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Neighborhood Environment, Sexual Risk Behaviors and Acquisition of Sexually Transmitted Infections Among Adolescents Diagnosed with Psychological Disorders

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Abstract

The association between neighborhood environment and prevalence of STIs, sexual partner variables and condom use among adolescents with psychological disorders was examined. Cross-sectional data in three urban areas of the US (Southeast, Northeast and Midwest) were obtained from 384 sexually active male and female participants who provided urine samples for laboratory-confirmed testing of *Neisseria gonorrhoeae*, *Chlamydia trachomatis* and *Trichomonas vaginalis*. A total of 15.4% of participants tested positive for one of the three STIs. Results indicated that relative to adolescents living in low risk neighborhood environments, those living in high risk environments were significantly more likely to have a STI and to report having casual partners. Findings suggest that in high risk neighborhoods, STI acquisition may be less dependent on

condom use and more dependent on other contextual factors. The importance of expanding public health research to include assessment of neighborhood context as a determinant of sexual risk-taking is emphasized.

Keywords

Neighborhood environment; Neighborhood cohesion; STIs; Adolescents with psychological disorders

Introduction

Adolescents in the US are disproportionately affected by sexually transmitted infections (STIs) with an estimated 11.5 million new cases each year among youth under age 25 (CDC 2005; Weinstock et al. 2004). Some of the well known sequelae of STIs include infertility, chronic pelvic pain, pelvic inflammatory disease, and ectopic pregnancy (Eng and Butler 1997). Furthermore, adolescents exposed to STIs are at heightened risk for acquisition of HIV (Cohen 1998). While adolescents as a whole constitute a vulnerable population, they are not a homogeneous group; rather, disparities in STI incidence exist among various subgroups. A number of studies have investigated myriad factors associated with sexual risk behaviors among various high risk adolescent subgroups including adolescent African-American females (Crosby et al. 2003; DiClemente et al. 2005a, b; Fullilove 1998) and detained adolescents (Voisin et al. 2004, 2006; Crosby et al. 2004a, b). However, markedly less research has been conducted among one specific subgroup: adolescents diagnosed with psychological disorders.

Although some data exist documenting the prevalence of STIs among adults suffering from mental illness (Carey et al. 1997; Rosenberg et al. 2001), such data are lacking for adolescents diagnosed with similar disorders. Even so, the extant research among adolescents demonstrates an association between mental illness and high risk sexual behavior including early initiation of sexual activity, sex with multiple partners and unprotected sex (Auslander et al. 2002; Ramrakha et al. 2000; Whitmore et al. 2000; Booth and Zhang 1997; Shrier et al. 2001; Smith 2001; Tubman et al. 2003). Adolescents living with psychological disorders are also characterized by a unique profile of antecedent factors, which contributes to their engaging in high risk sexual behaviors and risk for STI/HIV infection including personal attributes (e.g., impulsivity, self-destructive behaviors, cognitive impairment, substance use, poor judgment), family context (e.g., parental attitudes and behavior, parent-adolescent communication, parental monitoring and discipline), peer and partner relationships (e.g., relationship concerns, peer influence, partner communication) and environmental context (e.g., poverty) (DiClemente and Ponton 1993; Brown et al. 1997; Donenberg et al. 2001; Donenberg and Pao 2003; Wilson and Donenberg 2004; Donenberg and Pao 2005).

While the aforementioned antecedents to sexual risk taking range from individual level to environmental level factors, from a community psychology perspective, prioritizing higher-level environmental influences associated with negative health outcomes is essential to first, understanding the problem and second, for creating interventions that will ultimately impact

those environments (Brooks-Gunn et al. 1993, 1997; Maton 2000; DiClemente et al. 2003, 2005a, b; Gorbach and Holmes 2003; Aral et al. 2005). One theoretical perspective addressing how one specific environmental influence, the neighborhood, may be associated with a range of negative outcomes including health behaviors, is the Broken Window theory, originally applied to understanding neighborhood disorder and crime (Wilson and Kelling 1982).

