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Neighborhood Structural Inequality, Collective Efficacy, and Sexual Risk Behavior among Urban Youth

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Abstract

We draw on collective efficacy theory to extend a contextual model of early adolescent sexual behavior. Specifically, we hypothesize that neighborhood structural disadvantage—as measured by levels of concentrated poverty, residential instability, and aspects of immigrant concentration—and diminished collective efficacy have consequences for the prevalence of early adolescent multiple sexual partnering. Findings from random effects multinomial logistic regression models of the number of sexual partners among a sample of youth, age 11 to 16, from the Project on Human Development in Chicago Neighborhoods ($N = 768$) reveal evidence of neighborhood effects on adolescent higher-risk sexual activity. Collective efficacy is negatively associated with having two or more sexual partners versus one (but not zero versus one) sexual partner. The effect of collective efficacy is dependent upon age: The regulatory effect of collective efficacy increases for older adolescents.

Young adolescents who initiate sexual activity get a “head start” on exposure to risks such as sexually transmitted diseases and unwanted fertility, at a time when their developmental status places them at a disadvantage in the assessment and management of these risks (Keating 2004; Steinberg 2005). In addition to these direct risks, early onset of sexual activity is associated with other indirect outcomes, such as diminished mental health and increased involvement in other risk behaviors (Meier 2002; Resnick et al. 1997; Tubman, Windle, and Windle 1996). It is not surprising, then, that researchers have devoted considerable attention to the determinants of entry into sexual activity among adolescents (Albert, Brown, and Flanigan 2003).

However, the focus on sexual initiation as the outcome of interest obscures differentiation in sexual risk behavior. Once sexual behavior is initiated, the extent to which it presents a continued or accentuated risk depends upon the character and extent of the adolescent's later sexual involvement. Adolescents may follow quite different paths. Some may opt out of further sexual activity until later adolescence or even adulthood, while others may enter into long-term monogamous relationships. Still other adolescents, however, progress from sexual debut to a series of ephemeral sexual partnerships (Whitaker, Miller, and Clark 2000).

Youth who initiate sexual activity early and go on to have multiple partners during their teenage years are at greatest risk for negative outcomes, such as sexually transmitted diseases (STDs), that are associated with adolescent sexual activity.

Here, we extend prior research establishing a linkage between community-level social processes and adolescent sexual debut (Browning, Leventhal, and Brooks-Gunn 2004, 2005), investigating the influence of neighborhood context on multiple sexual partnering among younger adolescents. Our approach allows for an assessment of the factors that may contribute to continued exposure to sex-related risks throughout adolescence: Are neighborhood social processes more powerfully associated with higher risk and more extensive patterns of sexual partnering by comparison with initiation of sexual activity? The issue is an important one, as young adolescents are socially and physically rooted in the neighborhoods in which they reside. Higher-risk sexual behavior among adolescents in neighborhood contexts may thus serve to concentrate STD risk in these same contexts.

As an extension of recent developments in theory and research on the spatial correlates of adolescent behavior, research into adolescent sexual activity has moved beyond an exclusive consideration of family and individual-level factors to the contribution of contextual factors, such as neighborhood of residence. Indeed, a number of studies demonstrate the link between neighborhood structural disadvantage and the elevated prevalence of adolescent sexual behavior (Baumer and South 2001; Billy, Brewster, and Grady 1994; Brewster 1994; Ku, Sonenstein, and Pleck 1993; Ramirez-Valles, Zimmerman, and Juarez 2002; Upchurch et al. 1999). More recent research has explored the community-level social mechanisms that may channel the effects of structural disadvantage on adolescent sexual debut (Browning, Leventhal, and Brooks-Gunn 2004, 2005). This research has its basis in neighborhood theory, which highlights community social organization as a key link between structural disadvantage and individual outcomes (Leventhal and Brooks-Gunn 2000; Sampson, Morenoff, and Gannon-Rowley, 2002). Neighborhoods with high levels of “collective efficacy”—social ties between parents of interconnected youth, attachments to community, and norms regulating adolescent behavior—are likely better able to supplement the direct care-giving and supervisory capacities of parents (Sampson, Raudenbush, and Earls 1997). Neighborhood structural disadvantage, characterized principally by concentrated poverty, residential instability, and ethnic heterogeneity, attenuates this neighborhood-based supervisory capacity (Sampson, Morenoff, and Earls 1999).

In this research, we apply the collective efficacy approach to the case of adolescent multiple sexual partnering, considering the impact of structural disadvantage and collective efficacy—operationalized as the combined influence of intergenerational closure, social cohesion, and informal social control orientations toward local youth—on the accumulation of sexual partners during the early adolescent years. We also consider the potential for age to condition the influence of collective efficacy on the experience of higher-risk sexual behavior—acknowledging the increasing autonomy and associated exposure to neighborhood environments experienced by youth as they advance into their teenage years. We test this developmentally-contingent collective efficacy approach to the influence of neighborhood on adolescent sexual risk using data from the Project on Human Development in Chicago Neighborhoods. We employ random effects multinomial logit models to examine the extent to which (1) neighborhood structural disadvantage influences the number of sexual partners during adolescence, above and beyond the micro-level context; (2) collective efficacy exerts a unique influence on higher-risk adolescent sexual behavior; and (3) any observed effects of collective efficacy are dependent upon adolescent age.

THEORETICAL BACKGROUND

Neighborhood Structure and Adolescent Sexual Behavior

Collective efficacy theory links key aspects of urban neighborhood structure with variability in dimensions of social organization relevant to adolescent outcomes. The first of these structural characteristics is the concentration of economic disadvantage within contemporary urban neighborhoods. Stark socioeconomic inequalities across neighborhoods (Wilson 1996) and associated patterns of racial segregation (Krivo and Peterson 1996; Massey and Denton 1993) can deprive communities of resources essential to the development of children and adolescents (Jencks and Mayer 1990). Widespread poverty and unemployment at the neighborhood level substantially limit the availability of economic and social resources that are vital to sustaining schools, local voluntary organizations, and other local institutions.

