1999; Brofenbrenner 1989). To date, most research has examined characteristics of adolescents' homes and schools to assess their immediate social environment. However, a growing body of work has begun to focus on neighborhoods as one of the primary social contexts responsible for differential developmental trajectories among adolescents (Brooks-Gunn et al. 1997).

[2]Authors' names appear alphabetically reflecting equal contribution to the preparation of the manuscript.

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Although the documentation of neighborhood effects among adults is well established, the examination of these phenomena among adolescents is limited and results regarding neighborhood-specific processes among younger populations remain inconclusive (Fauth 2004). Some studies have found that neighborhood characteristics are associated with adolescents' physical and mental health, educational outcomes, engagement in problem behaviors, and life chances in general (Gephardt 1997; Sampson et al. 2002), but no existing study has undertaken the *simultaneous* examination of these distinct phenomena with a large nationally representative sample of adolescents and young adults. To illustrate, Sampson et al. (2002) conducted an exhaustive review of all quantitative studies published between 1996 and 2001 that "investigated variations in some aspect of social processes or mechanisms across ecologically defined units of analysis (e.g., census tracts, block groups)" (p. 447). Although the authors' intended focus was on children and adolescents, they found "very few neighborhood-effects studies that restricted their attention solely to children or adolescents" (p. 448).

There are several reasons to believe that neighborhoods may be particularly salient as a determinant of adolescent well-being compared to the well-being of either children or adults. First, adolescents spend a larger share of their day-to-day lives interacting with others in the immediate spaces and places outside of their homes compared to either children or adults. Second, the relative contribution of neighborhoods to global identity formation may be greater among adolescents. When responding to inquiries regarding self-definition, adolescents view themselves almost exclusively in terms of their day-to-day activities—drawing on immediate cues in their surrounding contexts (Damon and Hart 1988). Because of rapid changes that are occurring in their lives, adolescents have a particularly strong need for coherency in self-concept (Erickson 1968). This need for coherency, some argue, causes adolescents to rigidly adhere to a particular identification, including the normative environment of their neighborhoods (Harter 1999). Third, neighborhoods are associated with adolescents' immediate well-being, and the lagged effects of residential context at this critical stage in life have been observed well into adulthood (Wheaton and Clarke 2003). Combined, these reasons highlight the importance of neighborhoods in an adolescent's life and necessitate the situating of neighborhood studies squarely within the contours of a general life-course perspective (Diez Roux 2001; Poulton et al. 2002).

In this paper we seek to synthesize the seemingly disparate work regarding the impacts of residential context on various aspects of adolescents' lives. We use a simple statistical model to examine the relative importance of neighborhoods (between neighborhood variance compared to within neighborhood variance) on various adolescent outcomes. We use data from the National Longitudinal Study of Adolescent Health (Add Health) to calculate adjusted intra-class correlation coefficients for 34 outcomes nested within the following four domains: (a) engagement in risk-related behaviors, (b) educational outcomes, (c) physical and mental health, and (d) integration within social institutions.

Neighborhoods and Adolescent Outcomes

Macro and Meso-Level Processes

The literature on neighborhood-processes related to adolescent well-being is summarized in Figure 1. Until recently, the bulk of the research in this area focused almost exclusively on macro-system processes responsible for the spatial clustering of individuals with similar racial and class characteristics within the same residential areas. For example, Wilson's (1987) *The Truly Disadvantaged* highlighted the critical distinction between considering poverty as a characteristic of families as well as a characteristic of individuals' neighborhoods. And although the focus on socioeconomic resources has been broadened to include the concentration of affluence (Massey 1996) and employment characteristics

(Wilson 1996), this understanding of neighborhood composition and context relies almost exclusively on the geographic concentration of socioeconomic resources to capture meaningful differences across communities.

Building on the well-known typology established by Jencks and Mayer (1990), researchers then began to include information regarding the *institutional characteristics* and the *normative environment* within particular neighborhoods in an effort to account for the observed differences across communities in the risk associated with deleterious outcomes such as infant mortality, drug use, criminal activity, and sustained detachment from mainstream avenues of economic attainment (Leventhal and Brooks-Gunn 2000). These characteristics are presented as meso-level phenomena in Figure 1 and they are believed to mediate the observed relationship between neighborhood socioeconomic status and the elevated risk of particular outcomes among adolescents. For example, researchers have identified important differences in the availability of *institutional resources* such as health care (Brooks-Gunn et al. 1998), quality childcare (Fuller et al. 1997), youth-oriented organizations (O'neil et al. 2001), and learning centers designed for youth and adolescents (Catsambis and Beveridge 2001) across affluent and impoverished communities. Likewise, the presence of institutional risks such as the concentration of liquor outlets (LaVeist and Wallace 2000), presence of polluting factories (Downey 2002), and diesel exhaust fumes (Northridge et al. 1999) have been found to be strongly associated with the socioeconomic and racial characteristics of these communities.

Researchers have also stressed that unique *normative environments* are important mechanisms through which the prevalence of pro-social developmental outcomes diverge across communities (Anderson 1991). Researchers highlight the extent to which residents engage with one another and develop norms of reciprocity and trust (Sampson et al. 1997). Depending on the nature and consistency of these interactions, neighborhood residents may be able to organize to effectively address the needs of the neighborhood collectively (Sampson et al. 1999) or they may withdraw from one another and contribute less to the maintenance of neighborhood-oriented organizations, institutions, and relationships (Shaw and McKay 1942).

Micro-Level Processes

In many ways, the debates in the area of neighborhood-effects among adolescents have been structured around the ways in which neighborhood social processes mediate and moderate the effects associated with community-level socioeconomic disadvantage—meso-system processes—rather than micro-system processes involving different outcomes impacted by area of residence (Sampson et al. 1999; Browning et al. 2003). As a result, an important question remains unanswered. Namely, what aspects of adolescents' lives are impacted the most by the area in which they live? Although certain aspects of residential areas are theoretically linked to particular outcomes, it remains unclear how the individual-level phenomena identified by previous researchers as related to community characteristics compare with one another. For example, among adolescents, is the degree to which drug use clusters within neighborhoods comparable to neighborhood clustering of academic achievement?

