Risky Trade: Individual and Neighborhood-Level Socio-Demographics Associated with Transactional Sex among Urban African American MSM

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Abstract There is a clear, persistent association between poverty and HIV risk and HIV infection. Low educational attainment, neighborhood disadvantage, and residential instability are ways in which poverty is instrumentally experienced in urban America. We investigated the role of lived poverty at both the individual and neighborhood levels in transactional sex behavior among African American men who have sex with men (MSM) residing in urban neighborhoods. Using population-averaged models estimated by generalized estimating equation (GEE) models, we identified individual-level and neighborhood-level factors that are associated with exchanging sex for drugs and/or money. We tested the association between neighborhood and individual-level socioeconomic status and HIV risk behavior by combining area-based measures

of neighborhood quality from the US Census with individual survey data from 542 low-income African American MSM. The primary outcome measure was self-reported transactional sex defined as exchanging sex for drugs or money. Individual-level covariates included high school non-completion, income, and problem drug use. Neighborhood-level covariates were high school non-completion and poverty rates. The findings suggested that educational attainment is associated with both the individual level and neighborhood level. Participants were more likely to engage in transactional sex if they did not complete high school (OR = 1.78), and similarly if their neighbors did not complete high school (OR = 7.70). These findings suggest potential leverage points for both community-level interventions and advocacy for this population, particularly related to transactional sex and education, and will aid HIV prevention efforts that seek to address the contextual constraints on individual risk behavior.

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African American men who have sex with men (MSM) remain at heightened risk for HIV infection. Although African Americans represent only 13% of the US population, 46% of HIV diagnoses from 2008 to 2011 were among African Americans, and MSM accounted for the largest number of African Americans living with HIV/AIDS [1]. Studies have shown individual characteristics, including age, alcohol and substance use,

education, income, and housing quality, are related to HIV sexual risk behaviors [2–4]. Besides these individual determinants of HIV sexual risk behavior, social structural factors such as neighborhood characteristics are associated with HIV risk behaviors [5–8].

Urban neighborhoods characterized by high levels of poverty, unemployment, violent crime, abandoned buildings, and drug use and drug dealing have been linked to high rates of HIV infection in the USA [9]. For example, in examining neighborhood factors related to HIV risk behavior, researchers found African American MSM and trans-women (male to female transgender) were more likely to live in areas of higher HIV prevalence and lower income compared with white MSM [10]. Racial-ethnic disparities in HIV/AIDS are apparent in urban areas, but may be mediated by poverty. In analyses of national HIV surveillance data from 2009, racial-ethnic disparities in HIV epidemiology were evident across levels of urbanizations [11]. However, in that study, poverty was correlated with HIV prevalence only in metropolitan counties with no indicated racial disparities. In non-urban counties, racial-ethnic disparities persisted after controlling for poverty. In addition to socioeconomic factors, antigay stigma is theorized to be a structural predictor of HIV epidemiology. In metro Atlanta, African American MSM living with HIV tend to be concentrated in areas of high poverty and perceived gay stigma while their white counterparts live in low-poverty and low-stigma neighborhoods [12]. In a study of neighborhood characteristics and HIV risk behavior among adolescents in the USA, neighborhood cohesion (e.g., people caring about each other, people willing to help each other) was associated with condom use [13]. In a study of MSM in New York City, residential instability, unstable housing, and homelessness were associated with unprotected anal intercourse [14].

Transactional sex is the exchange of sex for money, drugs, housing, food, or other tangible items and has been tied to HIV infection [15]. Transactional sex that includes multiple partners, concurrent substance use, and/or the absence of consistent condom use places individuals at higher risk for HIV. For instance, injection drug-using MSM who reported having a greater number of lifetime paying male sex partners were significantly more likely to test positive for HIV compared with those with few such partners [16]. Evidence also suggests that neighborhood characteristics and transactional sex are related. Perceived neighborhood disorder, perceived

neighborhood violence, and homelessness were positively associated with transactional sex among MSM [15]. In addition, crack cocaine use has been linked to trading sex for drugs and money [17].

This study examined whether individual-level socioeconomic indicators and neighborhood characteristics were related to transactional sex behavior among African American MSM. Based on prior studies, we hypothesized that African American MSM living in neighborhoods with greater poverty, with lower levels of education, or those engaged in problem drug use would be more likely to report participating in transactional sex [18, 19].

