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Perceived Social Cohesion and Prevalence of Sexually Transmitted Diseases

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Background: **Although physical attributes have been shown to be associated with sexually transmitted disease (SD) rates, there is little information about the association between social attributes and STD rates.**

Goal: **The objective of this study was to determine the association between gonorrhea prevalence and perceptions of social cohesion in impoverished, urban neighborhoods.**

Study Design: **We conducted a street-based survey of 18- to 24-year-olds residing in selected census block groups in Baltimore City, Maryland. Census block groups eligible for selection were defined as impoverished (greater than 20% in poverty) and unstable (lowest 25th percentile for stability). From the eligible census block groups, 5 from high gonorrhea rate (greater than the 75th percentile) census block groups and 5 from the lower gonorrhea rate (lowest 25th percentile to equal or greater than the 75th percentile) census block groups were randomly selected. Participants within the 10 selected census block groups were recruited using a street-intercept method. Participants were asked about perceived social cohesion and control.**

Results: **Results showed that for young adults 18 to 24 years of age residing in high gonorrhea census block groups, the mean social cohesion index scores were 1.7 points lower than mean social cohesion index scores of the participants residing in the low gonorrhea census block groups ($P < 0.01$).**

Conclusion: **Future research needs to be conducted to determine the temporal association between gonorrhea prevalence and local social cohesion dynamics.**

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HISTORICALLY, THE PUBLIC HEALTH community has used individual-level models to understand the heterogeneous distribution of sexually transmitted diseases (STDs) within and among populations.[1] These models posit that people are more likely to become infected if they fail to use a condom consistently and correctly and/or change sex partners frequently.[2–9] More recently, work has shown that STD rates are associated with structural patterning such as socioeconomic gradients.[10] The characteristics of neighborhoods are not only markers for individual-level STD/HIV risk-related behavior, but also risk factors for STDs in their own right, and thus, appropriate targets for interventions.[11,12] The present investigation considers whether local gonorrhea rates in impoverished and unstable Baltimore City neighborhoods are associated with social cohesion and informal social control.

Studies have revealed that residents of neighborhoods characterized by lower socioeconomic position are at greater risk for STDs.[13–15] However, because lack of well-being indicators such as fear and local victimization are influenced by more than just sociodemographic factors captured in census data,[16–18] it makes sense to expect that a more expanded set of social and structural conditions will similarly affect STDs. Potentially important structural factors beyond those captured by the census include behavioral, physical, and social attributes of neighborhoods.[16,18–21] Behavioral attributes include people on the street and residing in the area (eg, positive role models, drug dealers); physical attributes include land use patterns (eg, liquor stores, churches),[22,23] signs of physical deterioration, also called physical incivilities,[24] and local service availability (eg, health clinics); and social attributes include residents' normative views about behaviors (eg, acceptable and unacceptable behaviors), residents' perceptions of connectedness and solidarity (eg, social cohesion), residents' perceptions of self-regulation and control (eg, informal social control), and shared beliefs about local agency (eg, collective efficacy).[16,25,26] To illustrate one thread in this work, the broken windows or incivilities thesis posits that neighborhood structural change, neighborhood crime rates, and individual and collective fear levels are influenced by signs of physical deterioration and disorderly social behavior.[23,24,27] Recent work from New Orleans at the ecologic level finds cross-sectional effects of physical deterioration on local gonorrhea rates, with rates at the lowest income levels most strongly impacted.[27]

STD core group theory suggests that neighborhoods with a high prevalence of STDs are more likely to be characterized by an increased presence of core transmitters, ie, relatively few individuals who have many sex partners over short time periods and are frequently infected with STDs.[9,28–33] We propose that, in part as a result of the presence of core transmitters, high prevalence neighborhoods will be characterized by increased levels of disorderly social behavior and unsupervised street behavioral patterns. The present investigation directly measures 2 important and commonly used measures of social attributes, social cohesion and informal social control. We hypothesize that high gonorrhea rate neighborhoods, or census block groups, will have lower levels of social cohesion and informal social control after controlling for nonres-