It is not our intention to evaluate or document specific social, behavioral, or environmental influences associated with neighborhood effects on adolescents' well being. Rather, we take the notion that neighborhoods *may* matter as a point of departure and instead focus on what social domains (and specific items within these domains) are the most and least impacted by adolescents' residential areas. Given our review of the literature we identify four social domains in which neighborhoods are believed to be important aspects of adolescents' lives

and we ask the following: *to what extent is variation in adolescent developmental outcomes associated with the neighborhoods in which they live?*

Risk-Related Behaviors—Perhaps the most important aspect of adolescents' lives that is believed to be impacted by area of residence is the likelihood of engaging in broadly defined risk-related behaviors such as sexual activity, substance use, or particular delinquent acts. For example, in two related papers, Brewster (1994) and Brewster et al. (1993) present evidence that the timing of first intercourse and the utilization of contraception during first intercourse among adolescent women are predicated on residential area (e.g., neighborhood). Although neighborhoods are found to operate through more proximate determinants such as family characteristics, both papers find risky sexual behavior to be negatively associated with the labor-force participation rate among women in the neighborhood even after controlling for individual-level differences among the respondents. Their findings build on previous work by Crane (1991) who finds that adolescent girls who reside in communities with the highest concentration of socioeconomically disadvantaged neighbors demonstrate a marked increase in the risk of giving birth to a child compared to girls with similar characteristics who reside in more affluent communities. Recent research supports these findings and builds on this work by re-examining these processes with more rigorous statistical techniques (Harding 2003). Likewise, Upchurch et al. (1999) elaborate on this existing body of work by identifying the perception of ambient risks such as the perception of crime as potentially mediating the relationship between socioeconomic status within a community and the subsequent risk of engaging in risky sexual activities among adolescents. South and Baumer (2000) also show that young women residing in disadvantaged communities expressed less reservations about unmarried parenthood compared to adolescents in more advantaged communities suggesting cultural differences across places characterized by low and high socioeconomic status.

Researchers have also found evidence that certain characteristics of neighborhoods provide opportunities for adolescents to engage in acts of delinquency, experiment with drugs and alcohol, or present symptoms of substance abuse. For example, in a widely cited study, Elliot et al. (1996) find that socioeconomic disadvantage at the community-level impacts an adolescent's involvement in problem behavior such as theft, drug use, drug dealing, and gang-related fighting through the absence of integrated social networks and sense of informal control among adults within the community.

Similarly, the likelihood that adolescents will be offered alcohol, tobacco, and drugs has also been linked to sociodemographic characteristics of neighborhoods (Crum et al. 1996). In this study, teens living in the highest category of disadvantage were six times more likely than those living in the lowest category of disadvantage to be offered cocaine by others. Similar findings reinforce the critical role of residential context when describing risky adolescent behavior. For example, researchers have found that the initiation of risky behaviors such as smoking among teenagers is described almost exclusively in reference to where they smoked, where they got the cigarettes, and how smoking was understood and perceived among individuals in the area (Frohlich et al. 2002). As such, they argue that smoking initiation should not be seen as a behavior, per se. Rather, smoking, as a social practice, captures complex aspects of what they call “collective lifestyles” (Frohlich et al. 2002, p. 1415) suggesting that the “where” of social practices is critical to any attempts to identify the “why.”

Educational Outcomes—A large amount of research emphasizes the ways in which adolescents' neighborhoods support or complicate successful academic adaptation, including educational attainment (Brooks-Gunn et al. 1993; Crane 1991; Duncan 1994) and achievement (Halpern-Felsher et al. 1997; Duncan et al. 2000; Ainsworth 2002). As noted

elsewhere (Leventhal and Brooks-Gunn 1997), researchers consistently demonstrate that residing in communities with a high concentration of relatively affluent neighbors provides important material and cultural resources that are critical to adolescents' intellectual development and successful adaptation within school settings (Roscigno and Ainsworth-Darnell 1999). For example, Brooks-Gunn et al. (1993) find that that the proportion of residents in adolescents' neighborhoods with incomes above $30,000/year is negatively and significantly associated with the risk of dropping out of high school. Focusing instead on the occupational status of employed adults in the neighborhood, Crane (1991) finds similar results as Brooks-Gunn et al. (1993) with the risk of dropping out of high school being the highest among residents of communities with a relatively low percentage of workers holding either professional or managerial workers. Among older adolescents, Duncan (1994) also finds that concentrated disadvantage (e.g., proportion of households that are low-income or headed by a female) is negatively associated with their years of schooling, the likelihood of completing high school, and subsequently the likelihood of entering college.

Neighborhood characteristics have also been linked to external assessments of educational achievement (i.e., performance on standardized tests). Research on academic achievement emphasizes the salutary role of relatively affluent adults within the community on collective socialization (Ainsworth 2002; Brooks-Gunn et al. 1993). Duncan et al. (2001) compare the degree to which achievement scores (Peabody Vocabulary Test) correlate among a variety of dyads—including monozygotic twins, dyzygotic twins, full siblings, best friends, neighbors, and grademates from the same school—and find that siblings and best friends have the highest degree of correspondence, but that two randomly selected adolescents from the same neighborhood demonstrated more similarities than two randomly selected adolescents from the same grade and same school.

Institutional Integration—Findings from several seminal pieces have demonstrated the importance of diverse social networks on lifespan and healthy lives (Berkman and Syme 1979; House et al. 1988). Social networks and social connections provide important information, opportunities, and resources to individuals (Granovetter 1973). Social integration is distinct from meso-level processes regarding social capital or collective efficacy, because it operates through individuals. That is, social capital and collective efficacy are characteristics of discrete social *environments* (e.g., neighborhoods or schools), whereas social integration is the perception among *individuals* that they are integrated within important social institutions.