Neighborhood socioeconomic disadvantage has been linked with early sexual activity and related outcomes in a number of studies (Baumer and South 2001; Billy et al. 1994; Brewster 1994; Brooks-Gunn et al. 1993; Ku et al. 1993; Ramirez-Valles, Zimmerman, and Newcomb 1998). Evidence also suggests that neighborhood socioeconomic status accounts, in part, for racial differences in the prevalence of early sexual activity and childbearing (Baumer and South 2001; Brewster 1994). Another structural factor—and a potential correlate of economic disadvantage—is the level of instability in residential tenure. Communities that experience rapid turnover in local population and diminished rates of homeownership are less likely to develop viable social networks. Community solidarity also suffers in residentially unstable areas: In the absence of a stable population, well-defined neighborhood identities are less likely to emerge.

Third, ethnic and racial heterogeneity may hinder informal communication within neighborhoods, affecting the development of network ties across groups. In the context of Chicago, we focus on the role of immigrant concentration in influencing the number of adolescent sexual partnerships, taking into account the potentially complex relationship between this feature of neighborhood context and individual outcomes. At low levels, increasing immigrant concentration may compromise social organization across diverse neighborhood groups. At high levels of immigrant concentration, i.e., in ethnic “enclaves,” adolescents may benefit from high degrees of social homogeneity and cohesion around more traditional normative orientations toward sexual

The effects of structural deficits on local institutions, neighborhood attachments, and network ties may impede the ability of community residents to achieve common goals, including the informal social control of neighborhood youth (Sampson 1997). In short, structural characteristics of neighborhoods may influence community-level mechanisms that have consequences for adolescent behavior—specifically, neighborhood cohesion and the capacity for informal social control. Sampson and colleagues describe these aspects of social organization as “collective efficacy” (Sampson et al. 1999). The concept of collective efficacy refers to the extent of mutual trust, solidarity, and shared values among community residents (i.e., social cohesion) combined with common expectations for pro-social action on behalf of collective goals (i.e., informal social control) (Portes 1998; Sampson et al. 1997).

Neighborhood Collective Efficacy and Adolescent Sexual Behavior

Communities that maintain high levels of collective efficacy may be better able to monitor and regulate the prevalence of both public behaviors such as street delinquency and more typically private behaviors such as adolescent sexual activity. Understanding this process requires attention to multiple dimensions of collective efficacy. First, Coleman (1990) has described “intergenerational closure” as the set of social relationships linking parents with the parents of their children's friends. These ties may be specifically relevant to the

management of adolescent behaviors—particularly adolescent sexual behaviors. While individual parents cannot be everywhere at all times, the parents of children within a social network may work together to supervise their children's behavior, disseminating information, sharing supervision responsibilities, and reinforcing norms regarding acceptable behavior, with potential implications for the regulation of problem behaviors, including sexual activity, among neighborhood youth (Sampson et al. 1999).

Intergenerational social ties, however, must be supplemented by supporting norms in order to yield collective benefits for youth (Sampson et al. 1999). The effective regulation of adolescent behavior is facilitated when extra-familial, intergenerational social relationships combine with expectations for adult action on behalf of local youth. These shared expectations may lead both to more effective supervision of local adolescents and to the development of community-level programs directed at involvement in conventional activities (such as after-school programs or youth recreation centers), thereby discouraging delinquent alternatives, including risky sexual behaviors. We test the hypothesis that collective efficacy exerts a direct effect on the likelihood of multiple sexual partnering, above and beyond predisposing family and individual factors.

These mechanisms have been found to discourage early sexual debut under some conditions (Browning et al. 2005); however, they may be particularly relevant in the control of multiple sexual partnering. Intergenerational ties rooted in shared expectations for adolescent behavior, for example, will be overtly challenged when more adolescents are involved in sexual activities. Although some parents may not expressly disapprove of an adolescent's involvement in a single, more committed sexual relationship, few parents are likely to endorse multiple, short-term, or predatory sexual partnering due to the risks involved and the apparent lack of emotional investment. Thus, parents are more likely to share expectations regarding adolescent sexual behavior when the behavior in question is multiple partnering. Moreover, parents of children in a social network are more likely to become aware of their children's activities in the event of multiple partnering.

The application of the regulatory capacity of neighborhood residents to adolescent sexual activity may also vary by age (Elliott et al. 1996). The rare participation of the youngest adolescents in sexual risk behavior may be attributable to potentially abusive relationships or individual characteristics, such as low self-control (Gottfredson and Hirschi 1990), that operate independently of neighborhood-level social processes. As most adolescents enter middle adolescence, however, their activities may increasingly take place within the purview of neighborhood residents. Increased freedom from the restraints of home life and more frequent informal social interactions with other neighborhood teens may increase their potential exposure to the regulatory effects of the neighborhood environment (Browning et al. 2005). Thus, we also test the hypothesis that collective efficacy is increasingly protective for youth as they advance into their teenage years.

In sum, we expect that the combined influence of intergenerational closure, social cohesion, and expectations for active support and supervision of youth by local adults will exert regulatory effects on adolescent multiple sexual partnering, and that these effects will be conditioned by the age of the adolescent. We examine hypotheses regarding community-level effects on multiple sexual partnering in the context of models that control a host of individual- and family-level predictors. Empirical investigation of the determinants of youth sexual behavior has yet to examine the unique effects of neighborhood-level collective efficacy on higher-risk multiple sexual partnering practices among youth.

