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Neighborhoods and Race/Ethnic Disparities in Adolescent Sexual Risk Behavior

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Abstract

Understanding the determinants of racial/ethnic disparities in adolescent sexual risk behavior is important given its links to the differential risk of teen pregnancy, childbearing, and sexually transmitted infections. This article tests a contextual model that emphasizes the concentration of neighborhood disadvantage in shaping racial/ethnic disparities in sexual risk behavior. We focus on two risk behaviors that are prevalent among Black and Hispanic youth: the initiation of sexual activity in adolescence and the number of sex partners. Using data from the 1997 National Longitudinal Study of Youth (N = 6,985; 48% female; 57% non-Hispanic White) evidence indicates that neighborhood disadvantage – measured by concentrated poverty, unemployment rates, and the proportion of female-headed households – partially explains Black and Hispanic disparities from Whites in the odds of adolescent sexual debut, although the prevalence of female-headed households in neighborhoods appears to be the main driver in this domain. Likewise, accounting for neighborhood disadvantage reduces the Black-White and Hispanic-White disparity in the number of sexual partners, although less so relative to sexual debut. We discuss theoretical and practical implications of these findings.

INTRODUCTION

Understanding the determinants of adolescent sexual risk behavior is important given its links to teen pregnancy, teen childbearing, and high rates of sexually transmitted infections (STIs) in the U.S. Although teen childbearing in the U.S. is down from a rate of 60 births per 1,000 females age 15–19 in 2000 to 34 per 1,000 in 2010, projections are that approximately 16% of women will have a child by age 20 (Martin et al. 2007; Martin et al.

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Author Contributions

DC consulted on the design of the study, assisted with the analysis, and led the writing of the manuscript. TM conceived the study, performed the statistical analysis, and helped draft the manuscript; PB helped with the study conception, collected data, assisted with statistical analyses, and helped draft the manuscript. SW participated in the analysis and interpretation of results and helped to draft the manuscript. All authors read and approved the final manuscript.

2012). Despite its declining prevalence, teen childbearing remains a concern since most teen births are unintended (Finer and Zolna 2011) and have significant negative consequences for adolescents' educational and occupational attainment, union formation and stability, and their children's status attainment and well-being (Hoffman 2008; McLanahan and Sandefur 1994; Qian et al. 2005). In addition to teen childbearing, STIs are another serious consequence of teen sex. Indeed, estimates from the year 2000 indicate that more than 9 million new cases of STIs occur each year among youth age 15–24 (Weinstock et al. 2004) - a number that has been rising since the 1980s (Center for Disease Control and Prevention 2011). Indeed, recent estimates indicate that as many as 25% of adolescent girls have a STI (Forhan et al. 2009).

Equally as alarming as the consequences of risky sexual behavior are the substantial racial/ethnic disparities in teen pregnancy, childbearing, and STIs associated with them. Although racial/ethnic differences have attenuated over time, African-American and Hispanic women are significantly more likely to become pregnant and bear children prior to age 20 compared to non-Hispanic White and Asian women (Martin et al. 2009; Martin et al. 2012). Moreover, estimates from the 1990's and 2000's indicate that Black youth are at significantly greater odds of having an STI than their White and Hispanic counterparts (Forhan et al. 2009; Upchurch, et al., 2004).

Reducing or eliminating unintended teen pregnancy/childbearing and STI disparities has been a public policy priority in the U.S. for decades (Luker 1996; U.S. Department of Health and Human Services 2010), but not enough progress has been made in understanding the etiology and persistence of racial/ethnic disparities in these outcomes. The most obvious proximate determinants of teen pregnancy/childbearing and STIs among adolescents are sexual debut in adolescence and multiple partners. There is clear evidence that these risk behaviors are historically more prevalent among Black and Hispanic compared to White youth (Blum et al. 2000; U.S. Department of Health and Human Services 2009). Social scientists increasingly recognize that because social and health outcomes are related to race, ethnicity, and economic well-being, policies that focus solely on behavioral interventions at the individual-level, such as sex education, have only limited success (Hotz et al. 2008; Kohler et al. Lafferty 2008). Rather, reducing rates of teen pregnancy/childbearing and STI's, and racial/ethnic disparities in them, requires an understanding of causes rooted in the social environment of racial/ethnic minorities, which increase the probability of engaging in risky sexual behavior in the first place.

The relevance of neighborhood disadvantage for understanding group differences in a wide range of youth outcomes, including risky sexual behavior, is well recognized (for reviews see Diez-Roux 2001; Pickett and Pearl 2001; Robert 1999; Warner et al. 2011), but relatively few studies (reviewed below) have included neighborhood-level measures. Nonetheless, research indicates that neighborhoods with higher concentrations of disadvantage increase the risk of adolescent sexual debut and multiple partners, and the frequency of sexual relations during adolescence (Baumer and South 2001; Biello et al. 2013; Browning et al. 2008; Browning et al. 2004; Cubbin et al. 2005; Cubbin et al. 2010; Warner et al. 2011).

This article draws on recent extensions of social disorganization theory, which stress both social control and subcultural repercussions of neighborhood structural disadvantage for adolescent behavior (Wilson 2009). We focus on two sexual risk behaviors that are prevalent among Black and Hispanic youth compared to other racial/ethnic groups: the initiation of sexual activity in adolescence and the number of sex partners. Using hierarchical modeling and data from the 1997 National Longitudinal Study of Youth we assess whether neighborhood disadvantage plays a role in explaining racial/ethnic disparities in risky sexual behavior in adolescence, independent of family socioeconomic status and parenting styles. We focus our analysis on three aspects of neighborhood disadvantage – the concentration of poverty, unemployment, and female-headed households – that may be especially consequential for youth’s sexual risk behavior and racial/ethnic disparities in them.