Perhaps most importantly, previous research suggests that adolescents' perceptions about parental monitoring of day-to-day activities are shaped by neighborhood characteristics (Rankin and Quane 2002). Specifically, teens from communities with higher levels of collective efficacy are more likely than those from less efficacious areas to perceive that their parents are monitoring their activities. Indeed, their findings suggest that parental monitoring is particularly important in reducing the risk of engagement in problem behavior among adolescents residing in communities with low collective efficacy. These findings are supported by Klebanov et al. (1994) who find that externally observed levels of maternal warmth directed toward young children are negatively correlated with the poverty rates of the community. This finding is particularly important because as others have found (Pinderhughes 2001), it suggests that observed differences in parenting strategies among black and white parents may be explained by race differences in neighborhoods' context, composition, and climate. Maternal concern and involvement have been shown to serve as both a protective buffer against association with delinquent peers and to a certain extent mediate the relationship between violence exposure and psychological functioning in disadvantaged neighborhoods (Brody et al. 2001; Ceballo 2004). Accordingly, familial

integration is often cited as one of the areas in which adolescents perceive their integration within institutions as a function of neighborhood-related characteristics.

This research stresses that conceptualizations of institutional integration and social connectedness, particularly among adolescents, need to include perceptions of a sense of belonging or place attachment (Schaefer-McDaniel 2004). While the primary sense of attachment among adolescents stems from familial integration, there is also evidence that adolescents derive an important sense of belonging from institutions outside of the household. Involvement in religious institutions in particular provides a regular and predictable mechanism for social connectedness. The social networks derived from religious affiliations impacts the promotion of healthy behavior and lifestyles, and religion-based support systems buffer the negative effects of stress and isolation (Sherkat and Ellison 1999). For example, high levels of religious attendance and associated religious activities are associated with better health (McCullough et al., 2000; Ellison and Levin 1998; Rogers 1996; Hummer et al. 1999).

Religion can also influence outcomes and behaviors through individual psychological levels through the physiological effects of positive emotions, group level health-promoting beliefs and personality styles, and through thoughts of hope, optimism, and positive expectation (Levin 2001). According to Case and Katz (1991), youths residing in a neighborhood in which a substantial amount of young people are religious will have significantly higher probabilities of exhibiting comparable religious behaviors controlling for family background and personal characteristics than youths living in neighborhoods who do not exhibit religious tendencies. Similarly, Regnerus and Elder (2003) report that subjective religiosity (e.g., “how important is your religion to you?”) is strongly associated with characteristics of adolescents' neighborhoods; religion is far more important among residents of high poverty (>40 percent poor) neighborhoods compared to adolescents residing in other areas.

Physical and Mental Health—Over the past two decades, researchers have made tremendous efforts to develop theoretical linkages between the social environment, health, and health-related behaviors with the explicit goal that social determinants of well-being are considered fundamental causes of health (Link and Phelan 1995; Berkman and Kawachi 2000). Residential context has taken center stage as one of the primary social environments that are believed to affect the health and well-being of adults, adolescents, and children (Kawachi and Berkman 2003). While the bulk of this research has focused on adults, findings from recent studies suggest that the neighborhood-health relationship is equally relevant among younger populations. Socio-environmental exposures associated with residential context are also found to be associated with the health behaviors and physical health of older children and adolescents. In particular, it has been demonstrated that adolescents from disadvantaged communities—regardless of their personal characteristics—have an elevated risk of unhealthy dietary habits compared to adolescents from more affluent areas (Lee and Cubin 2002). Likewise, adolescents from disadvantaged communities also report higher rates of asthma (Lang and Polansky 1994) and obesity (Fleming and Towey 2003).

Neighborhood processes also appear to have relationships with mental health outcomes. For example, adolescents and young adults who resided in disadvantaged neighborhoods as children have been shown to exhibit a larger number of externalized behavior problems such as bullying other children, impulsivity, cheating, lying, and “lack of remorse” (Wheaton and Clarke 2003, 690). Wheaton and Clarke (2003) find that the effect of neighborhood-level socioeconomic disadvantage is partially accounted for by differences in the perception of neighborhood problems (e.g., perceptions of danger, drug use, traffic, noise, and run-down buildings), which dovetails with other work in this area (Stiffman et al. 1999). Researchers

have also found that adolescents in risky neighborhoods present a higher symptom count for internalizing behavior such as depression and anxiety disorders (Aneshensal and Sucoff 1996) and lower self-esteem (Spencer et al. 1997).

Taken together, previous empirical and theoretical research suggests the importance of context on adolescent development and behavior, particularly in engagement in risk-related behaviors, intellectual development, institutional integration, and physical and emotional well-being. Yet, no previous research has synthesized the various outcomes to highlight where neighborhoods matter and where they do not. It therefore becomes imperative to delineate outcomes in which neighborhoods affect adolescents above and beyond their individual level characteristics, and to provide a synthesis of the substantive areas in which neighborhood-level processes are the most and least influential.

Methods

Data

Individual-Level Data—All data used in these analyses come from Wave 1 of the in-home sample of the National Longitudinal Study of Adolescent Health (Add Health). Add Health is uniquely appropriate for studying the association between area of residence and adolescent development because the study is premised on the notion that the contours of adolescents' lives are captured by the nested relationships within and between their families, friends, schoolmates, and their neighbors. Accordingly, the data collection of the study was designed to investigate these contexts (Harris et al. 2003). Add Health is a school-based, longitudinal study of youth in grades 7 through 12. Data for Wave 1 were collected from youth from 80 high schools and 52 middle schools in the years 1994 and 1995 (the in-school survey) and follow-up in-home surveys were then conducted with youth from the original sample (response rate 78.9 percent).