While our analyses focus on neighborhood processes of informal social control, it is nonetheless important to consider the effects of potential competing neighborhood processes

on adolescent sexual behavior. For example, Anderson (1990) has argued that disadvantaged environments in which opportunities for conventional success are foreclosed foster alternative or “street” codes of behavior that may encourage higher-risk sexual activity. Social organizational conditions, including levels of collective efficacy, may be highly correlated with the prevalence of alternative behavioral codes within urban communities. Moreover, widespread multiple sexual partnering may provide opportunities for higher-risk sexual behavior that operate independently of the regulatory influences of collective efficacy. Thus, we also consider the competing hypothesis that the extent of multiple partnering at the neighborhood-level (reflecting, potentially, norms supportive of higher-risk sexual behavior or opportunities to engage in such behavior) exerts an independent effect on adolescent multiple partnering at the individual-level and accounts for any observed effects of collective efficacy.

DATA AND METHODS

We use multiple independent data sources gathered by the Project on Human Development in Chicago Neighborhoods to examine individual, family, and neighborhood correlates of the number of sexual partners during early adolescence. The primary data sources used in the analyses are the Project's “Longitudinal Cohort Study,” their “Community Survey,” and 1990 Census data.

Design

For the Longitudinal Cohort Study, Chicago's 847 Census tracts were combined into 343 neighborhood clusters (NCs). Neighborhood clusters were constructed in order to maximize population homogeneity with respect to racial-ethnic, socioeconomic, housing, and family structure characteristics (NCs average roughly 8,000 people). Neighborhood clusters were bounded by identifying, where possible, ecologically meaningful borders such as railroad tracks and freeways. Next, a two-stage sampling procedure was employed that included selecting a random sample of 80 of the 343 Chicago neighborhood clusters. First, the 343 NCs were stratified on the basis of both racial-ethnic composition (seven categories) and socioeconomic status (high, medium, and low). The study design was constructed in order to capture an equal number of NCs in all 21 of these cells (varying by racial-ethnic composition and socioeconomic status). This objective was well approximated, with only 3 exceptions: low-income primarily European American, high-income primarily Latino, and high-income Latino/African American neighborhoods did not exist. From the remaining 18 cells, 80 NCs were randomly selected. Within these 80 NCs, children falling within seven age cohorts (birth and ages 3, 6, 9, 12, 15, and 18) were selected from households with children whose ages were within six months of the target age of the cohort. Extensive in-home interviews and assessments were conducted with these children and their primary caregivers at two points in time over a four-year period, at roughly two-year intervals (wave 1 in 1995–1996 and wave 2 in 1998–1999). All individual and family measures are drawn from the Longitudinal Cohort Study.

Neighborhood measures are constructed from the Community Survey as well as 1990 Census data. The Community Survey is a probability sample of 8,782 residents of Chicago emphasizing respondent evaluations of their communities. The Community Survey was conducted in 1994–1995, overlapping with the first wave of the Longitudinal Cohort Study. These samples were independently collected, however, minimizing problems of shared source bias that may afflict studies that employ neighborhood assessments from respondents who are also reporting on the dependent variable. The Community Survey used a three-stage sampling strategy: first, city blocks were randomly selected within each of the identified 343 NCs; second, dwelling units within blocks were randomly selected; and third, respondents (one adult, age 18 or over, per household) within dwelling units were randomly selected to

complete surveys. The Community Survey sampling strategy achieved a sufficient within-neighborhood sample n to estimate neighborhood characteristics based on aggregated individual-level data.¹ The final response rate was 75 percent.

Sample

In this study, we use data from wave 1 of the Longitudinal Cohort Study (individual and family characteristics) as well as neighborhood data from the Community Survey and demographic information from the 1990 Census. Using these data, we predict the number of sexual partners among respondents between the ages of 12 and 16 at wave 2. The final sample n for our analysis was 768.2 The sample used in these analyses is roughly evenly split by sex of the adolescent, and a range of socioeconomic groups is represented by design. For the total sample of youth, 51 percent are girls and 49 percent are boys. The Chicago population in the middle of the 1990s was increasingly diverse, and the composition of the Longitudinal Cohort Study represents this heterogeneity. In the study sample, 47 percent are Latino, 34 percent are African American, 16 percent are European American, and 3 percent are from other racial groups (we combine the European American and other racial categories in the analyses below). Among Latinos, a majority (nearly 70%) are of Mexican origin, with the remainder comprised predominantly of people of Puerto Rican and Central American origin. The response rate at wave 1 was 74.3 percent for the age 12 cohort, and 71.6 percent for the age 15 cohort. At wave 2, the response rate for wave 1 participants was 86.2 percent for the age 12 cohort, and 82.7 percent for the age 15 cohort. Respondents who attrited between waves 1 and 2 were somewhat more likely to be Latino and of a higher socioeconomic background. In order to address the possibility of bias due to sample attrition, we generated propensity scores to capture the likelihood of attriting between waves 1 and 2 (based on a host of individual- and neighborhood-level predictors). Propensity scores are included at level one in the analyses reported below.³

Dependent Variable

The dependent variable used in the analysis is a categorical measure of the reported total number of sexual partners at wave 2. During the second wave of the Longitudinal Cohort Study, adolescents who reported that they had experienced sexual intercourse were asked, "Since you first had sexual intercourse, has it always been with the same person, or have you had sex with more than one person?" Respondents who reported having had sex with more than one person were then asked, "How many different people have you had sex with?"⁴ For the sample as a whole, 76.6 percent reported no sexual partner in their lifetime, 13.2 percent reported one partner, and 10.2 percent reported two or more partners.⁵

¹The overall within-neighborhood n averaged about 25. The 80 target NCs for the longitudinal study included oversamples resulting in an average of about 50 interviews per NC.

²The number of eligible wave 2 cases (respondents in cohorts 12 and 15 and under the age of 17) was 941. Of these, 808 responded to questions regarding the number of sexual partners. An additional 40 cases were missing on individual-level independent variables. Imputed versions of key variables with higher proportions of item non-response were included in supplementary analyses in order to address the possibility that missing data biased the results of the analyses. These analyses yielded essentially the same results as those reported below.