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TABLE 1. Selected Census Block Group Demographics Stratified by High and Low Gonorrhea Census Block Groups

	High Gonorrhea Census Block Groups (n = 5)	Low Gonorrhea Census Block Groups (n = 5)
Mean rate of gonorrhea per 100,000 residents (SD)	1532 (412.9)	679 (218.1)
Mean no. of cases (SD)	21.6 (11.2)	13.8 (4.1)
Mean percentage of households in poverty (SD)	45.0 (19.2)	54.1 (20.4)
Mean instability score (SD)	284 (142.7)	445 (45.0)

SD = standard deviation.

idential land uses. Given that nonresidential land uses spawn physical deterioration,[22] and that land use mix on its own can erode local social climate and control,[34] it is necessary to control for the most relevant nonresidential land uses to gauge the independent effect of the local STD rate on social cohesion and informal social control.

Methods

Overview

We conducted a street-based survey of young adults 18 to 24 years of age recruited from venues such as street corners in impoverished census block groups in Baltimore City between September 2000 and December 2000. Eligibility requirements included ages 18 to 24 years old and residence in the recruitment census block group. To select the census block groups, we identified census block groups that, according to 1990 census data, were the most impoverished and unstable in the city (n = 78). We then categorized these census block groups as either having high or low rates of gonorrhea using reported cases of gonorrhea from 1995 to 1998. Next, we randomly selected 5 high gonorrhea and 5 low gonorrhea census block groups as the sites for the recruitment venues. Using a street intercept methodology,[35,36] we recruited approximately 30 men and women from each census block group over a 3-month time period. The study was reviewed and approved by the Johns Hopkins School of Medicine Institutional Review Board (IRB).

Selection of Census Block Groups

Based on 1990 Census information, we categorized census block groups according to: 1) percent (greater or less than 20%) of household incomes below the federal poverty level and (2) percentile (greater or less than the 25th percentile) of a measure of stability. We assessed stability using a previously reported 3-item scale[34] that represented the sum of the following items: 1) percentage of individuals residing at the same address since 1985; 2) number of one-unit housing structures; and 3) percentage of owner-occupied households (alpha = 0.69). Higher scores reflect more stability, lower scores more instability. Census block groups selected as eligible census block groups had greater than 20% of households below the federal poverty level and were among the lowest 25th percentile for stability.

Next, we categorized the eligible census block groups by percentiles of rates of gonorrhea into high (greater than the 75th percentile) and lower rates of gonorrhea (lowest 25th percentile to equal or greater than the 75th percentile). We calculated rates of gonorrhea by census block group using the number of gonorrhea cases reported to the Baltimore City Health Department from 1995 to 1998 over the 1990 Census population ages 15 to 39 years. We excluded the lowest 25th percentile of gonorrhea rates because the rates of disease were extremely low and could represent unstable estimates of disease. Based on this categorization schema, there were 39 eligible census block groups with high gonorrhea rates and 39 eligible census block groups with low gonorrhea rates.

To obtain our final sample of census block groups for participant recruitment, we randomly selected 5 census block groups from the high gonorrhea census block groups and 5 from the low gonorrhea census block groups. Two of the census block groups selected from the high gonorrhea block groups were adjacent to each other. As a result of the potential for confounding by geographic proximity, we randomly excluded one of the adjacent census block groups and randomly selected a replacement census block group from the same percentile grouping. Table 1 reveals the characteristics of the selected high and low gonorrhea rate census block groups.

Selection of Recruitment Venues

The recruitment for the street-based interviews was modeled on a random street intercept technique.[35,36] High-traffic venues were selected from within each census block group through observational assessments. Venue selection took place between July 31, 2000, and August 31, 2000. Brief street interviews (BSI) were conducted in the highest traffic venues within each census block group. The BSI were conducted to determine the potential number of eligible individuals who could be recruited for the survey at each venue. As part of the BSI, interviewers asked all individuals encountered at the venue who appeared to be 18 to 24 years old whether they lived in Baltimore City and whether they resided in that census block group. Based on the potential yield of eligible individuals, 2 venues per target census block group were selected as recruitment venues for the survey.