The Broken Window theory suggests that individual behavior may be motivated in part through messages conveyed by a neighborhood's physical appearance. Thus, a disordered and chaotic neighborhood characterized by broken windows, graffiti, abandoned cars or houses, etc. may convey the message to some of its inhabitants that unacceptable behaviors (e.g., littering, vandalism, illicit drug use, etc.) are permissible and in fact, over time, may become normative. Several studies have applied the Broken Windows theory to examining neighborhood conditions and STIs. Results showed a higher prevalence of gonorrhea rates among populations residing in high risk neighborhoods relative to low risk neighborhoods even after controlling for race, employment and income level (Cohen et al. 2000, 2003). In one recent study, gonorrhea rates among high school students in New Orleans were compared pre- and post hurricane Katrina testing the hypothesis that deterioration in neighborhoods due to Katrina would result in higher gonorrhea rates. Results showed that testing positive for gonorrhea more than doubled after the hurricane (Nsuumi et al. 2009). Other studies have linked perceived neighborhood disorder to sexual risk behaviors associated with HIV and other STIs (Latkin et al. 2007; Rhodes et al. 2005). An additional study with a community based sample of adolescents, showed that neighborhood conditions such as crime, violence and drug use were also linked to mental health disorders in adolescents (Aneshensel and Sucoff 1996). In turn, mental health disorders such as depression has been linked to sexual risk taking and STI outcomes (Buffardi et al. 2008).

On the other hand, neighborhood cohesion has also received attention in research studies examining crime and adolescent delinquency (Sampson et al. 1997; Widome et al. 2008). However, less is known regarding the influence of neighborhood cohesion on health risk behaviors. One study investigating neighborhood social cohesion, collective monitoring and STI risk taking among adolescents showed that social cohesion defined as trusting and caring for people in the neighborhood, as well as willingness to help each other, predicted a higher proportion of condom use at last sex (Kerrigan et al. 2006). However, collective monitoring, or the likelihood that adults in the neighborhood would intervene if they saw children or adolescents engaging in inappropriate behaviors, was not related to condom use at last sex. Another study with young adults between 18 and 24 years of age established an association between lower social cohesion scores and higher gonorrhea rates (Ellen et al. 2004); however, gonorrhea rates were assessed at the census rather than the individual level.

Although the social processes and mechanisms by which neighborhood context may influence negative health outcomes remains unclear, some hypotheses have been offered in the literature. Among these, concentrated poverty, neighborhood disorder and low neighborhood cohesion have been linked to mental distress, risk behavior and deviant peer associations among adolescents (Sampson et al. 2002; Brody et al. 2001). Furthermore, neighborhood deterioration may be associated with institutional disinvestment, out-

migration, fear and depression among residents (Sampson and Raudenbush 1999; Ross 2000; Perkins and Taylor 1996). Neighborhood disorder has been indirectly associated with sexual risk behavior through psychological distress and drug use, suggesting that neighborhood disorder represents a set of stressors with negative health behaviors serving as potential coping mechanisms (Latkin et al. 2007; Upchurch et al. 1999). Along these lines, Cohen et al. (2000, 2003), suggested one explanation for the significant relation between neighborhood environment and STI rates. They offer the hypothesis that as neighborhood conditions deteriorate (i.e. more disorder), behaviors that would otherwise be considered unacceptable become tolerated. These would include drug use and sexual risk behaviors. Cohen and colleagues also suggested that these risk behaviors may be conceptualized as coping mechanisms to a stressful environment.

Adolescents with a history of psychological disorders are an understudied population relative to both STI-associated risk behavior and contextual factors associated with STI risk behavior. Therefore, an imperative exists to learn more about the association between neighborhood disorder and risk for STIs among this population of adolescents. Accordingly, the purpose of the current study was to examine the association between neighborhood environment and STI prevalence as well as STI risk behaviors such as condom use and partner variables among a sample of adolescents diagnosed with psychological disorders.