Race, Ethnicity, and Sexual Risk Behavior

Racial/ethnic disparities in sexual risk behavior are well-documented. Both Blacks and non-immigrant Latinos are significantly more likely than non-Hispanic Whites to have sex during adolescence and to have more sexual partners (Baumer and South 2001; Blum et al. 2000; Brewster 1994; Browning et al. 2008; Browning et al. 2004; Cleveland and Gilson 2004; Cubbin et al. 2005; Kim 2010; Lansford et al. 2010; Lohman and Billings 2008; Wickrama, Merten, and Wickrama 2012). Scholars have investigated various features of individuals and their home environments to explain racial/ethnic differences in risky sexual behavior among adolescents. Family-level variables such as family attachment, support, and parental monitoring are clearly linked to sexual risk behavior, but have had only minimal utility in explaining racial/ethnic disparities in number of sexual partners and in adolescent sexual debut (Browning et al. 2004; Kim 2010; Lansford et al. 2010; Lohman and Billings 2008; Oman et al. 2013)

Family structure and family socioeconomic status (SES) also appear linked to some aspects of adolescent sexual behavior, but their influence is unclear. For example, adolescents from non-intact homes are at significantly higher risk of early sexual debut (Blum et al. 2000; Brewster, 1994; Browning et al. 2004; Cleveland and Gilson 2004; Cubbin et al. 2005; Fomby, Mollborn, and Sennott 2010; Kim 2010; Santelli et al. 2000; Solorio et al. 2008), and numerous sex partners (Abma and Sonenstein 2001; Cleveland and Gilson 2004) but some evidence indicates that family structure has no effect on these behaviors (Ku, Sonenstein, and Pleck 1993; Santelli et al. 2000; Upchurch et al. 2004). Of the two primary determinants of family SES, parents’ education appears to be more important than parental income in influencing adolescent sexual behavior (Baumer and South 2001; Brewster 1994; Kim 2010; Santelli et al. 2000). Yet, although numerous studies find that low parental SES lowers youth’s age at sexual debut and increases the number of partners (Abma and Sonenstein 2001; Baumer and South 2001; Blum et al. 2000; Brewster 1994; Browning et al. 2004; Cleveland and Gilson 2004), some studies find no association between parental SES and sexual risk behavior (Cleveland and Gilson 2004; Santelli et al. 2000) or find that it protects youth from sexual risk (Ku, Sonenstein, and Pleck 1993).

Evidence of the role of family structure and family SES in accounting for racial/ethnic disparities in risky sexual behavior is more limited, but the pattern of findings is fairly consistent. The higher prevalence of single-parent households among racial/ethnic minority groups accounts for some, but not all, of the racial/ethnic disparities in the number of sexual partners (Baumer and South 2001; Solorio et al. 2008) and in the odds of sexual debut during adolescence (Blum et al. 2000; Browning et al. 2004; Kim 2010). Family SES has received less attention but two studies indicate that it explains part of the observed racial/ethnic differences in age at sexual debut (Baumer and South 2001; Browning et al. 2004). In sum, although research on family-level factors such as family structure, family SES, and parenting styles has contributed to an understanding of the factors that shape disparities in adolescent sexual behavior, a substantial proportion of these disparities remains unexplained.

Neighborhood Context, Race/ethnicity, and Sexual Risk Behavior

We examine whether neighborhood disadvantage – indicated by concentrated poverty, unemployment, and female-headed households – plays a role in explaining racial/ethnic disparities in risky sexual behavior in adolescence. Extensive research indicates that the concentration of neighborhood disadvantage increases the odds of sexual debut, multiple partners, and the frequency of sexual relations during adolescence (Baumer and South 2001; Biello et al. 2013; Browning et al. 2008; Browning et al. 2004; Cubbin et al. 2005; Cubbin et al. 2010; Oman et al. 2013; Warner et al. 2011; Wickrama, Merten, and Wickrama 2012). However, there has only been limited research examining the effect of neighborhood disadvantage on racial/ethnic differences in adolescents' sexual risk behavior. Moreover, this research has produced inconsistent findings.

A few studies (Brewster 1994; Browning et al. 2004) find that racial/ethnic differences in the odds of sexual debut in adolescence are substantially mediated by neighborhood disadvantage. Other studies (Baumer and South 2001; Biello et al. 2013; Lohman and Billings 2008; Wickrama, Merten, and Wickrama 2012), conversely, find little to no effect of neighborhood characteristics on racial/ethnic differences in adolescent sexual debut. Research on the role of neighborhoods in producing racial/ethnic differences in frequency of sex or number of sexual partners are even more scant with little evidence as to whether neighborhood disadvantage accounts for racial/ethnic differences in such behaviors (Bolland et al. 2007; Wickrama, Merten, and Wickrama 2012).

The equivocal findings regarding the impact of neighborhoods on racial/ethnic differences in sexual risk may reflect the specific dimensions of structural disadvantage examined. Indeed, none of the studies on this topic assess neighborhood disadvantage the same way or parse out the impact of the individual items comprising aggregate scales. Factors that have been considered either alone or in combination include: residential segregation (Biello et al. 2013), immigrant concentration (Browning et al. 2004), neighborhood SES (Baumer and South 2001; Brewster 1994), percent in poverty/on public assistance (Browning et al. 2004; Wickrama, Merten, and Wickrama 2012), neighborhood collective efficacy (Browning et al. 2004; Lohman and Billings 2008), percent unemployed (Browning et al. 2004; Wickrama, Merten, and Wickrama 2012), percent of women employed (Brewster 1994), percent of men

unemployed (Wickrama, Merten, and Wickrama 2012), youth idleness (Brewster 1994), proportion of female-headed households (Browning et al. 2004; Wickrama, Merten, and Wickrama 2012), and residential instability (Browning et al. 2004)

Previous approaches to assessing the role of neighborhood disadvantage for racial/ethnic disparities in youth sexual risk are problematic for two reasons. First, inconsistent measurement inhibits comparison of findings across studies. Second, aggregated scales that apply equal weights to factors operate under the assumption that each factor contributes equally to explaining variance in the outcome of interest. This ignores the fact that particular dimensions or indicators of disadvantage may be more consequential for sexual risk behavior than others. We argue that both structural (social control) and subcultural repercussions of the neighborhood concentration of disadvantage likely play an important role in constraining/encouraging risky sex. Therefore, of the various dimensions of neighborhood disadvantage, the prevalence of female-headed households and concentration of poverty and unemployment are likely especially consequential for adolescent sexual risk behavior. Although all three factors are likely to be important, examining the relative contribution of each to racial/ethnic disparities in adolescent sexual risk behavior is essential for understanding the etiology of these behaviors.