All students who completed the In-School Questionnaire plus those who did not complete a questionnaire but were listed on a school roster were eligible for selection into the core in-home sample. Thus, the core-sample (N=12,105) is a nationally representative sample of adolescents in grades 7 through 12 in the U.S. in the 1994–95 school year with respect to region of country, urbanicity, school type, ethnicity, and school size (see Bearman, Jones and Udry 1997). Students were stratified by grade and sex within their schools and roughly 15-20 students were randomly chosen from each stratum so that a total of approximately 200 adolescents were selected from each of the 80 pairs of schools. After deleting cases with missing information on key variables we use a sample 12,086 adolescents in this study.

Neighborhood-Level Data—The neighborhood-level data come from the Add Health Wave 1 Contextual data file which contains sociodemographic information for all respondent's neighborhoods. Respondents' addresses were geocoded and information for all respondents' census tracts was appended from the 1990 census. Tracts contain between 3,000 and 8,000 residents, their boundaries are relatively stable over time, and are designed to be demographically homogeneous. Accordingly, they are widely used among social researchers as an appropriate operationalization of “neighborhood” (Sampson et al. 1997).

The Add Health data set does not assign each respondent a unique census tract identifier. Rather, compositional information from the 1990 census is appended for each respondent's census tract in the Add Health. Accordingly, we sorted the contextual data by three tract-level characteristics: (1) total population, (2) density (pop/km^2), and (3) proportion rural. After duplications in the sorted values are deleted, the remaining observations represent a tract-level data set in which unique tract level identifiers can be created for respondents from the same neighborhood. While the specific tracts remain anonymous, the sorting enables the

identification of individuals within given tracts which provides both micro- and macro-level units for analysis. Here it is important to note that tract-level information is not used in the subsequent analyses. We only use tract-level information to identify rather than describe neighborhoods. In total, the respondents come from 1,878 neighborhoods and each area had an average of 6.4 (min =1; max =160) adolescents per neighborhood.

Statistical Analyses

Intra-class correlation coefficients are calculated for all 34 variables considered. These values range from 0 to 1 and are understood as the percent of unexplained variation that is unique to neighborhoods. The variance of the level-2 residual variance in conjunction with the total residual variance can be used to estimate the extent to which variation in the different outcomes is situated *within* or *between* neighborhoods. The intra-class correlation coefficient is simply the ratio of level-2 residual variance to the overall residual variance. To identify characteristics that are associated with adolescents' neighborhoods, we use a simple mixed model presented in equation 1:

$$Y_{ij}=\beta_{00}+\sum \beta_h x_{hij}+u_j+e_{ij} \quad (1)$$

Here, Y_{ij} is the outcome for the *i*th adolescent in the *j*th neighborhood. In all models, we control for a number of individual and family-level characteristics ($\Sigma\beta_h x_{hij}$) including adolescent's race/ethnicity, age, and gender as well as their mother's marital status, highest level of education, and whether or not the family receives public assistance (see Appendix 1 for descriptive statistics and a description of all variables used in the analyses). The value β_{00} represents the grand mean for the population of scores—adjusted for the *h* covariates—and u_{0j} and e_{ij} represent error terms. The first is simply an offset to the grand mean for the *j*th neighborhood and e_{ij} is an offset for the *i*th observation in the *j*th neighborhood. Together, the two sources of error are used to calculate the intra-class correlation coefficient $\left(\rho=\frac{\sigma_u^2}{\sigma_u^2+\sigma_e^2}\right)$, which describes the relative contribution of level-2 $\left(\sigma_u^2\right)$ residual variance to the total residual $\left(\sigma_u^2+\sigma_e^2\right)$ variance. For example, an intra-class correlation coefficient of .10 suggests that 10 percent of the total variation occurs between neighborhoods and 90 percent of the total variation occurs between adolescents within neighborhoods. Researchers suggest that coefficients greater than .08 may be considered to be a large effect (Duncan and Raudenbush 1999). For multilevel models involving binary outcomes, total residual variance is calculated in a similar fashion, with the exception that the observation-level error is estimated as $\frac{\pi^2}{3}$ (Snijders and Bosker 1999). All multilevel models are estimated using SAS PROC MIXED 8.2 (Littell et al. 1996). Because these models control for individual differences among adolescents, we refer to the intra-class correlation coefficient presented below as a residual or adjusted intra-class correlation.

Results

According to the results presented in Table 1, neighborhoods are equally relevant for adolescents' educational outcomes, the likelihood that they will engage in risky behaviors, and the extent to which they are integrated within important institutions. In these three, the typical adjusted intra-class correlation coefficient (ICC) is approximately .10. Only items from the risk-related outcomes and educational outcomes domains demonstrate ICCs above .20 and the single most important aspect of adolescents' well-being that is impacted by their

neighborhoods is their performance on the standardized achievement test (PVT). Even after adjusting for socioeconomic and sociodemographic characteristics of adolescents, we estimate an ICC of .25 for PVT scores. Also, drug use (ρ=.22) and number of days that adolescents skip school (ρ=.21) present ICC values above .20. According to Table 2, apart from these relatively high residual ICCs, the distributions are quite similar across these three domains.

Engagement in risk-related behaviors as well as tobacco and alcohol use among adolescents do not appear to be influenced by the neighborhoods in which teenagers live, however, the use of drugs does. Our findings suggest that the likelihood of being a victim of a crime is more strongly associated with area of residence than is the likelihood of committing crimes. For example, there is a spatial clustering of fighting, stealing, and property damage, but the magnitude of this neighborhood dependence is weak when compared to the values of victimization. Neighborhoods appear to matter for delinquent behaviors among more petty acts of deviance such as skipping school or being suspended.