Recruitment and Consent

Interviewers approached individuals entering or standing in or near the recruitment venue who appeared to be between the ages of 18 to 24 years old; the geographic boundaries of the venue were determined at the time of venue selection. Interviewers identified themselves and asked individuals appearing eligible whether they wanted to participate in a 10-minute interview in exchange for a compact disc gift certificate.

To determine eligibility for the study, interested individuals were asked their age. They were also shown a map of the census block group and asked whether they resided within the census block group. The interviewers then obtained verbal consent from the participants. Verbal consent was acceptable to our IRB because the survey was anonymous, the participants were 18 years and older, and the study presented minimal harm to participants. Table 2 shows participant recruitment and enrollment.

Procedures

The interviewers administered the questionnaire on the street. The interview lasted 10 minutes and was conducted, when possi-

TABLE 2. Participants Screened, Eligible, and Interviewed from High and Low Gonorrhea Census Block Groups

	High Gonorrhea Census Block Groups (n = 5)	Low Gonorrhea Census Block Groups (n = 5)
No. screened	244	191
No. eligible (%)	127 (52)	117 (61)
No. interviewed (%)	124 (98)	117 (100)

ble, out of the hearing range of others. Answers were recorded directly onto a questionnaire. Questionnaires were scanned into an Access database using TELEform version 7 (Cardiff Software, Inc., San Marcos). Data were converted to SAS version 8.0 (SAS Institute, Inc., Cary, NC) and HLM v5.04 (HLM 5.04 for Windows, Lincolnwood, IL) for the generation of summary statistics and analysis.

Measures

In the multilevel model, we have 2 classes of factors: individual (level 1) and ecologic (level 2).

Level 1: Individual Factors. We asked participants their date of birth, whether they owned or rented their home, the last year of school completed ("educational attainment"), employment status, and marital status. Interviewers recorded sex based on observation.

Level 2: Ecologic Factors. A dummy variable (1 = high; 0 = low) reflected the census block group gonorrhea rate, with those scoring 1 from greater than the 75th percentile and those scoring zero from the lowest 25th percentile to equal or greater than the 75th percentile.

Land Uses

We asked participants about nonresidential land uses ("Which of the following items exist in your neighborhood?"). On the basis of factor analysis, we separated land uses into nightclubs and other nonresidential land uses (community clinic, community organization, drug treatment center, park, or eatery/restaurant). The percentage of participants in each census block group reporting the existence of a nightclub in their census block group was standardized and followed distribution Z(0,1). This aggregated variable captures both the presence and the shared knowledge about these clubs. We asked participants whether a community clinic, community organization, drug treatment center, park, or eatery/restaurant exists in their neighborhood. The 4 items were summed. The Cronbach's alpha for the 4 items was 0.58. Mean of the sum score created the aggregated index. This index was standardized and followed distribution Z(0,1).

Outcomes: Perceived Social Cohesion. A 4-item scale was generated to create a "social cohesion" index.[18] The items were comprised of 3 questions, each beginning with "How strongly do you agree or disagree that. . ." ". . .people in this neighborhood can be trusted"; ". . .this is a closeknit neighborhood"; ". . .people around here are willing to help their neighbors." The responses were 1 = strongly agree, 2 = agree, 3 = disagree, or 4 = strongly disagree. A fourth item asked respondents "When a neighbor is not home, how often do other neighbors watch over their property?" with response formats being 1 = never; 2 = rarely; 3 = sometimes; 4 = a lot; or 5 = always. The Cronbach's alpha for the items was 0.75. The fourth item was rescaled and the 4 items were summed to create an index. The sum was then standardized and followed distribution Z(0,1).