As Cleveland and Gilson (2004) note, three aspects of neighborhoods central to adolescent sexual risk behavior – monitoring, intergenerational closure, and role model availability – are linked specifically to the concentration of poor, female-headed households in neighborhoods. From a social control perspective, one of the primary reasons single-parent households are positively associated with adolescents' risky sexual behavior is that single parents are not able to monitor their children's behavior to the same extent as two-parent families, especially when parents work (Cleveland and Gilson 2004; Kim 2010; Lohman and Billings 2008). Although unmonitored time may also be problematic in dual-worker two-parent families, the prevalence of single-parent households as a feature of neighborhood structure influences the ability of parents to monitor adolescents' whereabouts and activities and the level of opportunity available to engage in sexual intercourse (Akers, Muhammad, and Corbie-Smith 2011; Simons et al. 1996). Although one's family structure certainly matters for the opportunity to engage in sexual intercourse, so too does the family structure of one's potential sexual partners. The concentration of single-parent households in neighborhoods increases sex opportunities for adolescents in part by increasing the number of unsupervised household environments. In addition, impoverished neighborhoods may be dangerous and lack diverse public recreational and leisure opportunities for youth, making private, home environments the primary location for youth interaction outside of school (Akers, Muhammad, and Corie-Smith 2011).

Neighborhood disadvantage also matters for sexual risk behavior in that it inhibits the development of social capital and collective efficacy, not only with respect to establishing trust and reciprocity among community members but also in creating and enforcing behavioral norms (Akers, Muhammad, and Corie-Smith 2011; Sampson et al. 1997). High rates of poverty and a high proportion of single-parent households may be particularly consequential for the development of social capital relevant to adolescents' sexual risk behavior. Limits and constraints on poor, single parents' time and energy has a negative

effect on the production of social ties within neighborhoods thereby reducing social capital in the form of intergenerational closure (Coleman 1988; Oman et al. 2013). This results in diminished social control and enforcement of norms against adolescent sexual activity as evidenced by the fact that youth with few non-parental adult role models are at higher risk of sexual initiation by age 20 (Oman et al. 2013).

In addition to diminished social control, higher concentrations of poverty and single-parent homes create local opportunity structures in impoverished neighborhoods that offer few legitimate avenues to the realization of conventional adult roles and statuses. Adolescents growing up in such environments are exposed to adults without stable histories of work and family formation. Moreover, the lack of opportunity creates a normative context in which early sex, sexual promiscuity, and childbearing may receive greater acceptance than in more advantaged neighborhoods (Anderson 1999; Edin and Kefalas 2005; Wilson 2009).

Anderson's (1989) subcultural argument stresses that in disadvantaged environments with high unemployment young males lack viable job prospects that could economically sustain family formation – a conventional mark of manhood. The lack of successful adult male role models of work and family stability in neighborhoods may further reinforce a more tolerant community attitude toward early sexual relations (Wilson 2009). In such environments, young males emphasize sexual prowess as a source of manhood, self-esteem, and respect, whereas for young women early sexual relations and having babies provide a sense of control and confer social status among peers (Anderson 1989, 1990, 1999; Edin and Kefalas 2005; Marsiglio 1993).

According to Anderson (1989), this normative context in impoverished inner-city neighborhoods produces “sex codes” that foster antagonistic gender relations where young males “play the field” and engage in promiscuous sex as a means to enhance social status among peer groups. Females too play the game and are lured by young males’ promises of love and a stable family life. Anderson also argues that the ability of young men “to run their game” depends on the presence of fathers in homes. When fathers are absent, young boys see homes and the girls within them as an “unprotected nest,” yet think twice about pursuing a girl sexually when her father is present for fear of his moral authority and potential reprisal. Moreover, daughters - for similar reasons – also think twice about whether to engage sexually with boys.

Subcultures of early sexual initiation, sexual promiscuity, and early childbearing arguably emerge when youth anticipate dim and limited futures as the result of exposure to chronic disadvantage (Soller and Haynie 2013). Empirical evidence, nonetheless, is mixed as to whether youths’ own perceptions of themselves and their future opportunities affect engagement in risky behavior. Giordano and colleagues (2009) find that young men who subscribe to the player identity have more sexual partners than those who do not and that this explains some of the racial/ethnic disparities in number of sex partners. Moreover, some studies find that youth who perceive limited futures and fewer costs are more likely to engage in risky behaviors (Borowsky, Ireland, and Resnick 2009; Edin and Kefalas 2005). Yet, most studies demonstrate that youths’ own aspirations and perceptions of the future are not associated with engagement in risky sexual behavior (Cubbin et al. 2010; Oman et al.

2013; Soller and Haynie 2013). Strong evidence indicates, nonetheless, that youth whose *peers* have diminished aspirations and/or who engage in risky behaviors *are* more likely to engage in risky behaviors, including risky sex (Baumer and South 2001; Browning et al., 2004, 2008; Moore and Chase-Lansdale 2001; Oman et al. 2013; Soller and Haynie 2013). Such evidence reinforces the importance of social networks and community context in the formation of youths' sexual behaviors. Indeed, the importance of group influence extends beyond one's immediate social network to the norms of the entire community. As Warner et al. (2011) demonstrate, the general normative climate at the neighborhood-level – as measured by the sexual attitudes of all individuals within neighborhoods – has strong effects on the odds of youths' sexual debut in adolescence and number of partners. Therefore, regardless of their own values and perceptions or the values and perceptions of their peers, the normative environment in one's community has strong effects on youths' sexual behaviors.

The linkage of subculture theories to explanations of risk behavior does not imply that all or even a large proportion of residents in the most disadvantaged neighborhoods embrace non-mainstream sexual norms (Giordano et al. 2009) or that a subculture embraced by a majority of residents is necessary for the spread of STIs resulting from multiple sexual partnering. Research on sexual networks, for example, indicates that a small number of individuals with multiple, concurrent sex partners can quickly spread STIs and that neighborhood context may contribute to Black-White differences in sexual networks, which reinforce marked disparities in rates of STIs (Adimora and Schoenbach 2005). Specifically, the sexual networks of Blacks: involve more frequent sexual contact between those with many partners and those with few partners, are more racially segregated (Laumann and Youm 1999), and are comprised of more concurrent sexual partnerships (multiple simultaneous sexual relationships or those that overlap in time) than their counterparts in other racial or ethnic groups (Adimora et al. 2002; Adimora and Schoenbach 2005). Thus, a more subtle and perhaps more accurate subcultural argument posits that neighborhood disadvantage provides a context in which some individuals embrace sexual norms that encourage risky sex, which can have a substantial impact on the prevalence and persistence of disease in the local population.