As with previous research in this area (Brewster 1994; Upchurch 1999) we find that neighborhoods are associated with the risk of engaging in sexual activities. Specifically, whereas the bulk of variation in the likelihood that an adolescent has reported to engage in sexual intercourse occurs within neighborhoods, roughly 11 percent of this variation occurs between neighborhoods. Although we find that adolescents' sex-related behaviors are structured in part by their neighborhoods, we do not find similarly strong evidence regarding pregnancy-related attitudes.

We also find that adolescents' integration within religious and health institutions is associated with their neighborhood. Importantly, we find all three of the religiosity outcomes to be among the 10 highest ICCs. Likewise, adolescents' access to health services was consistently associated with neighborhoods for both psychological counseling and physical examinations; however, this pattern is less consistent among educational or familial integration.

Finally, it is important to note that characteristics associated with adolescents' physical and mental well-being comprise the bulk of relatively low intra-class correlation coefficients. Specifically, all eight health-related characteristics have ICCs less than .05. Indeed, less than 4 percent of the variation in self-rated health, one of the most frequently used measures of health among adults (Idler and Benyamini 1997; Benyamini and Idler 1999), is associated with adolescents' neighborhoods. Likewise, the ICC estimates for both mental health measures fall below commonly accepted thresholds (Duncan and Raudenbush 1999). Thus, adolescent's mental health status does not appear to be directly impacted by their area of residence. This is somewhat unexpected given the increased emphasis of the linkages between the social environment and health related practices. However, here it is also important to consider that we have used extensive individual-level controls in the calculation of the adjusted intra-class correlation coefficients. Therefore, the observed relationship between neighborhoods and health among adolescents may be more adequately described as compositional rather than contextual in nature. In other words, once the sociodemographic and socioeconomic characteristics of individuals are considered, there only appears to be a slight association with overweight prevalence and area of residence. This does not mean that area of residence is not important for health outcomes such as obesity; rather, the mechanisms through which neighborhoods are operating may (in the case of overweight/obesity) have more to do with the characteristics of individuals who reside in particular neighborhoods rather than neighborhood-level characteristics, per se.

Discussion

The stated goal of this paper was to identify characteristics of adolescents' lives in which their neighborhoods have particularly strong or weak influences. We use a nationally representative sample of middle-school and high-school age adolescents to measure the extent to which variation, across 34 characteristics, is due to variation between adolescents' neighborhoods or between adolescents within neighborhoods. It is important to note that at most, neighborhoods explain one-quarter of the variance in the various outcomes, reinforcing the well-established importance of individual level characteristics. Regardless of the importance of within-neighborhood variation, the results confirm that neighborhood effects are by no means inconsequential, and are important factors in adolescent development and behavior.

Consistent with other work in this area we find that neighborhoods factor into adolescents' externalizing behavior problems (Case and Katz 1991; Elliot et al. 1996; Sampson and Groves 1989; Aneshensel and Sucoff 1996; Loeber and Wikstrom 1993; Peeples and Loeber 1994) and their educational outcomes (Leventhal and Brooks-Gunn 2000). The observed relationship between neighborhood context and PVT scores is also congruent with previous studies that have examined younger age groups, suggesting the continuous nature of context on development (Chase-Lansdale and Gordon 1996; Chase-Lansdale et al. 1997).

As highlighted elsewhere, educational outcomes are one of the most frequently studied areas of neighborhood-level effects on adolescents primarily because school achievement and academic integration have been shown to be important predictors of future success. The choices that adolescents make in regards to their education will strongly influence their options, occupational choices, and future earning potential and must be studied in detail. The existing academic outcome literature focuses primarily on years of schooling and college attendance (Duncan 1994), school drop-out (Brooks-Gunn et al. 1993; Crane 1991; Garner and Raudenbush 1991), and self-reported grades (Dornbusch, Ritter and Steinberg 1991). In addition to these measures, our inclusion of relative intelligence, school involvement, and the measures of academic delinquent behavior provide a more thorough examination of the educational environment, better inform the mechanisms through which academic outcomes are influenced, and help to describe the process of successful adult transition.

It also appears that external assessments are more strongly associated with area of residence than are subjective educational assessments such as relative intelligence. This distinction is important because it highlights the relative influence of structural and cultural factors related to the school-neighborhood-development paradigm described by others (Gephardt 1997). For example, institutional considerations associated with adolescents' neighborhood and school environments may be particularly relevant when considering external educational assessments. Therefore, it is also important to consider that some of the observed relationships might be due to the nesting of neighborhoods within schools. In particular, as the Add Health study is a school-based design, adolescents from similar neighborhoods may likely attend the same school. Future research will benefit from an examination of school-level variance and the potentially overlapping relationship with neighborhood-level variance. Students from disadvantaged neighborhoods attending disadvantaged schools may be more likely to experience negative outcomes because of a “double disadvantage,” while more advantaged schools may act to provide a buffer to potentially deleterious neighborhood processes. Regardless, the results indicate a strong clustering of educational outcomes at the neighborhood level, reinforcing the notion that neighborhood-level processes may influence adolescents' values, standards for behavior, and achievable goals (Grusec and Goodnow 1994; Schunk and Zimmerman 1996).

These results highlight the importance of neighborhoods on social integration and social connectedness, particularly in the involvement in religion and use of health care facilities. Given this institutional integration into religious and health institutions, it becomes clearer that various pathways exist through which neighborhoods can influence health and risk behaviors. It is possible that religious involvement and access to health services exist as important mediators to subsequent practices and outcomes and may act as buffers against deleterious outcomes.