Methods

Participants

This is a substudy of a larger multisite family-based randomized clinical trial designed to evaluate the efficacy of an intervention to reduce HIV risk behaviors and STIs while enhancing HIV-preventive psychosocial and structural factors among adolescents diagnosed with psychological disorders. Adolescents were eligible if they were between the ages of 13 and 18, received a clinician-based psychological diagnosis along the externalizing-internalizing spectrum of disorders (schizophrenia and other psychotic disorders were excluded), received in- or outpatient mental health treatment at one of the study recruitment sites, lived with a parent or guardian who was also willing to participate in the study, and provided informed consent. Adolescents were excluded if they had a history of sexually aggressive behavior (i.e., sexual assault or molestation), were currently pregnant, were known to have tested positive for HIV, or had cognitive deficits precluding them from completing the assessment or participating in group activities. Participants were enrolled in the study at three recruitment sites: Brown University, Providence, Rhode Island, University of Illinois, Chicago, and Emory University, Atlanta, Georgia. Clinics and hospitals providing mental health services to adolescents served as recruitment sites. Of 1,102 adolescents who met eligibility criteria, 891 (81%) agreed to participate and subsequently completed baseline assessments. Of the 891 participants, 384 (43.1%) reported being sexually active. Analyses for the current study were conducted with baseline data obtained from these 384 participants. The Institutional Review Boards at Brown University, University of Illinois, Chicago, and Emory University approved the study protocol.

Procedures

Adolescents and parents completed an audio-assisted computerized interview at baseline. The adolescent interview assessed sociodemographic characteristics, sexual behavior patterns, psychosocial characteristics as well as psychological symptomology. The parent interview assessed sociodemographic characteristics, parent norms about sexual behavior and variables addressing quality of parentadolescent interactions such as communication. On average, interviews were 90 min in duration for teens and parents independently. Finally, adolescents were also asked to provide a urine specimen that was assayed for three common STIs (Chlamydia, Gonorrhea, and Trichomoniasis).

Measures

Neighborhood Environment Index—Neighborhood environment, the main predictor variable in this study, was assessed using a 6-item index (Crum et al. 1996). Participants were asked to indicate whether their neighborhood was characterized by the following: (1) broken bottles/trash, (2) people drunk/high, (3) abandoned/ boarded-up buildings, (4) neighbors stealing/damaging property, (5) seeing homeless people every day, and (6) seeing lots of poor people. Responses to all six items were summed and participants were categorized in one of two groups based on the resulting median split value: (1) living in a low risk environment (none, one or two of the six items were endorsed) and (2) living in a high risk environment (three or more of the six items were endorsed).

Neighborhood Cohesion—Neighborhood cohesion was assessed using a 6-item scale assessing whether respondent (1) visited neighbors, (2) could go to their neighbors for advice, (3) regularly talked to people in their neighborhood, (4) knew people's names, (5) felt comfortable asking to borrow things, and (6) felt comfortable asking neighbors to watch their home (Tolan et al. 2001; Sheidow et al. 2001). Answer options ranged from 1 = strongly disagree to 5 = strongly agree. Cronbach alpha reliability for this scale was .86, indicating a high level of internal consistency.

Sexually Transmitted Infections—Urine samples were evaluated for *Neisseria gonorrhoeae*, *Chlamydia trachomatis* and *Trichomonas vaginalis*. Assays were conducted at the Emory University Molecular Diagnostics Laboratory. Chlamydia trachomatis and Neisseria gonorrhoeae were detected using the BD ProbeTec assay utilizing homogeneous strand displacement amplification (SDA) technology as the amplification method and fluorescent energy transfer (ET) as the detection method. Lastly, Trichomonas vaginalis was tested using real time PCR. Adolescents identified with an STI were provided directly observable single-dose STI treatment, received appropriate risk reduction counseling per CDC recommendations, and were encouraged to refer sex partners for treatment. Participants who were positive for Chlamydia, Gonorrhea, and/or Trichomoniasis were categorized as "STI positive". This was subsequently considered the main outcome variable of interest.