HYPOTHESES

Variation in the concentration of disadvantage across neighborhoods may have significant implications for racial/ethnic disparities in sexual risk behavior due to mutually reinforcing structural and cultural factors (Wilson 2009). We examine a neighborhood disadvantage scale comprised of the concentration of poverty, unemployment rates, and the proportion of female-headed households. We consider each dimension collectively and individually as a critical dimension of neighborhood disadvantage that may be particularly consequential for adolescent sexual activity. High levels of SES disadvantage and a prevalence of female-headed households implies a dearth of role models that have successful histories of stable work and family formation, and also diminished social control as a result of limited time to monitor and supervise adolescent activities. Early and more numerous sexual relations may also be especially tolerated in a social milieu characterized by a preponderance of poor, non-intact families (Wilson 1987). Specifically, we hypothesize that neighborhood disadvantage

will explain a portion of racial/ethnic disparities in adolescent sexual debut and in the frequency of sex with multiple partners. In addition, poverty, unemployment, and female-headed households are particularly acute in predominantly Black areas (Massey and Denton 1993), and therefore may affect the sexual risk behavior of Black adolescents more than other racial or ethnic groups.

METHOD

Data and Sample

To address racial/ethnic differences in sex risk behavior, we estimate hierarchical models using a sample designed to capture the period of adolescence (13–21). To preserve causal order, we measure family socioeconomic status and neighborhood disadvantage with measures derived from the first round of data collection while sexual risk behavior is measured with data drawn from the second through fifth waves of the 1997 National Longitudinal Survey of Youth (NLSY97). The NLSY97 is a household based, nationally representative sample of adolescents between the ages of 12 and 16 when recruited into the sample at wave one and who have been interviewed yearly since 1997, with an over-sample of African Americans and Hispanics. Screening interviews resulted in 9,806 eligible subjects, 8,984 of whom participated, yielding a 91.6% response rate. By the fifth round, 7,883 respondents completed interviews, yielding an 87.7% retention rate that does not vary significantly by race/ethnicity.

The analysis is restricted to neighborhoods in which there are at least two respondents to ensure a more reliable estimate of the between-neighborhood variance component (Maas and Hox 2005; Bell, Ferron, and Kromrey 2008). This reduces the sample size to 7,358 (cases dropped do not vary significantly by age, race, sex, or family/neighborhood SES). We also exclude married respondents from our sample, although we recognize that they may engage in risky behaviors. The NLSY97 includes some survey items which were included in every wave and some only in specific waves. Data availability therefore plays a role in structuring the hierarchical analysis and dictates which variables can be treated as within- (i.e., time varying) or between-individual.

The sample size varies across analyses based on whether the dependent variable is measured at the person level (whether subjects ever had sex by the fifth wave) or the within-individual level (number of sex partners during each wave). The first analysis, a two-level model of persons nested within neighborhood, examines the onset of sexual behavior by the age of 21 using 6,985 persons nested in 1,463 neighborhood contexts. The second, a three-level model, examines the number of sex partners in waves in which subjects report having one or more partners. The 3-level model has a sample size of 10,597 time-varying observations nested within 4,943 persons nested within 1,414 neighborhoods. Regression imputation with random error components was used to replace missing values on explanatory measures (Jinn and Sedransk 1989). To ensure that the reported results are not sensitive to imputation we replicated our models using listwise deletion of cases with missing values and also mean substitution. There are no substantive differences. Table 1 shows descriptive statistics for the full sample and the Appendix presents descriptive data by racial and ethnic group.

Measures

Dependent variables

Sexual debut (person-level): *Sexual debut* is a binary outcome with a value of one reflecting whether the subject has ever had sexual intercourse (i.e., made love, had sex, or gone all the way) with a person of the opposite sex. About sixty percent of the sample engaged in sexual intercourse by the time of the wave five interviews (see Table 1), with Black respondents evidencing the greatest likelihood of adolescent sexual debut (71%) and Asians (31%) the lowest. Mean differences relative to White adolescents (55%) are statistically significant, except for Hispanics (see Appendix, panel A).

Sex partners (within-individual): *Sex partners* is a measure that reflects the number of sexual partners in the past twelve months (or since the date of last interview). This item is repeated in each survey round. The analysis is restricted to subjects with one or more sexual partners because the correlates of sexual onset may differ from those associated with multiple sexual partners. White respondents evidence the fewest number of reported sexual partners compared to each of the remaining racial/ethnic groups (see Appendix, panel B).

Independent variables

Racial/ethnic background (person-level): Race and ethnicity are measured with a series of dummy variables distinguishing (non-Hispanic) *Black*, *Hispanic*, *Asian*, and *Other* subjects with non-Hispanic *White* as the reference category. About 47% of the sample self-reports as White, 25% non-Hispanic Black, 20% Hispanic, 2% Asian, and 6% place themselves in the other category.

Socioeconomic status (person-level): Socioeconomic status is assessed with three variables reflecting -income, education, and family structure. *Family income*, derived from an interview with a parent/guardian in the first wave, reflects annual income in dollars with an average family earning just below \$46,000 (Table 1); White adolescents reside in families with substantially and significantly higher incomes relative to each group except Asians (see Appendix). Education is also derived from the parent interview and reflects the biological mother's educational attainment in years. The typical mother had just over twelve years of education, with White and Asians having the highest levels of maternal education. Given research showing residence with both biological parents is associated with a wide variety of positive social outcomes (McLanahan and Sandefur 1994) we distinguish respondents who reside with both *biological parents* from other living situations (step or single parents, adoptive parents, or no parent figure). The indicator of biological parents reflects the proportion of waves in which respondents lived with both biological parents. The typical subject resided with both biological parents in fewer than half of the waves, with Black subjects and the members of other racial/ethnic groups significantly less likely, and Asians more likely, than Whites to have resided with both biological parents in any given wave (see Appendix).

Neighborhood disadvantage (neighborhood-level): *Neighborhood disadvantage* is assessed with block group data obtained during the 2000 U.S. Census, which are attached to each respondent's record based on the latitude and longitude of the home address in the first

wave. We assess a standardized disadvantage scale comprised of z-scores for the percent of residents below the official poverty threshold, the percent of residents (16+) who are unemployed, and the percentage of households headed by a female with children less than eighteen living in the household (Cronbach's $\alpha = .82$). In addition to the standardized disadvantage scale, we also examined the effects of the individual items separately as a means to assess their relative contributions to explanation of both sexual risk behavior and racial/ethnic differences in those behaviors (results discussed below). There is substantial variation in the concentration of SES disadvantage across neighborhoods, especially among non-Hispanic Black and to lesser extent Hispanic respondents, who are more likely than Whites to reside in neighborhoods high in disadvantage (see Appendix).