Building on the relationship between neighborhoods and health, religion is consistently documented to impact health outcomes and mortality (Sherkat and Ellison 1999). Indeed, in a review of religious effects on health behaviors, Koenig et al. (2001) find that the majority of religious studies demonstrate lower levels of substance abuse among more religious adolescents. Religious involvement has also been shown to decrease the likelihood of engaging in other risky behaviors including sexual activity, lack of seat belt use, and cigarette smoking (Koening et al. 2001). It remains likely that church attendance will have similar effects on peer relationships through the creation of strong social ties, and peer groups that engage in healthy lifestyles. It is possible then, that the observed strength of neighborhood-specific religiosity will impact psychological and physical health outcomes as adolescents become older.

Given the large body of work dedicated to the documentation and explanation of neighborhood effects on physical and mental outcomes among adults (Robert 1999), we were surprised to find little evidence that neighborhoods matter with respect to physical and mental development among adolescents. Apart from recent evidence linking neighborhood dynamics to newborn babies (Morenoff 2003), little research links children's area of residence to their current health status. For example, a recent book is entirely dedicated to the theoretical considerations, methodological concerns, and findings with respect to neighborhoods and health (Kawachi and Berkman 2003), but makes no mention of these processes among children and adolescents. It is possible that the standard measures used in this study do not adequately assess adolescents' health status (Schwab-Stone et al. 1994; Booth et al. 2001; Abernathy 1997).

The lack of robust results may also be due to neighborhood specification issues. Whereas younger children are more restricted in their mobility, the increased autonomy of adolescents facilitates a broader base for social interactions. In other words, neighborhood studies are often limited to geographic operationalizations that fail to include behavioral and experiential boundaries. It is possible that a more refined operationalization of “neighborhood” would provide more substantial results. Additionally, health is a lifelong process, and health outcomes are likely to be influenced through the neighborhood differentially at different developmental stages.

It is also possible that neighborhoods, quite simply, are not associated with adolescents' physical or mental well-being. If the latter is true, then it is paramount for investigators to ask and identify why. Moreover, if indeed neighborhoods are important social contexts in which adults' health status is shaped, then characteristics of adolescents' lives that are impacted by neighborhoods may help account for these well-documented relationships among adults. In other words, given the relationship between education and overall physical health status (Lynch and Kaplan 2000), it is possible that one of the mechanisms through which prior area of residence impacts health among adults is through educational opportunities and education-related outcomes as adolescents (Wheaton and Blair 2003).

Conclusion

The results presented in this paper contribute to the large body of work that continues to demonstrate the role of residential context as an important aspect of differential developmental trajectories among youth (Brooks-Gunn et al. 1997). Although these studies have considered each of the domains that are examined in the present study, no existing work has examined these outcomes simultaneously. This paper helps to situate the meaning of neighborhoods with respect to a wide variety of important outcomes. Nevertheless, there are additional substantive and methodological considerations that should be considered when interpreting the results of our study. For example, we do not address in our analyses the ways in which neighborhood effects are moderated by individual-level characteristics. Jencks and Mayer (1990) discuss models of social comparison and relative deprivation where the meaning and importance of individuals' socioeconomic status is properly understood in relation to those around them. Context factors in as a moderating characteristic if the organization of status depends on the perceived successes of an adolescent's peers (Leventhal et al. 2001). A clear next step in these analyses is the exploration of neighborhoods as moderating contexts along with important neighborhood-level characteristics, with the operationalization of aforementioned concepts such as collective efficacy, social disorder, and neighborhood-level measures of socioeconomic status. The inclusion of these variables would help to identify the process or compositional factors that are associated with particular outcomes.

Another important area for future work involves the co-morbidity of risk factors. Although we evaluate each characteristic independently, there are many reasons to believe that these characteristics are strongly associated with one another (Sampson, Morenoff and Gannon-Rowley 2002; Leventhal and Brooks-Gunn 2000). It may be particularly insightful to model the extent to which multi-problem characteristics vary from neighborhood to neighborhood. For example, the convergence of poverty, inadequate educational resources, relatively insecure familial contexts, high prevalence of individuals engaged in risk related outcomes, and inadequate health-related resources is qualitatively different than one of these characteristics set apart from the others. This distinction should be given careful consideration in future analyses.

As discussed elsewhere (Boardman 2004) variance estimates obtained from multilevel modeling reflect the tendency for relatively similar responses to cluster within particular ecological units. Less common is the evaluation of relative outliers. And as Duncan et al. (1996, p. 821) discuss, multilevel models enable researchers to make “predictions of place-specific intercepts and slopes can be obtained and since these are made using the entire sample of places they are more precise than those from a traditional approach in which each place is estimated separately.” In other words, neighborhood-specific parameter estimates obtained from multilevel models can be used to identify neighborhoods in which there is a relatively high degree of clustering in the dependent variable and neighborhoods in which the estimated effect of a particular individual-level characteristic (e.g., socioeconomic status) is relatively strong or weak. Once these neighborhoods are identified, more elaborate and nuanced methodological techniques such as systematic social observation (Sampson and Raudenbush 1999) can be used to more accurately describe neighborhood mechanisms that account for this variation across neighborhoods.

Last, adolescent outcomes are influenced by their interactions with their peers in a given context while influencing and shaping the contexts in which they interact and reside (Aber et al. 1997; Frohlich et al. 2001). Although neighborhoods are believed to impact adolescent outcomes, it is also possible that any of these characteristics may be important criterion for neighborhood selection (i.e., persons who exhibit a greater frequency of risky behaviors may

choose to reside in certain neighborhoods because of these behaviors are more evident). Similarly, it is important to remember that adolescent outcomes change over time but so do neighborhoods (Quillian 1999), and there is little evidence about the processes relating neighborhood change to the adolescent well-being.

Throughout this manuscript, we have focused on the notion that neighborhoods may matter in various adolescent outcomes. Rather than specifically focusing on the ways in which neighborhoods may mediate specific adolescent outcomes, we focus on *what* specific items and *what* social domains are the most and least impacted by an adolescent's neighborhood context. Specifically, we determine the extent to which variation in adolescents' responses are captured by relatively similar responses among peers within particular neighborhoods. This provides researchers with a framework for determining the adolescent outcomes that are the most likely to be clustered in neighborhoods, and supplies a foundation for future research. Importantly, this research suggests that neighborhoods have different levels of consequence for various adolescent outcomes, and confirms that neighborhood processes are noteworthy throughout the life course.