³The original variable (probability, ranging between 0 and 1) was multiplied by 100 in the analyses.

⁴An effort was made to protect confidentiality during gathering of sensitive information, such as ensuring privacy and making youth aware of the fact that a Federal Certificate of Confidentiality was obtained for the study, which made it illegal to disclose adolescents' responses to anyone, such as parents or school officials (the exception being if youth posed a potential threat to themselves or others).

⁵The distribution ranged from 0 to 13. We reproduced our final models, dropping adolescent respondents who reported an age (in years) at first sex prior to their wave 1 age, in order to address the possibility that acquisition of sexual partners prior to the period captured between waves 1 and 2 biased the results of the analyses. These additional analyses yielded a comparable pattern of magnitude and significance with respect to the effects of collective efficacy, age, and their interaction. Nevertheless, we note that the inclusion of respondents who reported sexual partnerships occurring prior to the data collection period is a potential limitation of the analysis.

Independent Variables

We include a variety of independent variables designed to measure key family, peer, and child characteristics as well as features of the neighborhood environment. Table 1 reports descriptive statistics on variables included in the analysis.

Child and family demographic characteristics—Demographic characteristics include gender, age, race-ethnicity (two dummy codes indicating African American and Latino, with European American and other [hereafter European American] serving as the omitted referent), and immigrant generation (first, subject born outside the United States; second, at least one of the subject's parents born outside the United States; third or higher [omitted referent], subject's grandparents or more distant relations born outside the United States). Family-level structural background measures include socioeconomic status (the first principal component of annual household income, education [highest education level achieved by primary caregiver in the household],⁶ and occupation of the adolescent's primary caregiver).⁷ Family structure is captured by a dummy variable marking the presence of a biological mother and father in the household versus all other family arrangements. Household size measures the number of individuals in the household.

Family processes—We include two multiple-item scales: First, family attachment and support is comprised of five items tapping adolescents' agreement with the following statements: (1) “No matter what happens, I know that my family will always be there for me should I need them,” (2) “My family lets me know they think I'm a worthwhile (valuable) person,” (3) “People in my family have confidence in me,” (4) “People in my family help me find solutions to my problems,” and (5) “I know my family will always stand by me” (reliability = .75) (Turner, Frankel, and Levin 1987).

Second, supervision is a 24-item scale based on an expanded version of the supervision subscale of the “home observation for measurement of the environment” (HOME; Bradley and Caldwell 1984; Bradley et al. 2000). Items were based on primary caregiver reports and include dichotomous (yes/no) responses to questions asking whether, for example, the subject has a set time (curfew) to be home on school nights; after school, the subject goes somewhere that adult supervision is provided; and whether the subject is not allowed to wander in public places without adult supervision for more than two hours. The final measure is the empirical Bayes residual from a two-level Rasch model (reliability = .67).

Peer influences—We include a measure of peer deviance constructed from 17 items asking adolescents to report on the behavior of people they “spend time with.” Questions asked about how many of these people engage in activities such as alcohol and drug use, property and violent crime, and “sexual intercourse.” Responses were given on a three-point scale (“none of them,” “some of them,” or “all of them”). The measure used in the analyses is the empirical Bayes residual from a multilevel ordinal logit (rating scale) analysis (reliability = .86).

Individual risk factors—We focus on developmental, behavioral, and temperamental risk factors for early sexual activity. Boys were asked whether they had experienced a height spurt, growth of body hair, any skin changes (such as pimples), voice deepening, and growth of facial hair (responses were given on a four-point scale: “no,” “yes (barely),” “yes (definitely),” or “development completed”). The scale constitutes the sum of the item

⁶If the subject had two primary caregivers, the caregiver who had the highest education level was used.

⁷Occupational prestige was based on a coding strategy developed by Nakao and Treas (1994), using the updated 1990 Census “occupational classification system” (see Obeidallah et al. 2000 for a discussion of the occupational prestige coding strategy used in the Project on Human Development in Chicago Neighborhoods).

responses divided by the number of items (reliability =.69). Girls were asked whether they had experienced a height spurt, growth of body hair, any skin changes (such as pimples), breast growth, and menstruation (reliability =.72) (Brooks-Gunn, Warren, Rosso, and Gargiulo 1987; Petersen et al. 1988).

Prior problem behavior was assessed by adolescents' reported participation (yes/no) in 19 non-sexual activities involving violent behavior, property crime, and use of illegal drugs; items were combined using a multilevel Rasch model. The final scale used in the analyses is the empirical Bayes residual from the level-two model (reliability =.75).

In addition, a subscale of the “emotionality and sociability inventory” (EASI; Buss and Plomin 1984) was employed to assess sociability. This widely used inventory was administered to primary caregivers who reported how characteristic each behavior was of their children (from “1” uncharacteristic to “5” characteristic). Sample items include “makes friends easily” and “likes to be with people.” The scale constitutes the sum of the item responses divided by the number of items (reliability =.65).

Neighborhood characteristics—All neighborhood characteristics were derived for each of the 80 NCs (or neighborhoods) used in the analyses. Measures of neighborhood-level structural characteristics were constructed using data from the 1990 decennial Census. Based on theory and extensive prior investigation (Land, McCall, and Cohen 1990; Sampson et al. 1997), we performed principal components analyses on selected Census-based measures. First, concentrated poverty is the first principal component of the percent below the poverty line, percent receiving public assistance, percent unemployed, and percent households headed by a female. For analytic purposes, the natural log of this principal components scale score was used. Second, a residential stability component combines measures of continuity of residence (percent living in the same house as in 1985) and percent housing occupied by owners. Third, an immigrant concentration component combines percent Latino and percent foreign-born.