Control variables—Several variables are included to minimize overestimation of the coefficient reflecting the influence of neighborhood disadvantage.

Age: *Age* is measured at each wave in months, which we average across waves two through five and express in years in the two-level model. The average age of the sample is about eighteen and a half years. Preliminary analysis suggests a non-linear relationship between *age* and *sexual debut* and hence a squared term is included to capture it. We measure *age* at level one (within-individual) in the three-level model because it is available at each wave. We find no evidence of a non-linear relationship between age and sex partners.

Respondent's sex (person-level): *Biological sex* is controlled with the dummy variable *male* with females as the referent. The sample is approximately evenly split between males and females.

Parenting style (person-level): Given theory and research (cited above) indicating that parental supervision is consequential for sex risk behavior, we include a parenting style measure constructed by Child Trends, Inc. for NLSY97 that is derived from an extensive review of parenting literature. Specifically, Maccoby and Martin (1983) developed a four-style typology that combines two dimensions reflecting how demanding/strict and responsive/warm subjects perceive their parents to be. The measure is comprised of dummy variables distinguishing *uninvolved* (neither demanding nor responsive), *permissive* (responsive but not demanding), and *authoritarian* (demanding but not responsive) from the reference category reflecting *authoritative* parenting (both demanding and responsive). Maccoby and Martin's (1983) research indicates that authoritative parenting is the most successful style and is associated with improved child outcomes (for a detailed discussion of the parenting style measure see the NLSY 97 Codebook Supplement, Appendix 9).

Residential change (person-level): Finally, *residential change*, a count of the number of household moves including those occurring during childhood, is specified. This selectivity control affords some confidence that the neighborhood effects we are estimating are not biased by movement in and out of neighborhoods. In particular, single parents are likely to have diminished economic and social capital relative to dual parent households, increasing the likelihood of residential movement to disadvantaged neighborhoods (South and Crowder 1998). Residential changes may also capture disruption and/or severing of social capital ties

for adolescents, both of which have negative consequences for adolescent well-being (Ingersoll, Scamman, and Eckerling 1989; Reynolds 1991).

Analytical Strategy

Racial/ethnic difference in sexual onset is addressed in Table 2 with two-level hierarchical models with persons nested within neighborhoods (estimated in HLM 6.08; for an overview of the statistical procedures see Luke 2004:59–62 or Raudenbush and Bryk 2002:231–232). The level one model is expressed as follows: $\eta_{ij} = \pi_{0j} + \pi_{1ij} \alpha_{1ij} + e_{ij}$ where η_{ij} is the logit of sexual debut for person i ; π_{0j} is the intercept for neighborhood j ; α_{1ij} reflects person-level covariates such as race, controls, or family socioeconomics; and π_{1ij} is the corresponding level-one coefficient indicating the association between predictors and sexual debut for person i . The key analytic question addressed is whether racial/ethnic differences in sexual debut can be attributed to the neighborhood concentration of disadvantage, above and beyond the influence of family disadvantage. Thus, the intercept is modeled as an outcome of person level characteristics and random error while the remaining level 1 variables are fixed. More specifically, the following level 2 equation is estimated: $\pi_{0j} = \beta_{00} + \beta_{01} X_{1j} + \Gamma_{0j}$ where β_{00} is the intercept; X_{1j} is neighborhood disadvantage; β_{01} is the corresponding regression coefficient; and Γ_{0j} is a level-2 random effect that represents the deviation of neighborhood j 's level-1 intercept (π_{0j}) from the predicted value based on the neighborhood-level model.

Table 3 presents a three-level Poisson regression of multiple sexual partnering on race/ethnicity and socioeconomic disadvantages. The level-one model is expressed as follows: $\eta_{ijk} = \pi_{0jk} + \pi_{1ijk} \alpha_{1ijk} + e_{ijk}$ where η_{ijk} is the log of the number of sex partners per wave i for person j in neighborhood k ; π_{0jk} is the intercept for person j in neighborhood k ; α_{1ijk} are time-varying covariates that predict sex partners; π_{1ijk} are the corresponding level-1 coefficients indicating the association between predictors and sex partners for person j in neighborhood k ; and e_{ijk} is a level-1 random effect that represents prediction error.

At level-two we model: $\pi_{0jk} = \beta_{00j} + \beta_{01j} X_{1ij} + \Gamma_{0ij}$ where β_{00j} is the intercept for person j in neighborhood k ; X_{1ij} are person-level characteristics including race, family socioeconomics, and controls; β_{01j} are the corresponding regression coefficients; and Γ_{0ij} is a level-2 random effect that represents the deviation of person jk 's level-1 coefficient (π_{0jk}) from the predicted value based on the person-level model. We model an intercept as outcome equation at level-three to assess the influence of neighborhood disadvantage, which takes the following form: $\beta_{00j} = \gamma_{000} + W_{jk} \gamma_{001} + u_{00k}$ where γ_{000} is the intercept for sex partners (i.e., grand mean); W_{jk} is our measure of neighborhood disadvantage; γ_{001} is the corresponding level-3 coefficient that represents the extent of association between disadvantage and mean sex partners.

RESULTS

Two-Level Logistic Regression Model of Sexual Debut

Table 2 presents two-level hierarchical logistic regression models that predict whether respondents report ever having sex. Model 1 is a baseline equation including the level-1

control variables. Compared to Whites, the log-odds of sexual debut are significantly higher among Blacks (.62; $p < .001$) and Hispanics (.14; $p < .10$), but lower for Asians and other ethnic groups. The age effect is significant and non-linear, indicating that the log-odds of sexual debut increase with age until respondents reach about 17 years after which the likelihood of sexual debut during adolescence diminishes. Residential change evidences a positive effect on sexual debut, perhaps reflecting disruption of social capital ties. The parenting style dummy variables also evidence significant contrasts: compared to an “authoritative” style, the log-odds of sexual debut are higher among adolescents residing in families where parents are “uninvolved” or “authoritarian.”