Appendix 1. Descriptive characteristics of all variables used in the analyses

Domain	Item	Range	Mean/%	S.D./N
Institutional Integration				
Religious Participation				
Subjective Religiosity	How important is religion to you?	1 (“Not important at all”) to 4 (“Very important”)	3.31	0.77
Frequency of Prayer	How often do you pray?	1 (“Never”) to 5 (“At least once a day”)	3.90	1.30
Church Attendance	In the past 12 months, how often have you attended religious services?	0 (“Never”) to 4 (“Once a week or more”)	2.94	1.07
Education				
Sense of School Belonging	Mean of the following six items: How strongly do you (1) feel close to people at your school, (2) feel like you are part of your school, (3) students at your school are prejudiced (reversed), (4) happy to be at your school, (5) teachers at your school treat students fairly, and (6) you feel safe at your school (alpha = .61)?	1 (“Strongly disagree”) to 5 (“Strongly agree”)	3.57	0.71
Sense of School Connection	Mean of the following four items: Since school year started this year, how often have you had trouble with: (1) getting along with teachers, (2) paying attention in school, (3) getting homework done, and (4) getting along with other students (alpha = .64).	0 (“Everyday”) to 4 (“Never”)	1.04	0.74
Perceived Care				
From outside the family	How much do you feel the following people care about you: (1) your parents, (2) adults, (3) your teachers, (4)	1 (“Not at all”) to 5 (“Very much”)	4.24	0.56

Domain	Item	Range	Mean/%	S.D./N
	your friends you feel that your teachers care about you (3) How much do you feel that your parents care about you?" (4) How much do you feel that your friends care about you (alpha= .64)?			
From mother	Mean of the following three items: (1) "Most of the time, your mother is warm and loving toward you," (2) "When you do something wrong that is important, your mother talks about it with you and helps you understand why it is wrong," (3) "You are satisfied with the way your mother and you communicate with each other." (alpha= .76)	1 ("Strongly disagree") to 5 ("Strongly agree")	4.18	0.78
Health care				
Physical Examination	"In the past year have you had a physical examination"	Yes	64.61	7951
Psychological Counseling	"In the past year, have you received psychological or emotional counseling"	Yes	12.95	1542
Physical and Mental Health				
Physical Health				
Fatigue	Respondents indicated that they felt physically weak, very tired, or dizzy once a week or more during the past 12 months.	Yes	26.01	3174
Pain	Respondents indicated that they had a headache, a stomach ache, or joint pains once a week or more during the past 12 months.	Yes	40.94	5006
Sick	Respondents indicated that they had a sore throat, a cough, felt really sick, or had cold sweats once a week or more during the past 12 months.	Yes	14.21	1737
At risk of overweight or overweight	Body Mass Index (kg/m^2) at or above the 85th percentile for sex-specific BMI-for-age growth chart (Vital Health Statistics 2002).	Yes	26.15	3152
Self-Rated Health	"In general, how is your health?"	1 ("Poor") to 5 ("Excellent")	3.88	0.91
Injury	Which of these describes your worst injury in the past year?	1 ("Very minor") to 5 ("Extremely serious")	1.77	0.88
Mental Health				
Psychological Distress	Mean of the following five items describing how respondents felt last week: (1) "You were bothered by things that usually don't bother you," (2) "You felt that you could not shake off the blues, even with help from your family and your friends," (3) "You felt depressed," (4) "You felt sad,"	0 ("Never or rarely") to 3 ("Most/all of the time")	0.39	0.46

Domain	Item	Range	Mean/%	S.D./N
	and (5) "You felt life was not worth living." (alpha=.81).			
Psychological Well-being	Mean of the following four items. Last week: (1) "You enjoyed life", (2) "You were happy", (3) "You felt hopeful about the future", (4)"You felt that you were just as good as other people." (alpha = .72).	0 ("Never or rarely") to 3 ("Most/all of the time")	0.97	0.67
Educational Outcomes				
External Assessment				
GPA	Average self-reported grade point average from math, science, English, and social studies grades.	1 to 4	2.79	0.77
PVT	Adolescent Health Picture Vocabulary Test (*PVT*), which is an abbreviated version of the Peabody Picture Vocabulary Test.	14 to 139	100.89	15.00
Held back a grade	Respondent has repeated a grade or been held back.	Yes	21.85	2629
Subjective Assessment				
Relative Intelligence	"Compared with other people your age, how intelligent are you?"	1 ("Moderately below average") to 6 ("Extremely above average")	3.84	1.10
Academic Aspirations	"On a scale from 1 to 5, how much do you want to go to college?"	1 ("Low") to 5 ("High")	4.40	1.05
Academic Expectations	"On a scale from 1 to 5, how likely is it that you will go to college?"	1 ("Low") to 5 ("High")	4.12	1.12
Risk-Related Behaviors				
Substance Use				
Tobacco	Self reported use of cigarettes or chewing tobacco	Yes	57.33	7052
Alcohol	Self reported use of alcohol	Yes	54.18	6754
Drugs	Self reported use of marijuana, cocaine, inhalants, or other drugs	Yes	27.54	3577
Delinquency				
Fighting	Self-reported engagement in a physical fight in the past 12 months.	Yes	35.56	4199
Stealing	Self-reported shoplifting or stealing something less than $50	Yes	25.81	3133
Property Damage	Self-reported painting of graffiti or deliberately damaging property.	Yes	20.68	2435
Criminal Victimization	Respondent reports any of the following in the past 12 months: (1) "Someone pulled a knife or gun on you"; (2) "Someone shot you"; (3)	Yes	19.87	2338