Our measure of collective efficacy combines information from two scales administered as part of the Community Survey: First, we constructed a social cohesion scale from a cluster of conceptually-related items measuring the respondent's level of agreement (on a five-point scale) with the following statements: (1) “People around here are willing to help their neighbors,” (2) “This is a close-knit neighborhood,” (3) “People in this neighborhood can be trusted,” (4) “People in this neighborhood generally don't get along with each other,” and (5) “People in this neighborhood do not share the same values.” The latter two items were reverse coded.

Second, an intergenerational closure and informal social control scale was constructed from items tapping the respondent's level of agreement that (1) “Parents in this neighborhood know their children's friends,” (2) “Adults in this neighborhood know who the local children are,” (3) “There are adults in this neighborhood that children can look up to,” (4) “Parents in this neighborhood generally know each other,” and (5) “You can count on adults in this neighborhood to watch out that children are safe and don't get in trouble.” By design, this scale captures aspects of both adult-child social ties as well as expectations for active support and informal social control of local youth by neighborhood adults (Sampson et al. 1999).

The two scales were highly correlated (i.e., $r > .65$) and were combined into a single measure of youth-related, intergenerationally-oriented collective efficacy (hereafter “collective efficacy”). The measure of collective efficacy used in the analysis was constructed using a three-level linear item response model (Raudenbush and Bryk 2002; Sampson et al. 1997).

At level one, an item-response model adjusted individual-level latent collective efficacy scores for missing data, taking into account the difficulty level of items for which a response was provided. At level two, neighborhood collective efficacy scores (intercepts in between-individual models) were adjusted for the social composition of Chicago neighborhoods through inclusion of controls for gender, age, race-ethnicity (black and Hispanic vs. European American), education, employment status (employed vs. not employed), marital status (never married, separated, or divorced vs. married), home ownership, years resident in the neighborhood, and number of moves in the last five years. At level three, adjusted neighborhood intercepts varied randomly around the neighborhood grand mean. The standardized neighborhood-level empirical Bayes residual constitutes the collective efficacy score employed as an independent variable in subsequent analyses of the number of sexual partners. The three-level reliability of the combined scale was .81.8

Analytic Strategy

Tables 2 and 3 present the results of multilevel multinomial logit models examining the determinants of the number of sexual partners during adolescence. As noted, the Project on Human Development in Chicago Neighborhoods data are hierarchically structured (individuals nested within neighborhoods). Within-neighborhood correlation between cases may bias standard errors downward. Random effects multinomial logit models account for within-neighborhood correlation between respondents and provide an opportunity to test for random variation in the log-odds of representation in a given category of the dependent variable relative to another category. In the analyses presented below, we examine the log-odds of having zero or two or more partners relative to one partner. This approach allows us to determine whether differences exist in the influence of key neighborhood processes on the transition from no to one sexual partner and one to multiple sexual partners. The multilevel multinomial logit model takes the following form:

$$\eta_{mij} = \beta_{0j(m)} + \sum_{q=1}^{Q_m} \beta_{qj(m)} X_{qij}$$

$$\beta_{0j(m)} = \gamma_{0(m)} + \sum_{s=1}^S \gamma_{sj(m)} W_{sj} + u_{j(m)}$$

where η_{mij} is the log-odds of falling into category m of the dependent variable versus the reference category—in this case, having one sexual partner—for $m-1$ categories. Thus, the level-one model includes equations for two log-odds ratios—the log of the probability of reporting no partner relative to one partner and the log of the probability of reporting two or more partners relative to one partner. Individual- and family-level predictors X_q (with associated coefficients β_q) are grand-mean centered and included at level one for both contrasts. Two level-two intercepts, $\beta_{0j(1)}$ and $\beta_{0j(2)}$, are modeled as a function of S grand-mean centered neighborhood-level covariates W (concentrated poverty, residential stability, immigrant concentration, collective efficacy, and the aggregated neighborhood-level number of sexual partners) with corresponding coefficients γ_s . Random effects $u_{j(1)}$ and $u_{j(2)}$ can also be included at level two.

⁸See Raudenbush and Sampson (1999) for a discussion of reliability in three-level models.

Our first multivariate analysis (Table 2) focuses on individual, family, and peer influences on adolescent sexual behavior. We examine the effects of race-ethnicity, age, immigrant generation, sex, family background (SES, structure, size, supervision, and attachment) and peer and individual-level risk factors (peer deviance, pubertal development, prior problem behavior, and sociability) on the log-odds of reporting no sexual partners versus one partner and two or more versus one partner.

We turn next to our principal focus, the influence of neighborhood structure and social processes on multiple sexual partnering (Table 3). First, we include our key neighborhood structural characteristics—concentrated poverty, residential stability, and immigrant concentration (model 1)—to test whether these characteristics aid in the explanation of number of sexual partners over and above family, peer, and individual characteristics. Although they are included in the analytic models, we do not present coefficients for the individual-level covariates in Table 3, with the exception of age. We then enter our measure of collective efficacy (model 2) to consider its unique effect on the number of adolescent sexual partners. In model 3, we include the aggregated (neighborhood level) number of sexual partners measure to determine its unique effect and whether it modifies the influence of any other observed neighborhood influences. Finally, we include the cross-level interaction between collective efficacy and individual-level age in order to test the hypothesis that the impact of collective efficacy varies by adolescent age. Models are clustered by category comparison (e.g., coefficients from three models showing the change in log-odds of reporting one sexual partner vs. no partners associated with model covariates are grouped in the first three columns of the table).