Model 2 incorporates the indicators of family SES and family structure, which are statistically significant in expected directions. The log-odds of sexual debut are lower among respondents residing in two-biological parent families with higher levels of maternal education. Controlling for family SES reduces the Black-White disparity in the log-odds of ever having sex by about 32% (.62, $p < .01$ to .42, $p < .05$), although the gap remains significant. The Hispanic-White disparity is reduced to non-significance. The family SES indicators, however, do not provide much in the way of an explanation for the Asian-White disparity although some is explained, and the gap between Whites and other racial/ethnic groups is widened.

The third model alternately adds the neighborhood disadvantage index, which has the expected positive effect (.05; $p < .001$) on the log-odds of sexual debut during adolescence. Incorporating neighborhood disadvantage reduces the Black-White disparity in ever having sex by about 24% (.62 to .47), although the log-odds remain significantly higher for Black adolescents. The Hispanic-White disparity is again rendered non-significant. Model 4 in Table 2 presents the fully specified equation. Findings indicate that the effect of neighborhood disadvantage on the log-odds of sexual debut is reduced substantially to non-significance as a function of the individual-level family SES indicators. The full model explains about 42% of the Black-White and all of the Hispanic-White disparities in sexual debut, but does not meaningfully explain the disparity from Whites among Asians or other racial groups. The final model (Model 5) substitutes the percent of female-headed households (with children less than 18) for the full disadvantage scale. Net of individual-level family SES and family structure, the prevalence of female-headed households in neighborhoods continues to increase the log-odds of adolescent sexual debut and accounts for more of the Black-White disparity than the full scale. The other components of the scale – poverty and unemployment – do not have independent net effects on debut beyond that of family disadvantage.

Three-Level Poisson Regressions of Multiple Sex Partners

Table 3 presents three-level Poisson regressions of multiple sexual partnering on race/ethnicity, and socioeconomic disadvantages. In Model 1 each of the racial/ethnic disparities (relative to Whites) are significantly positive, except for the Asian coefficient which is in the expected direction (negative) but not significant. Consistent with prior research (e.g., Baumer and South 2001), the likelihood of reporting multiple sex partners is significantly higher for Blacks (.20; $p < .01$), Hispanics (.15; $p < .01$), and respondents of other racial/

ethnic backgrounds (.28; $p < .01$) compared to non-Hispanic Whites. Males and older adolescents are also more likely to report multiple sex partners. Changes in residence are also consequential in increasing the frequency of adolescent sexual activity. Finally, adolescents who resided in homes with “authoritarian” parenting styles evidence an increased risk of engaging sexually with multiple partners, compared to those in homes with “authoritative” parenting styles.

Model 2 adds the family SES indicators. Family income has the expected negative effect on the frequency of multiple sexual partnering, whereas mother’s education and living with both biological parents do not reach significance. The family SES indicators do not fully explain the racial/ethnic disparities observed in Model 1, although they reduce the Black and Hispanic differences by 15% and 20%, respectively. Models 3 and 4 add neighborhood disadvantage to the intercept equation at level-3, with (Model 4) and without (Model 3) the individual-level family SES indicators. Model 3 shows that neighborhood disadvantage has the expected positive effect on multiple sexual partnering and explains 15% and 13% of the Black-White and Hispanic-White disparities, respectively. Adding the family SES indicators (Model 4) reduces the neighborhood disadvantage effect on multiple partners to marginal significance (.01; $p < .10$), principally as a function of family income which retains a significant negative effect.

DISCUSSION

Adolescent sexual risk behavior is a significant public health concern given its links to STI transmission and teen childbearing. Additionally disconcerting are the substantial racial and ethnic disparities in teen pregnancy, teen childbearing, and STI’s that result from group differences in sexual risk behavior. Although identifying and targeting individual- and family-level correlates of adolescent risky sexual behavior can be beneficial for reducing the risk of teen pregnancy, teen childbearing, and STI’s, it has had only limited utility for understanding racial/ethnic disparities in these domains. Although research recognizes the relevance of neighborhood disadvantages for understanding group differences in health outcomes and risky sexual behavior (Diez-Roux 2001; Pickett and Pearl 2001; Robert 1999; Warner et al. 2011), their importance for understanding racial/ethnic disparities in sexual risk behavior has received less attention.

In this study we develop and test a model that assesses the role of neighborhood disadvantage in generating racial/ethnic disparities in the initiation of sexual activity and the number of sex partners during adolescence. The findings indicate that non-Hispanic Blacks and to a lesser extent Hispanics are more likely, and Asians and other racial/ethnic groups less likely, than non-Hispanic Whites to ever have sex during adolescence. Among respondents who had intercourse before age 21, results show that Blacks, Hispanics, and other non-Asian racial/ethnic groups report more sexual partners than non-Hispanic Whites.

Evidence from the 1997 National Longitudinal Study of Youth reveals that, net of individual-level parental SES, family structure, and parenting styles, the neighborhood concentration of disadvantage contributes to an explanation of greater sexual risk behavior among Blacks and Hispanics compared to non-Hispanic Whites, but does not provide a full

explanation of these disparities. Although neighborhood disadvantage is associated with both the odds of sexual debut in adolescence and number of sexual partners, we find that neighborhood disadvantage explains racial/ethnic disparities in adolescent sexual debut to a greater extent than it does for number of sex partners. Indeed, only a handful of studies (Bolland et al. 2007; Wickrama, Merten, and Wickrama 2012) has assessed the role of neighborhood disadvantage for racial/ethnic differences in number of partners and has found – as we do – limited evidence that neighborhood disadvantage accounts for these differences. This suggests that disadvantage matters primarily for racial/ethnic differences in sexual initiation but not subsequent decisions to sexually engage multiple partners.

That neighborhood disadvantage operates differently for these sexual risk behaviors is not entirely surprising given that there is no inherent correlation between attitudes regarding appropriateness of sex in adolescence and attitudes regarding sexual promiscuity. Nonetheless, to the degree that neighborhood SES and the prevalence of female-headed households affect social control and subcultural norms, our results imply that most of the racial/ethnic differences in number of partners are not likely due to neighborhood differences in monitoring, role-modeling, or sex codes that stem from constrained opportunities for work and family formation.