Domain	Item	Range	Mean/%	S.D./N
	"Someone cut or stabbed you"; or (4) "You were jumped."			
Number of Days Skipped School	0-99 days of days skipped school for a full day without an excuse in the current school year.	0 to 99	2.00	7.21
Suspended	Respondent reports have ever received an out-of-school *suspension* from school	Yes	27.66	3330
Sex and Pregnancy				
Sexual Intercourse (yes)	Self-reported sexual intercourse	Yes	38.30	4678
Pregnancy attitudes	It wouldn't be all that bad if you got pregnant or you got someone pregnant at this time in your life	1 ("Strongly agree") to 5 ("Strongly disagree")	4.19	0.88
Sociodemographic Characteristics				
Age	Age of respondent in years	11 to 21	15.44	1.82
Race/Ethnicity	Self-identification			
	Non-Hispanic White	Yes	73.50	8507
	Non-Hispanic Black	Yes	12.58	1815
	Hispanic	Yes	8.91	1044
	Asian	Yes	2.54	383
	Native American	Yes	2.47	319
Marital Status	Mother of respondent currently married	Yes	60.41	7227
Sex	Sex of adolescent	Female	49.29	6303
Socioeconomic Characteristics				
Proxy for yearly income	Receipt of public assistance at time of survey	Yes	8.08	955
Education	Highest level of educational attainment by mother	Less than 8th grade	4.61	544
		9th to 11th grade	9.54	1102
		High school graduate	24.82	2915
		Some college	12.71	1475
		College graduate or higher	48.32	6032

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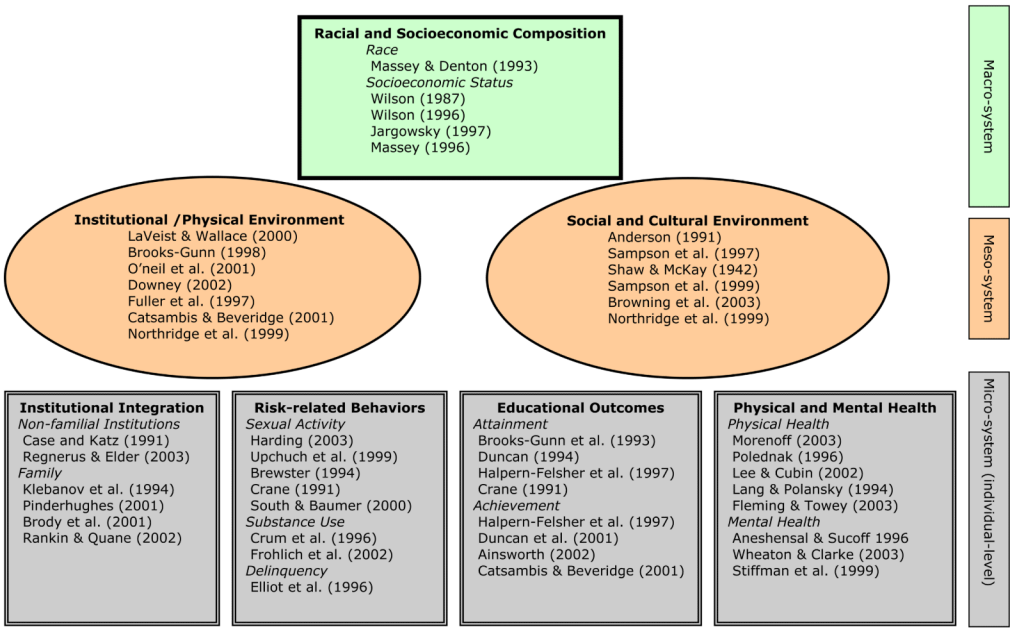

Figure 1. System-model of neighborhood-related processes among adolescents: Conceptual model and review of literature

Table 1

When do neighborhoods matter? Relative contribution of neighborhoods to overall variation across four developmental domains

Institutional Integration	Intra-class correlation	Educational Outcomes	Intra-class correlation
Religion		External Assessment	
Subjective Religiosity	0.16	GPA	0.09
Frequency of Prayer	0.11	PVT	0.25
Church Attendance	0.12	Held back a grade	0.14
Education		Subjective Assessment	
Sense of School Belonging	0.07	Relative Intelligence	0.06
Sense of School Connection	0.05	Academic Aspirations	0.08
Perception of care from others		Academic Expectations	0.10
From outside the family	0.06		
From mother	0.02	**Risk-Related Behaviors**	
Health care		Substance Use	
Physical Examination	0.10	Tobacco use	0.06
Psychological Counseling	0.14	Alcohol use	0.05
Physical and Mental Health		Use of drugs	0.22
Physical Health		Crime and Delinquency	
Fatigue	0.02	Fighting	0.06
Pain	0.01	Stealing	0.08
Sick	0.04	Property Damage	0.05
At risk of being overweight	0.05	Victimization	0.12
Self-Rated Health	0.04	Skipped School (# days)	0.21
Injury	0.02	Suspended	0.17
Mental Health		Sex and Pregnancy	
Psychological Distress	0.02	Sexual Intercourse	0.11
Psychological Well-being	0.04	Pregnancy Attitudes	0.06

Note: Cell entries represent adjusted intra-class correlation coefficients describing the relative contribution of neighborhood-specific variation to overall variation. Data come from Wave 1 of the National Longitudinal Study of Adolescent health (N = 12,086).

Table 2
Summary statistics for each domain: adjusted intra-class correlation coefficients

	Average	Median	Minimum	Maximum
Physical and Mental Health	0.03	0.04	0.01	0.05
Institutional Integration	0.09	0.10	0.02	0.16
Risk-Related Behaviors	0.11	0.08	0.05	0.22
Educational Outcomes	0.12	0.09	0.06	0.25

Note: Derived from values presented in Table 1.