RESULTS

We begin by considering unconditional multilevel multinomial logit models of the number of sexual partners in order to assess baseline variation in the log-odds of reporting no versus one partner and two or more versus one partner. Including random effects for both contrasts results in very high correlation between the two random effects ($r > .98$), complicating estimation of the model. We fit models alternately fixing one random effect. This strategy offered evidence of significant variation across neighborhoods in both log-odds ratios. Given our primary interest in the comparison of two or more partners and one partner, we chose to include a random effect for this contrast, constraining residual variation across neighborhoods to zero for the other contrast.⁹

Table 2 reports the results of conditional multilevel multinomial logit models of the number of partners, including demographic, family, peer, and additional individual-level covariates. The coefficients in the first column represent the log-odds of having no sexual partners versus one partner. The coefficients in the second column represent the log-odds of having two or more sexual partners versus one partner. Focusing, first, on the contrast between one and no sexual partner, results indicate that older age, male gender, more advanced pubertal development, and prior problem behavior are negatively and significantly associated with reporting no sexual partner versus one. In contrast, first or second immigrant generation (versus third or higher) and higher levels of parent-child attachment are positively associated with having no sexual partners. These findings are generally consistent with prior research on the transition to one sexual partner during adolescence. Of interest is the positive association between the propensity to attrit between waves and the likelihood of reporting no versus one partner.

⁹We estimated all models including random effects for both contrasts in order to test for the sensitivity of our results to specification of the random component of the model. Coefficients for neighborhood variables remained virtually the same when both random effects were included.

The second column of Table 2 reports the pattern of association between individual and family-level predictors and the log-odds of reporting two or more sexual partners versus one sexual partner. Again, we focus on one partner as the reference category in order to examine the predictors of movement from one sexual partner to multiple sexual partners during adolescence. In general, fewer family- and individual-level covariates are predictive of having two or more versus one sexual partner. Greater age and African American race-ethnicity are positively associated with reporting multiple sexual partners versus one—African American youth are roughly three times as likely as European American youth to report two or more sexual partners versus one partner. Remaining predictors included in the model for this contrast are not statistically significant.

Table 3 reports the results of models adding neighborhood-level covariates to models that include all individual- and family-level covariates. Although we include individual- and family-level covariates in all models reported in Table 3, we do not present the coefficients (available upon request), with the exception of age. Focusing, first, on the contrast between zero and one sexual partner (the first four columns of Table 3), model 1 includes measures of concentrated poverty, residential stability, and immigrant concentration (linear and quadratic terms). Concentrated poverty is positively associated with reporting no versus one sexual partner; a one unit increase in the concentrated poverty scale decreases the odds of reporting no sexual partner (versus one) by nearly 40 percent. Residential stability and immigrant concentration are not significant predictors in model 1.

Models 2 and 3 add neighborhood-level collective efficacy and the aggregated number of sexual partners variable. The coefficient for collective efficacy is not statistically significant. The addition of the aggregated number of sexual partners variable (model 3), however, offers evidence of a significant negative association between the prevalence of multiple partnering at the neighborhood level and the likelihood of reporting no sexual partners. Moreover, the inclusion of the aggregated number of sexual partners variable reduces the coefficient for concentrated poverty by nearly 30 percent and renders it statistically insignificant. Note, also, that the coefficient for the quadratic effect of immigrant concentration becomes significant in model 3. This finding is consistent with the hypothesis of a negative ethnic heterogeneity effect on the likelihood of having no sexual partners at low levels; however, at higher levels, ethnic enclaves may begin to form that crystallize around more traditional orientations toward sexual behavior (consistent with a positive effect on having no adolescent sexual partners).

The fifth through eighth columns of Table 3 report comparable results for the contrast between two or more sexual partners and one partner—the key focus of the analyses. Model 1 offers little evidence of neighborhood structural effects on the movement to two or more sexual partners from one partner. Including the measure of collective efficacy in model 2, however, reveals a negative and statistically significant effect; a one standard deviation increase in neighborhood collective efficacy decreases the likelihood of reporting two or more sexual partners (versus one) by nearly 40 percent. Model 3 includes the aggregated number of sexual partners variable and reveals a positive but statistically insignificant effect of this covariate on the likelihood of two or more sexual partners (versus one). The negative effect of collective efficacy, however, remains significant.

Finally, model 4 includes the cross-level interaction between collective efficacy and age.¹⁰ The coefficient for the interaction term is significant and negative, indicating that as age increases, the magnitude of the regulatory impact of collective efficacy increases. In model

¹⁰We also examined the cross-level interaction between age and collective efficacy for the contrast between 0 and 1 partner. The coefficient was not significant.

4, we subtracted 15 from the original age variable rather than the grand mean, in order that the coefficient for collective efficacy represents its impact when wave 1 adolescents are age 15. For 15-year-old adolescents at wave 1, a one standard deviation increase in neighborhood collective efficacy reduces the odds of reporting two or more sexual partners by 56 percent.

Figure 1 presents predicted probabilities for wave 1 15- and 12-year-old adolescents (corresponding to the modal ages of the two Project on Human Development in Chicago Neighborhoods cohorts represented in the sample¹¹) based on model 4 of Table 3, holding other covariates at their grand means. Among 12-year-olds, the predicted probability of two or more partners is quite small (ranging between .02 and .04). Although the effect of collective efficacy is negative for 12-year-olds, the coefficient is relatively small in magnitude (−.13) and does not achieve significance. In contrast, over 30 percent of 15-year-old adolescents in low collective efficacy neighborhoods (1.5 standard deviations below the mean) are expected to report two or more sexual partners. At 1.5 standard deviations above the mean, only 4 percent of 15-year-olds are predicted to report two or more sexual partners—a marked decrease. The impact of collective efficacy becomes significant for adolescents between the ages of 13 and 14. Thus, collective efficacy exerts a significant impact on the likelihood of experiencing higher-risk sexual activity among adolescents 13 and older, but not for the younger or “pre-adolescent” youth. Moreover, the findings indicate that collective efficacy is more relevant for the movement from one sexual partner to more extensive (and higher-risk) sexual partnering among adolescents in comparison with the transition to one partner.¹²