Of course, there may be other dimensions of neighborhood disadvantage that are not captured here that could account for racial/ethnic differences in number of partners. Like past studies that have looked at the role of neighborhood disadvantage for racial/ethnic disparities in number of partners our study was limited to neighborhood SES and the prevalence of female-headed households. Other dimensions of neighborhoods, such as racial residential segregation and sex ratios, are additional factors that future research should investigate.

In addition to examining the links between neighborhood disadvantage, race/ethnicity, and the number of partners in adolescence, we improved upon past research by examining the importance of individual indicators of neighborhood disadvantage for racial/ethnic differences. Indeed, although several studies have investigated the role of neighborhood disadvantage for racial/ethnic disparities in adolescent sexual risk, rarely have individual dimensions of disadvantage been investigated and compared. We find that the prevalence of female-headed households, in particular, appears central to racial/ethnic differences in the odds of adolescent sexual debut.

This finding has important implications for our understanding of youth sexual risk behavior as well as racial/ethnic disparities in those behaviors. High concentrations of poverty and unemployment have theoretically similar consequences for youths' sexual behaviors as high prevalence of single mother families in that all are hypothesized to increase sexual risk via fewer positive role models and greater tolerance of early and promiscuous sex. Yet, these results suggest that, if these are indeed the mechanisms that lead to early sex and that produce racial/ethnic disparities in the risk of early sex, it is the prevalence of female-headed households that is most central to creating such conditions. Moreover, these findings imply that conditions unique to the prevalence of female-headed households, such as the lack of intergenerational closure and monitoring in neighborhoods and the availability of fathers to

constrain youths' sexual activity, may be especially important mechanisms affecting the timing of sexual debut.

Efforts to reduce racial/ethnic disparities in adolescent sexual risk will likely benefit from additional emphasis on the neighborhood conditions that constrain or encourage healthy sexual behavior. Yet, whereas our findings indicate that neighborhood disadvantage is a significant predictor of sex risk behavior and helps account for racial/ethnic differences in early sexual debut, it does not fully explain these disparities. While findings offer some support for the role of neighborhoods, they suggest that explanations of racial/ethnic disparities may reside in additional factors that may be correlated with residence in disadvantaged neighborhoods, such as the subcultural processes suggested by Anderson (1989) and sexual network composition and processes. Indeed, a limitation of this study – in addition to the age of the data – is that we are unable to explore the mechanisms – such as normative climate of attitudes about sex, collective supervision, and role model availability – linking neighborhood disadvantage to sexual risk or other dimensions of disadvantage (imbalanced sex ratios, segregation, etc.) that may explain these disparities.

Although the concentration of female-headed households helps explain Black-White and Hispanic-White differences in sexual risk in adolescence, we find that it accounts for very little of the differences between other racial/ethnic groups and Whites. The likely reason for this is that the concentration of female-headed households is especially different for Black and Hispanics compared to non-Hispanic Whites than it is between Whites and other racial/ethnic groups (see Appendix). Given that the prevalence of female-headed households is especially high in Black and Hispanic neighborhoods, it is possible that there exists a threshold effect where the concentration of female-headed households becomes especially salient for sexual risk behavior in adolescence, but only at a certain extreme level of saturation within neighborhoods.

From a policy perspective, these findings suggest that reducing race and ethnic differences in sex risk behavior would require, in part, amelioration of neighborhood (and racial/ethnic) disparities in the concentration of disadvantage, perhaps especially non-intact families. Social policies designed to strengthen families and their connections to neighborhood institutions (e.g., schools) in poor neighborhoods may also help in reducing the differential risk across racial/ethnic groups. It is important to note, however, that although the concentration of single-parent families matters for youths' sexual risk behaviors and racial/ethnic disparities in them, it does not follow that changing the family structure composition of neighborhoods alone will solve these problems nor does it mean that promoting two-parent family environments universally and indiscriminately will lead to positive consequences for children and adults. Indeed, such an approach may actually harm families and communities by ignoring the factors that lead to non-marital childbearing, family instability, and the retreat from marriage in the first place.

CONCLUSION

While the results of this study show that neighborhoods matter, significant racial/ethnic disparities in sex risk behavior remain unexplained. Future research should explore other

dimensions of neighborhoods that may shape group differences in sexual risk behavior. Additional research on variables that may potentially mediate the associations between neighborhood characteristics and risky sex in adolescence is also needed. Finally, work that addresses the potential differences across groups in subcultural influences, such as attitudes regarding family and pre-marital sex, may help account for the remaining unexplained racial/ethnic disparities in sex risk behavior. From an empirical standpoint, the results of this study suggest that models that do not consider aspects of neighborhood disadvantage may be misspecified. Our findings indicate that neighborhood disadvantage is pertinent to explanations of adolescent sexual behavior and suggest that reducing racial/ethnic disparities would benefit from a deeper understanding of how neighborhood environments shape the social context of racial and ethnic minorities in ways that increase the probability of engaging in risky sexual behavior.

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Table 1

Descriptive Statistics

VARIABLE NAME	Two-Level Model		Three-Level Model	
	MEAN	SD	MEAN	SD
<i>Level-1 Statistics</i>				
Sexual Debut	.59	.49	3.16	7.22
Black	.25	.43	227.28	18.14
Hispanic	.20	.40		
Asian	.02	.14	10,597	
Other	.06	.23		
Age	18.38	1.43		
Male	.52	.50		
Residential Change	7.58	4.22	.28	.45
Uninvolved	.10	.30	.19	.40
Permissive	.34	.47	.01	.11
Authoritarian	.16	.37	.06	.23
Family Income	46,217.51	37,676.42	.51	.50
Mother's Education	12.50	2.86	8.14	4.42
Biological Parents	.43	.47	.11	.31
N persons	6,985		.33	.47
			.17	.38
			44,036.76	36,452.74
			12.33	2.71
			.35	.46
			4,943	
<i>Level-2 Statistics</i>				
Neighborhood Disadvantage	.00	2.70	.00	1.00
% Female-Headed Households	9.44	5.84		
N neighborhoods	1,463		1,414	

Table 2
Two-Level Hierarchical Models of Sexual Debut on Race and Socioeconomic Disadvantage.