Informal Social Control

Seven items contributed to the "informal social control" index. Informal local social control has been variously labeled over the years[39] and operationalized by a wide array of indicators. We chose here to ask directly about control-related issues. Some of these items are similar to items asking about territorial regulation of activities in near-home spaces,[39] but the focus has been changed to ask about the neighborhood rather than the spaces immediately in front of or behind the home. Items were worded "How much control you think people in this neighborhood have over. . .?"; ". . .the people that hang out in the neighborhood and streets"; ". . .the safety of the neighborhood and its residents"; ". . .who travels and/or moves through the neighborhood"; ". . .whether they are exposed to violence in the neighborhood"; ". . .whether they are exposed to drugs in the neighborhood"; ". . .whether they are exposed to prostitution in the neighborhood"; and ". . .the businesses that come into the neighborhood." The responses are 1 = a lot, 2 = some, 3 = a little, or 4 = none. The Cronbach's alpha for the 7 items was 0.85. The 7 items were summed to create an index. The index was then standardized, following distribution Z(0,1).

Analysis Plan

Because respondents were nested within census block groups, multilevel models represented the most appropriate analytic tool.[39] This analysis recognized the possibility of correlated error terms within groups, makes empiric Bayes adjustments of the group means, and generates a statistical test of between-group variance on the outcome, which informed us if the between-group differences represent more than sampling error.

Random-effects analysis of variance (ANOVA) informed us about the significance of between-group differences in the dependent variables and the degree of agreement within the groups. The next set of models was analysis of covariances (ANCOVAs); level 1 predictors were entered and significant ones were retained. Finally, in a means as outcomes regression (MAOR) model, we added level 2 predictors for gonorrhea rate and nonresidential land use variables. Throughout, level 1 slopes were fixed because we lacked specific theoretical rationales for allowing them to vary.

Results

Descriptive

Table 3 shows the demographic characteristics of participants. Generally, the respondents from the 2 sets of block groups were closely comparable. The only noticeable difference between the 2 sets of census block groups was on the percentage receiving a regular paycheck (49% in the high group compared with 66% in the low-rate block groups).

Analysis of Variance

The within-block-group agreement on the amount of social cohesion in the neighborhood was 0.88; this represents a very high degree of interrater agreement. In addition, the analysis revealed a significant amount of ecologic variation in social cohesion. A substantial 24% of the variation in social cohesion was distributed

TABLE 3. Demographic Characteristics of Participants From High and Low Gonorrhea Census Block Groups

	High Gonorrhea Census Block Groups (n = 5)	Low Gonorrhea Census Block Groups (n = 5)
Average no. interviewed in block group (SD)	24.6 (5.98)	23.4 (3.44)
Percentage male	60%	59%
Mean age, years (SD)	21.0 (2.30)	20.9 (2.36)
Percentage with educational attainment less than high school	89%	91%
Percentage enrolled in school	36%	31%
Percentage with regular paycheck	49%	66%

SD = standard deviation.

between block groups, with the remaining 76% attributable to individual differences and error. The chi-squared test for level 2 variation revealed that this ecologic variation was significant ($P < 0.001$). Because the variation was significant and represented more than just sampling error differences on the group means, we were justified in trying to find an association with level 2 factors.

In contrast, the ANOVA for informal social control revealed poor interrater reliability on average across the block groups (0.002). Correspondingly, the portion of variation in the outcome attributable to ecologic variation was less than 1% (0.008%). In short, the indicators used here suggest that the block group means did not differ on informal social control, and that residents within a neighborhood failed to agree on how to score this attribute for their locale. Given this pattern, we dropped informal social control from our model and subsequent analyses.

Finally, as a form of validity check, we conducted an ANOVA for the percentage who reported the presence of a nightclub and other land uses in the neighborhood. Because respondents were reporting on a feature of the locale, we would expect strong interrater agreement and significant differences from block group to block group. The analysis revealed reliability of 0.85 and 0.88, respectively. A significant 21% and 24%, respectively, of its variance was distributed between block groups ($P < 0.001$). These features of this outcome support its use in aggregated form to capture presence of nightclubs and other land use.

Level 1: Individual Factors

In an ANCOVA model, we entered various level 1 factors to learn which ones significantly affected the outcomes, keeping their slopes fixed throughout. The only personal demographic characteristic correlated with social cohesion was sex (coefficient = 0.50, standard error = 0.12, $P < 0.05$). Male as compared with female respondents perceived *higher* levels of social cohesion after controlling for group context. Age, employment status, and educational attainment were not correlated with social cohesion. Thus, in the full model, we retained sex as a level 1 factor. However, we also retained employment status of participants as a level 1 factor because the percentage employed varied between high and low gonorrhea block groups.