Condom Use Behavior and Partner Variables—Participants were asked how often they used condoms with their sexual partners. Answer options ranged from (1) always to (5) never. This variable was recoded such that participants who indicated they always used

condoms with their sexual partner were categorized as “consistent condom users”. All other participants were categorized as “inconsistent condom users”.

Additionally, participants were asked to indicate whether they ever engaged in sexual activity with casual and/or multiple partners. These variables were used as separate outcomes in this study.

Computerized Diagnostic Interview Scheduled for Children (CDISC)—The CDISC, a structured computer-assisted diagnostic interview was administered to parents and adolescents separately for purposes of deriving symptom counts in this sample of adolescents previously clinically diagnosed with a psychological disorder (Shaffer et al. 2000). Reliability and validity of the CDISC are acceptable (Schwab-Stone et al. 1996). Because preliminary analyses found that the parent interview is more sensitive than the adolescent interview, we utilized a combination of both parent and adolescent responses to assess number of symptoms. Symptom counts were derived using the algorithm developed by Shaffer and colleagues at Columbia (Shaffer et al. 2000).

Parent Norms About Sex—Adolescents’ perceptions of parents’ degree of approval of their sexual activity, and parents’ degree of approval of social activities without adult supervision was assessed with this 7-item measure (Baker et al. 1988). Sample questions include “My parent thinks that sex is ok after 1 or 2 dates” or “My parent thinks sex is ok with a person I love”. Answer options ranged from (1) very true to (5) very false. Responses to all 7 items were summed into one total score. Cronbach alpha reliability for this scale was .80, indicating a high level of internal consistency.

Parental–Adolescent General Communication—This 20-item measure assessed positive and negative aspects of general parent-adolescent communication (Barnes and Olson 1985). Sample items include “If I was in trouble, I could tell my parent” or “I don’t think I can tell my parent how I really feel about some things”. Answer options ranged from (1) strongly disagree to (5) strongly agree. Responses to the items representing two subscales, Open Family Communication and Problems in Family Communication were summed into two separate scores. Internal consistency of the two subscales ranged from .78 to .90 respectively.

Data Analyses

First, descriptive analyses were conducted to obtain means, standard deviations, and proportions for relevant sociodemographic variables. Additionally, bivariate analyses consisting of chi square and independent samples *t*-tests were performed to examine the associations between STI infections and sociodemographic variables as well as to identify potential covariates. Finally, logistic regression models were conducted to explore whether neighborhood environment predicted acquisition of STIs, sexual behavior with casual and/or multiple partners, and condom use behavior after controlling for potential confounders.

Results

Adolescents in this sample had a mean age of 15.27 ($sd = 1.28$). The majority of participants identified as female (60.2%) and reported living in single parent households (63.3%). Approximately 45% of families reported an annual income of less than \$20,000. A total of 66.2% of families identified as belonging to a minority ethnic group, with the majority categorized as African American (98.0%) followed by Latinos (1.2%). Among those reporting any risky neighborhood characteristics, the mean number of risky neighborhood characteristics endorsed by participants was 3.62 ($sd = 1.80$) with a possible range of 1–6. A total of 36.8% of participants endorsed at least 5 or 6 risky neighborhood characteristics. The mean neighborhood cohesion score for this sample was 18.94 ($sd = 6.31$) with a possible range of 6–30. In this sample of adolescents 15.4% tested positive for at least one of the three assessed STIs. Additional descriptive statistics as well as differences between participants who tested positive versus those who tested negative for an STI on important study characteristics are presented in (Table 1). Of these, adolescents' age, gender, race, parent marital status, parental sexual norms, problems in family communication, and study site were statistically related to acquisition of STIs at $p = .15$ level, and were therefore included as covariates in the multivariable logistic regression model (Hosmer and Lemeshow 2000). Although condom use behavior was not associated with acquisition of STIs at the bivariate level, we controlled for this variable in our multivariate model predicting STI outcome. Similarly, household annual income and number of psychological symptoms were also not statistically related to acquisition of STIs in bivariate analyses, but were utilized as covariates in all subsequent multivariate models.