DISCUSSION

Research on the etiology of early sexual behavior is moving beyond the longstanding exclusive interest in family, peer, and individual factors to include consideration of the neighborhood contexts of adolescents' lives (Brooks-Gunn et al. 1993). We build on this research to develop and test a theory of the link between neighborhood context and adolescent sexual risk behavior, emphasizing the role of structural disadvantage and collective efficacy. Specifically, we extend a model focused on the influence of neighborhood-level disadvantage and collective efficacy to understand neighborhood differences in the number of sexual partnerships during adolescence. The prevalence of multiple sexual partnering has important policy implications: Sexual risk may become concentrated, affecting outcomes (including, critically, the spread of sexually transmitted diseases) of even those who do not themselves enter into serial or concurrent sexual relationships. Thus, explanation of variation in the total number of sexual partnerships captures a consequential, cumulative, and socially extensible dimension of sexual risk (Jemmott and Jemmott 1990).

Our analyses began by investigating the micro contextual determinants of having no, one, or two or more sexual partnerships during adolescence. Drawing on extant research, we explored the contribution of family socioeconomic attributes, family processes, peer, and individual-level characteristics to adolescent sexual risk. Findings indicated that, although a number of individual- and family-level covariates predicted having no sexual partnerships versus one (largely consistent with prior research), relatively few were uniquely predictive of having two or more versus one partner. African American youth were at substantially higher risk of experiencing two or more sexual partnerships versus one than were European

¹¹PHDCN adolescents are, on average, 1.9 years older by wave 2.

¹²Tests for interaction effects between collective efficacy and gender revealed no significant interactions.

American or Latino youth. Male gender was also positively associated with having two or more sexual partners.

Our principal concern focused on the independent impact of neighborhood characteristics on the number of sexual partners. The introduction of the neighborhood concentrated poverty measure to models including individual, family, and peer effects revealed a significant effect of this covariate on reports of having no sexual partner versus one, but no additional impact on the log-odds of reporting two or more sexual partners versus one.

The effect of immigrant concentration on reports of having no sexual partner versus one was consistent with both a collective efficacy theory expectation of a positive effect of ethnic heterogeneity on the number of partners at low levels of immigrant concentration as well as a negative enclave effect on sexual partnering at high levels. The potential for negative effects of ethnic heterogeneity may be offset by the increasing concentration of Latino immigrants in Chicago communities and the corresponding cohesion around more traditional orientations toward sexual behavior. Indeed, this finding is consistent with the notion that high levels of Latino and foreign-born presence may tap a broadly protective “enclave effect” relevant to a range of adolescent outcomes.

Collective efficacy theory emphasizes community-level social organization as a key neighborhood-level factor influencing individual adolescent behavioral outcomes (Brooks-Gunn et al. 1993; Sampson 1997; Sampson et al. 1997; Wilson 1996). Our investigation of this hypothesis with respect to the number of adolescent sexual partnerships yielded evidence in support of the claim that collective efficacy—as represented by the joint influence of intergenerational closure, social cohesion, and expectations for adult protection and active support of local youth—has important consequences in limiting risky sexual behavior. Our measure of collective efficacy exerted statistically significant negative effects on reporting two or more sexual partners versus one partner, above and beyond individual-level and neighborhood structural controls.

We also examined the hypothesis that the regulatory effect of collective efficacy varies by adolescent age. Indeed, our analyses offer evidence of an increasingly pronounced negative effect of collective efficacy after adolescents enter their teenage years (around age 13). For pre-adolescents, however, we observed no statistically significant effect of collective efficacy. Previous research indicates that the impact of collective efficacy may be more pronounced for adolescents who experience lower levels of supervision (Browning et al. 2005). The adolescent life course is likely to enhance exposure to neighborhood contexts, potentially amplifying the impact of neighborhood informal social control processes. Moreover, the occurrence of multiple partnering among the youngest adolescents may point to the occurrence of abusive relationships or the operation of trait-based processes such as low self-control that are less responsive to environmental conditions.

These findings highlight the relevance of community-level social processes in understanding individual adolescent sexual risk behavior beyond sexual debut. Specifically, collective efficacy plays a significant role in limiting higher-risk behavior, particularly for teens in mid-adolescence. Collective efficacy may be effective in the regulation of adolescent multiple sexual partnering because community-level norms regarding the appropriateness of this behavior for adolescents are more likely to be consistent and powerful. Moreover, to the extent that multiple sexual partnering expands the network exposed to the behavior, stakeholders have, potentially, greater access to information through which to produce an informal social control response.

A number of limitations to the analysis are worthy of note. First, the Project on Human Development in Chicago Neighborhoods is limited to the city of Chicago, complicating

inferences to other populations. Second, neighborhood residence is not random, as families have some choice as to where they live. Some unmeasured characteristics may account for any observed neighborhood influences (Tienda 1991). Nevertheless, we observe neighborhood effects even after including a rich battery of micro-level controls made available in the Project on Human Development in Chicago Neighborhoods data. Third, though our research represents a first step in considering the role of neighborhood social processes in limiting multiple sexual partnering, we are unable to examine the impact of neighborhood social processes on sexual behavior trajectories in detail (i.e., the process by which adolescent sexual behavior unfolds over time). In addition, the sexual partnerships of some of our respondents occurred outside of the time period captured by waves 1 and 2 of the Project on Human Development in Chicago Neighborhoods Cohort study. However, our results provide evidence that collective efficacy is relevant to patterns of sexual activity beyond sexual debut, suggesting that further examination of the role of neighborhood social processes in shaping sexual behavior trajectories is warranted.