Final Model

Results using both the level 1 and level 2 factors appear in Table 4. This full model explained 87% of the level 2 variance and 26% of total variance in social cohesion. The chi-squared test of the remaining level 2 variance showed that the remaining ecologic variation was not significant ($P = 0.06$).

The association between gonorrhea rate (high vs. low) and social cohesion was statistically significant ($P < 0.05$), controlling for participants' sex, employment status, and block-group differences in reported presence of nightclubs and other land uses. On average, because the outcome is on a z-scored metric, social cohesion was 0.51 standard deviations lower on high gonorrhea rate as compared with low gonorrhea rate block groups, controlling for other factors.

Discussion

We found that among the most impoverished, unstable census block groups in Baltimore City, residents of high gonorrhea prevalence census block groups perceive less social cohesion among their neighbors than residents of census block groups with lower prevalence of gonorrhea, controlling for nonresidential land uses. The expected level 2 impacts of both the presence of nightclubs and other nonresidential land uses reported were significant. Both these coefficients are in line with earlier work, suggesting land use variety creates unstable block settings and abrades local social cohesion.[22–24]

The association between high gonorrhea rate neighborhoods and low levels of social cohesion could be in part the result of the increased presence of core transmitters. We did not directly test the presence of core transmitters and we have not tested whether high STD rates lead to decreased levels of social cohesion or vice versa. The relationship between high gonorrhea rate neighborhoods and low levels of social cohesion could in fact be cyclical in nature.

TABLE 4. Correlates of Perceived Social Cohesion by Census Block Group

Fixed Effect Variable	Level	Coefficient	SE	*P* Value
Sex (1 = male, 0 = female)	Individual	0.50	0.12	0.000
Unemployment (1 = regular paycheck, 0 = no)	Individual	−0.12	0.12	0.324
Mean reported nonresidential land use	Census block group	−0.25	0.09	0.041
Percentage of participants who reported the presence of a nightclub	Census block group	−0.28	0.09	0.026
Rate of gonorrhea (1 = high, 0 = low)	Census block group	−0.51	0.16	0.022

SE = standard error.

The findings extend previous investigations, which have explored the association between socioeconomic position and STDs and suggest a broader, adverse, local, and social impact on community well-being than has heretofore been suggested. The results expand the work by Cohen and colleagues by directly measuring social attributes and their relationship to gonorrhea instead of looking at markers of social attributes such as signs of physical disorder. We were not able to test whether informal social control was associated with gonorrhea rates because our measure of informal social control lacked interrater reliability and significant ecologic variation. The extremely low interrater reliability suggests that low-income and/or young people could interpret the concept of informal social control idiosyncratically perhaps because "control" is a very abstract concept. By contrast, the social cohesion items assess concrete activities of daily life and do have a more common interpretation.

The study findings rely on reported cases of gonorrhea by census block group, which could be biased by geographic variation in those who seek care for gonorrhea, those who are tested for gonorrhea, and which providers report cases of gonorrhea to health departments.[37] Thus, the census block group gonorrhea rates could be subject to misclassification bias. Because we have obtained results with these less-than-perfectly reported rates, more accurate classification would probably yield a stronger impact. Another potential limitation is that of temporality. We used census 1990 indicators and reported gonorrhea cases from 1995 to 1998 for the census block group eligibility criteria. It is possible that census block group indicators of poverty and instability changed between 1990 and 1995, resulting in a misclassification bias.

The findings of this study have research and programmatic implications. Future research needs to be conducted that directly tests the temporality of our posited explanations for the relationship between mechanisms of social cohesion and the prevalence of gonorrhea. Such research should also include block groups of higher socioeconomic status and address the limitations of our current study. In addition, programs need to be developed, implemented, and evaluated that are aimed at strengthening the local social community fabric and that do not rely on large-scale economic redevelopment of disorganized neighborhoods.[38,40]

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