Four separate logistic regression models are presented in Table 2. Results indicate that even after controlling for covariates, adolescents residing in high risk neighborhood environments were 2.7 times more likely to test positive for an STI ($p = .013$) and almost 2 times more likely to report engaging in sexual activity with casual partners ($p = .035$) compared to adolescents residing in low risk neighborhood environments. No significant associations were found between neighborhood environment and multiple partners ($p = .267$) or inconsistent condom use ($p = .255$). Finally, we conducted the same four logistic regression models again including neighborhood cohesion as a potential moderator of sexual risk behavior; however, no significant moderation effects were observed. Thus, Table 2 represents results from logistic regression analyses that exclude neighborhood cohesion from the models.

Discussion

This is the first published study to report that physically chaotic environments are associated with increased prevalence of laboratory-confirmed STIs among adolescents. The findings greatly expand upon the work of Cohen and colleagues (2003) by demonstrating this relationship based on data collected from individuals rather than the use of census tracts, investigator ratings of neighborhood quality, and population based gonorrhea rates. Indeed, the variance in neighborhood quality observed in this study, the use of data from 3 geographically distinct cities, plus the use of biomarker outcome data provide considerable rigor to the findings.

Of interest, the presence or absence of physically chaotic environments substantially predicted disease among this relatively homogeneous sample of adolescents who were specifically recruited based on a history of psychological problems (problems that may well predispose to risky behavior). Among this sample of adolescents who must navigate the challenges of sex and sexuality while also managing the burden of a psychological diagnosis, it appears that their neighborhood environment may indeed be a valid proxy of their risk of STI acquisition by virtue of increased sexual risk taking.

Of our current sample, almost 37% endorsed 5 or 6 of the disordered environment characteristics including the presence of a physically chaotic environment (e.g. broken bottles/ trash, abandoned or boarded-up buildings), as well as a high prevalence of poverty, homelessness, substance abuse and theft. Adolescents living in a high risk environment, compared to their peers living in low risk environments, were almost three times as likely to test positive for a laboratory-confirmed STI. This significant association remained even after controlling for individual-, familial and extra-familial factors associated with STI acquisition. Additionally, in this sample of adolescents, those residing in high risk neighborhoods were almost two times more likely to have a casual sex partner. However, a similar association between neighborhood and multiple sex partners was not found, possibly because of the relatively young age of the sample (mean age = 15.27).

Although the present study cannot elucidate the mechanisms by which neighborhood environment affects sexual risk taking, and particularly STI acquisition, the current findings lend support to the Broken Windows theory, which suggests that this association may be explained by the possibility that residents of chaotic neighborhoods may be more susceptible to the negative forces in their environment rather than positive forces. Specifically, as suggested by Cohen et al. (2003), sexual risk behaviors such as engaging in sex with casual partners which may ultimately place adolescent at heightened risk for contracting an STI, may serve as a temporary coping mechanisms against environmental and familial stress factors, and may provide a temporary sense of acceptance and cohesion in an environment that may otherwise be perceived as chaotic and unstable.