Fixed Effect^d	(1)	(2)	(3)	(4)	(5)
Intercept	-18.55***	-19.15***	-20.36***	-21.16***	-21.16***
<i>Level-2 Predictor</i>					
Neighborhood Disadvantage			.05***	.02	.09***
Percent Female-Headed Households					
<i>Level-1 Predictors</i>					
Black ^b	.62***	.42**	.47***	.36***	.32***
Hispanic	.14*	-.02	-.05	-.05	-.06
Asian	-.96***	-.92***	-.97***	-.93***	-.93***
Other	-.55***	-.72***	-.60***	-.73***	-.74***
Age	1.52***	1.71***	1.50***	1.70***	1.69***
Age squared	-.05*	-.03**	-.03**	-.03***	-.03**
Male	.03	.03	.03	.03	.03
Residential change	.07***	.05***	.07***	.05***	.05***
Uninvolved	.48***	.37***	.48***	.38***	.38***
Permissive	.07	.06	.08	.06	.06
Authoritarian	.52***	.40***	.52***	.41***	.40***
Family Income ^c		-.01		-.01	-.01
Mother's Education		-.05***		-.04***	-.04**
Biological Parents		-.55***		-.55***	-.54***
Random Effect					
Level-2	.21***	.17***	.20***	.17***	.17***

Notes:

* p < .10;

** p < .05;

*** p < .01.

^aRobust Standard Errors.

^bWhite is the reference.

^ccoefficient multiplied by 10,000 to reduce places to the right of the decimal.

Table 3

Three-Level Hierarchical Poisson Regression of One or More Sex Partners on Race and Socioeconomic Disadvantage

Fixed Effect^a	(1)	(2)	(3)	(4)
Intercept	.38***	.57***	.39***	.49***
<i>Level-3 Predictor</i>				
Neighborhood Disadvantage			.02**	.01*
<i>Level-2 Predictors</i>				
Black ^b	.20***	.17***	.17***	.15***
Hispanic	.15***	.12***	.13***	.11***
Asian	-.02	-.01	-.02	-.01
Other	.28***	.27***	.27***	.26***
Male	.43***	.43***	.43***	.43***
Residential change	.01***	.01***	.01***	.01***
Uninvolved	.04	.03	.04	.03
Permissive	.001	-.003	.002	-.002
Authoritarian	.11***	.10**	.11***	.10***
Family Income ^c		-.01***		-.01***
Mother's Education		-.004		-.002
Biological Parents		-.01		-.01
<i>Level-1 Predictors</i>				
Age (in months)	.01**	.01**	.01**	.01**
Random Effect	Variance Component			
Level-2	.39***	.39***	.39***	.39***
Level-3	.03**	.03**	.03**	.03**

Notes:

* p < .10;

** p < .05;

*** p < .01.

^aRobust Standard Errors.

^bWhite is the reference.

^ccoefficient multiplied by 10,000 to reduce places to the right of the decimal.

Appendix

Descriptive statistics by race/ethnicity

<i>Panel A. Two-level Model</i>	Black		Hispanic		Asian		Other		White	
	Mean (SD)		Mean (SD)		Mean (SD)		Mean (SD)		Mean (SD)	
Sexual Debut	.71* (.46)		.58 (.49)		.37* (.48)		.48* (.50)		.55 (.49)	
Age (in years)	18.43* (1.43)		18.33 (1.42)		18.49 (1.49)		18.67* (1.45)		18.34 (1.42)	
Male	.49* (.50)		.53 (.50)		.56 (.50)		.53 (.49)		.53 (.49)	
Residential Change	7.61 (4.28)		6.95* (3.83)		7.03* (3.23)		8.04 (4.84)		7.80 (4.26)	
Uninvolved	.09 (.29)		.12 (.32)		.08 (.27)		.10 (.31)		.09 (.29)	
Permissive	.29* (.45)		.33* (.47)		.28 (.45)		.35 (.48)		.36 (.48)	
Authoritarian	.19* (.39)		.15 (.35)		.27* (.45)		.18 (.38)		.14 (.35)	
Family Income (in thousands)	29.41* (22.88)		31.62* (24.18)		71.41* (37.59)		43.93* (34.67)		60.40 (42.43)	
Mother's Education	12.30* (1.99)		10.30* (3.47)		13.29 (3.34)		12.27* (2.68)		13.49 (2.40)	
Biological Parents	.23* (.40)		.48 (.47)		.62* (.45)		.26* (.37)		.52 (.47)	
Neighborhood Disadvantage	2.09* (2.87)		.79* (2.61)		-1.38 (1.89)		-.15* (2.04)		-1.55 (1.42)	
% Female Headed Households	.87* (1.14)		.12* (.89)		-.47 (.68)		-.03* (.71)		-.54 (.49)	
<i>Panel B. Three-level Model</i>	Black		Hispanic		Asian		Other		White	
	Mean (SD)		Mean (SD)		Mean (SD)		Mean (SD)		Mean (SD)	
Sex Partners	3.55* (7.57)		3.45* (8.24)		3.58* (10.38)		3.72* (7.48)		2.72 (6.33)	
Age (in months)	226.12* (18.59)		226.80 (17.86)		231.40* (17.27)		232.61* (18.62)		227.61 (17.84)	
Male	.51* (.50)		.54* (.50)		.55 (.50)		.52 (.50)		.48 (.50)	
Residential Change	3.02 (2.06)		2.96* (2.01)		2.99 (1.74)		3.75* (2.72)		3.10 (2.32)	
Uninvolved	.10* (.30)		.12 (.32)		.10 (.30)		.11 (.31)		.12 (.32)	
Permissive	.30* (.46)		.33* (.47)		.23* (.42)		.34 (.48)		.36 (.48)	
Authoritarian	.20* (.40)		.16 (.36)		.27* (.45)		.20* (.40)		.16 (.37)	
Family Income (in thousands)	29.10* (22.81)		31.91* (24.69)		69.89* (44.67)		43.32* (32.51)		57.19 (41.14)	
Mother's Education	12.24* (1.97)		10.47* (3.32)		13.22 (3.56)		12.25* (2.37)		13.17 (2.30)	
Biological Parents	.20* (.40)		.41 (.49)		.52* (.50)		.26* (.44)		.40 (.49)	

<i>Panel A. Two-level Model</i>	Black		Hispanic		Asian		Other		White	
	Mean (SD)		Mean (SD)		Mean (SD)		Mean (SD)		Mean (SD)	
Neighborhood Disadvantage	1.45*	(2.71)	.52*	(2.43)	-.92	(1.43)	-.10*	(2.10)	-1.04	(1.33)

Note:

* coefficient is significantly different from White, $p < .05$.