The findings in this study indicate the importance of collecting detailed information on the multiple social contexts to which adolescents are exposed. Emerging investigation of the role of school context in adolescent development, for instance, has been undertaken largely independently of research on neighborhood effects. The simultaneous assessment of neighborhood and school effects on adolescent outcomes may shed important light on persistent yet unexplained effects of these contexts when examined separately. Finally, adolescent lives unfold not only within the confines of families, neighborhoods, and schools, but larger structural contexts such as metropolitan areas and regions. Assessing variation in adolescent development at higher levels of analysis would facilitate the additional consideration of factors such as racial segregation, broader cultural formations, and the state in understanding the adolescent experience.

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FIGURE 1.
Predicted Probability of Two or More Sexual Partners by Collective Efficacy for 12- and 15-
Year-Old (at wave 1) PHDCN Adolescents

TABLE 1

Descriptive Statistics for Variables in the Analysis*

Independent Variables	Mean/Percent	Standard Deviation	Minimum	Maximum
<i>Demographic and family background</i>				
Race/ethnicity				
African American	.34	—	.00	1.00
Latino	.47	—	.00	1.00
White/other	.20	—	.00	1.00
Male	.49	—	.00	1.00
Age (Wave 1)	12.36	1.31	10.97	15.65
Age (Wave 2)	14.75	1.17	12.87	16.99
Immigrant generation				
First	.14	—	.00	1.00
Second	.31	—	.00	1.00
Third or higher	.55	—	.00	1.00
Family socioeconomic status	−.11	1.43	−2.99	3.52
Two biological parents	.47	—	.00	1.00
Family size	5.28	1.95	2.00	14.00
Family attachment and support	2.79	.29	1.00	3.00
Supervision	.09	.68	−2.78	.96
<i>Peers</i>				
Peer deviance	−.44	1.27	−2.81	3.69
<i>Individual characteristics</i>				
Pubertal development	.17	.64	−1.21	1.63
Prior problem behavior	−.29	.96	−1.13	2.94
Sociability	3.69	.77	1.00	5.00
<i>Neighborhood characteristics</i>				
Concentrated poverty	−.02	.91	−3.07	1.51
Residential stability	−.25	.99	−1.63	2.23
Immigrant concentration	.36	1.04	−1.05	2.82
Collective efficacy	.00	1.00	−2.34	3.09
Mean number of sexual partners	.00	1.00	−1.25	3.37

* $N = 768$ for individual, peer, and family level variables; $N = 77$ for neighborhood characteristics.

TABLE 2

Random Effects Multinomial Logit Model of the Number of Sexual Partners during Adolescence (0, 1, 2 or more)—Individual-Level Predictors^a

Independent Variables	0 vs. 1 partner	2 or more vs. 1 partner
Race/ethnicity		
African American	.159 (.357)	1.093* (.497)
Latino	-.095 (.332)	-.426 (.624)
Age	-.421*** (.110)	.151 (.153)
Immigrant generation (vs. third)		
First	1.076* (.446)	1.132 (.832)
Second	.956** (.358)	.945 (.593)
Male	-.535* (.272)	1.012** (.317)
Family socioeconomic status	.056 (.121)	.016 (.144)
Two biological parents	.564 (.317)	-.313 (.396)
Family size	-.089 (.053)	.012 (.070)
Supervision	.142 (.252)	-.111 (.260)
Family attachment and support	1.298*** (.328)	.087 (.414)
Peer deviance	.108 (.101)	.166 (.148)
Pubertal development	-.748** (.234)	.201 (.286)
Prior problem behavior	-.424** (.135)	.322 (.206)
Sociability	-.169 (.163)	-.022 (.228)
Propensity to attrit at Wave 2	.003* (.001)	.001 (.001)
Intercept	2.120*** (.144)	-.967** (.278)

^aNeighborhood level $N = 77$; Person level $N = 768$.

*
 $p < .05$

**
 $p < .01$

 $p < .001$ (two-tailed tests). Standard errors in parentheses.

TABLE 3

Random Effects Multinomial Logit Models of the Number of Sexual Partners During Adolescence (0, 1, 2 or more), including Neighborhood Characteristics^a

Independent Variables	Model: 0 vs. 1 partner				Model: 2 or more vs. 1 partner			
	1	2	3	4	1	2	3	4
<i>Neighborhood characteristics</i>								
Concentrated poverty	-.493* (.201)	-.504* (.211)	-.348 (.205)	-.347 (.205)	.168 (.370)	.047 (.352)	.025 (.373)	-.018 (.360)
Residential stability	-.201 (.173)	-.176 (.182)	-.160 (.182)	-.165 (.185)	-.486 (.307)	-.183 (.329)	-.166 (.344)	-.153 (.351)
Immigrant concentration	.086 (.301)	.090 (.309)	-.009 (.271)	-.014 (.271)	-.096 (.447)	-.157 (.436)	-.061 (.449)	-.038 (.453)
Immigrant concentration squared	.212 (.127)	.201 (.121)	.235* (.097)	.245* (.098)	.118 (.225)	.077 (.209)	.041 (.215)	.026 (.214)
Collective efficacy	—	-.051 (.161)	.014 (.153)	.046 (.162)	—	-.547* (.263)	-.558* (.265)	-.828** (.283)
Prevalence of multiple partnering	—	—	-.538** (.156)	-.539 (.155)	—	—	.207 (.267)	.224 (.261)
Age (<i>individual level</i>)	-.438*** (.108)	-.440*** (.108)	-.470*** (.114)	-.463*** (.114)	.162 (.162)	.162 (.162)	.189 (.172)	.178 (.162)
Collective efficacy * Age	—	—	—	—	—	—	—	-.234* (.119)
Intercept	1.959*** (.177)	1.970*** (.176)	1.977*** (.169)	.963*** (.240)	-.975*** (.339)	-1.001*** (.335)	-1.069*** (.347)	-.678 (.358)

Note: Models control for all individual and family level characteristics

^aNeighborhood level $N = 77$; Person level $N = 768$.

* $p < .05$

** $p < .01$

*** $p < .001$ (two-tailed tests). Standard errors in parentheses.