Unlike previous studies (Kerrigan et al. 2006; Ellen et al. 2004), our findings did not support the idea that perceived neighborhood cohesion may buffer against the influences of a chaotic environment with regard to sexual risk taking. This may be due in part to the unique characteristics of the adolescents in this study whose experience of a physically chaotic environment may be compounded by an unstructured and chaotic family environment as well as their own psychological susceptibility (Brown et al. 1997). In fact, these youth may be more susceptible to the negative covert messages conveyed by a neighborhood's physical appearance. Such messages may be more readily assimilated by these adolescents due to their own low self-esteem, hopelessness, impulsivity, poor reality assessment and inability to problem solve. Moreover, interpersonal deficits, characteristic of many adolescent psychological disorders such as attention deficit hyperactivity disorder, oppositional defiant and conduct disorders may diminish adolescents' ability to see beyond environmental and family dysfunction such that community cohesion and its inherent positive messages, although present, may seem dissonant with their compromised internal psychological processes. As a result, tapping into supportive aspects of their environment, which requires

interpersonal interaction and skill, may become unattainable to this population of vulnerable adolescents (Greene et al. 2002a, b). Conversely, stigma associated with mental illness may be an alternative explanation for the lack of association between neighborhood cohesion and risk behavior. Adolescents in this sample may experience social isolation by virtue of their psychological symptomatology, and as a result may become separated from possible protective factors in the community such as neighborhood cohesion (Bauman 2007).

Null findings of particular interest indicate that the neighborhood environments of these adolescents were not related to their condom use practices ($p = .255$), and condom use practices were not related to STIs ($p = .878$). Although the current study did not formally assess the prevalence rates of STIs at the neighborhood level, these important null findings suggest that physically chaotic neighborhoods may be places where STI prevalence rates are inflated thereby increasing the odds of engaging in sex with an infected person. Conversely, those living in less chaotic neighborhoods may be exposed to lower STI prevalence rates, and thus might be fortunate enough to avoid sexual encounters with infected persons (Bunnell et al. 1999). In essence, in our sample, physically chaotic neighborhoods do not directly affect condom use practices; rather, they may create an environment where elevated STI prevalence rates may increase the odds of STI acquisition in the absence of anything less than the consistent and correct use of condoms. Again, because this study did not measure STI prevalence rates at the neighborhood level, we can only offer this as a possible explanation of our findings. While this explanation remains open for further investigation, one implication of the findings is that STI prevention and control efforts must be greatly intensified in physically chaotic environments. Overall prevention and control efforts will lower community/ neighborhood STI prevalence thereby providing a form of passive protection for high-risk adolescents such as those diagnosed with psychological disorders.

One other null finding warrants discussion. Several studies have shown an association between economic deprivation (i.e., income level) and high risk sexual behavior and/or STI incidence (Brooks-Gunn et al. 1993; Averett et al. 2002; Baumer and South 2001; Brooks-Gunn et al. 1997; Elliot et al. 1996). This relationship was not observed in our study. Not surprising, low family income was significantly associated with residing in a high risk neighborhood ($p = .001$); however, our findings indicate that family income is not significantly related to STI prevalence. This is consistent with observations reported by Cohen et al. (2000) suggesting that poverty is an insufficient explanation for gonorrhea incidence based on her findings that other low-income but less deteriorated neighborhoods had lower gonorrhea rates.

Further research is needed to explain more precisely the association between neighborhood environments and elevated rates of STI prevalence among adolescents diagnosed with psychological disorders. Several possibilities exist. For example, as suggested by the Broken Window theory (Wilson and Kelling 1982), a deteriorated physical environment may communicate negative messages to its inhabitants which may subsequently motivate individual risk behaviors. However, previous studies have also shown that neighborhood cohesion may counter the effects of a stressful environment for some populations (Kerrigan et al. 2006; Ellen et al. 2004). Although neighborhood cohesion was not found to be a protective factor among adolescents in our study, future studies should investigate possible

ways to optimize existing positive social forces within high risk neighborhoods. A more balanced approach to understanding neighborhood forces associated with sexual risk taking would allow future research to focus on partner selection in the context of both neighborhood risk and neighborhood cohesion while taking into account the specific vulnerabilities of adolescents diagnosed with psychological disorders.

Limitations

Three limitations to this study need to be acknowledged. First, the generalizability of the findings is limited to (a) adolescents meeting the specific criteria for inclusion in the randomized clinical trial and (b) the three geographic regions of the county from which the data are obtained. Second, with the exception of STI results, all other data including perception of neighborhood deterioration were obtained through self-report. No census data were available to externally validate adolescents' reports of neighborhood environment. Third, no data were collected regarding the length of residence in high risk neighborhoods, therefore, the possible relationships between length of residence and STIs could not be assessed.

Conclusion

Findings suggest that STI prevention and control efforts should be intensified in physically chaotic environments to better protect a vulnerable population of adolescents: those diagnosed with psychological disorders. Also, the results of this study emphasize the importance of expanding public health research to include assessment of environmental as well as community-level determinants of STI acquisition. Such studies are important as they can inform adaptations in the theoretical frameworks guiding the development of interventions designed to target high risk adolescents.

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Table 1

Characteristics of STI positive and STI negative adolescents

	STI positive		STI negative		p
	Adolescents (n = 59)		Adolescents (n = 325)		
	Mean (sd)	N (%)	Mean	N (%)	
Age of adolescent	15.0 (1.3)		15.3 (1.3)		.089
Parental norms about sex	26.4 (5.8)		23.3 (6.7)		.002
Parent-adolescent communication					
Open communication	34.8 (11.7)		34.2 (10.7)		.715
Problems in communication	28.8 (9.0)		31.1 (8.3)		.062
Number of psychological symptoms	33.4 (18.0)		36.1 (16.7)		.271
Neighborhood cohesion	18.2 (6.6)		19.1 (6.3)		.361
Neighborhood environment					.01
High risk		35 (61.4)		139 (42.9)	
Low risk		22 (38.6)		185 (57.1)	
Gender					.001
Male		7 (12.3)		144 (44.3)	
Female		50 (87.7)		180 (55.7)	
Ethnic group					.001
Caucasian		5 (8.8)		110 (33.8)	
Minority		52 (91.2)		201 (61.8)	
Parent marital status					.046
Parent in committed relationship		13 (24.5)		120 (38.8)	
Single parent		40 (75.5)		189 (61.2)	
Household Income (<20K/year)					.245
<20K/year		29 (51.8)		131 (43.4)	
>20K/year		27 (48.2)		171 (56.6)	
Condom use behavior					.427
Consistent use		23 (46.9)		166 (53.0)	
Inconsistent use		26 (53.1)		147 (47.0)	

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Study site	STI positive		STI negative		<i>p</i>
	Adolescents (n = 59)		Adolescents (n = 325)		
	Mean (sd)	N (%)	Mean	N (%)	
Atlanta	28 (47.5)		107 (32.9)	.016	
Chicago	24 (40.7)		126 (38.8)		
Providence	7 (11.9)		92 (28.3)		

Table 2

Association between neighborhood environment, STIs, partner variables and inconsistent condom use among adolescents

	Adolescents from high risk neighborhoods N (%)	Adolescents from low risk neighborhoods N (%)	Prevalence ratio	AOR ^a	95% conf. interval	<i>p</i>
STI positive	35 (20.1)	22 (10.6)	1.9	2.7	1.2–5.8	.013
Casual partners	138 (82.1)	145 (72.1)	1.1	1.9	1.0–3.5	.035
Multiple partners	43 (25.9)	45 (23.4)	1.1	1.4	0.8–2.5	.267
Inconsistent condom use	77 (45.8)	95 (49.2)	0.9	1.3	0.8–2.3	.255

^a Adjusted odds ratio using adolescents from low risk environment as the referent category; models are controlling for age, income, gender, race, parent marital status, parental norms about sex, problems in family communication, number of psychological symptoms, and study site; the STD model also controls for inconsistent condom use