Methods

This cross-sectional study examined the relations of neighborhood- and individual-level socioeconomic status to transactional sex behavior by combining area-based measures of neighborhood quality from the US Census with individual survey data from 564 low-income African American MSM. The primary outcome measure was self-reported transactional sex defined as exchanging sex for drugs or money. Individual-level correlates included high school non-completion, income, and problem drug use. Neighborhood-level correlates included high school non-completion and poverty rates.

Institutional review boards (IRB) at the University of Pennsylvania and Temple University approved this study. The data for this article were from the baseline sample of the Being Responsible for Ourselves (BRO) HIV Risk-Reduction Intervention randomized controlled trial [20, 21]. The study methods were fully described in Jemmott et al., 2014 [20]. Briefly, men were eligible to participate if they were at least 18 years of age, self-identified as black or African American, were born a male, and reported having anal intercourse with a man in the previous 90 days. Men were excluded if they reported having anal intercourse with only one main male partner in the past 90 days or had participated in an HIV/STI risk-reduction intervention in the past 12 months. The participants were recruited in the Philadelphia area using a variety of methods including advertising in local newspapers, at community-based organizations serving African American MSM, colleges, universities, parks, bars, and adult bookstores. We also conducted face-to-face recruitment at social events, activities, and parties and through the referrals of participants.

Measures

To obtain individual measures, the participants completed confidential questionnaires via audio computer-assisted self-interviewing (ACASI) technology, which provided both audio and video presentation of the questions and response options on a laptop computer. Sexual risk behaviors, theoretical constructs, socio-demographic variables, and health-promotion behaviors were assessed. We pilot tested the paper version of the questionnaire with 217 men to ensure that the questions were clear and appropriate for the target population and then programmed it for ACASI and pilot tested it with 16 men.

The primary outcome variable was *transactional sex* measured as “In the past 90 days, on how many days did you exchange sex for drugs or money?” [22]. The participants were coded for transactional sex behavior if they reported 1 or more days and were coded as not having transactional sex if they reported 0 days. *Individual income* was assessed as “total monthly income from all sources” and recoded into three categories: less than \$400 per month, between \$400 and \$850 per month, and more than \$850 per month. *High school non-completion* was measured as a binary variable indicating not completing high school or obtaining a graduation equivalency (e.g., the GED).

To assess the variable *live in own home*, we used the measure, “Where do you live now?”, recoding the responses into a binary measure. Individuals who stated that they lived in their home or apartment were coded positively. All other responses were coded as “not living in their own home”, including residence in a family member’s home or apartment, in someone else’s home or apartment (not family), in a rooming house or single room hotel, in a welfare type place, and in a group home or institution. Those who reported having no regular place to live were also included in this category.

Problem drug use was measured with items adapted from the Texas Christian University Problem Drug Use Screen II [23]. This self-administered screening tool was designed to assess the severity of problem drug use. Individual items included, “During the past 90 days, did you spend less time at work, school, or with friends so that you could use drugs?” and “During the past 90 days, did you use larger amounts of drugs or use them for a longer time than you had planned or intended?” The items were treated as an index, with scores ranging from 0 to 10, where higher scores represent increased

problem drug use. Age and HIV status were included in the analyses to provide context of the sample.

We conceptualized census block group as proxy measures of neighborhood, recognizing these measures are crude estimations at best [24]. Neighborhood-level data on socioeconomic characteristics was collected from the 2006–2010 American Community Survey from the US Census at the census block group level. Census block groups are statistical subdivisions of larger census tracts and include between 300 and 6000 residents [25]. Participant’s addresses at study enrollment were geocoded and linked to census block groups using QGIS software. We used the geocodes to merge neighborhood-level data from the American Community Survey data with the participants’ individual-level survey data. We excluded participants whose addresses were missing or insufficiently complete to geocode ($n = 29$).

Neighborhood high school non-completion was a continuous variable measured as high school non-completion rate for persons aged 25 and above by census block group, based on the aggregate measure from the American Community Survey [25]. *Neighborhood poverty* was continuous measured as the proportion of households living at or below the poverty level in the past 12 months by census block group.

Data Analyses

We examined the quality of the data using descriptive statistics, including mean, median, standard deviation, and range for continuous variables and frequency and proportion for categorical variables. Unadjusted associations of individual- and neighborhood-level characteristics with transactional sex were evaluated using single predictor population-averaged models with generalized estimating equations (GEE) to account for clustering within census block group. Independence working correlation was used to achieve cross-sectional regression. Similarly, in the multivariable analysis, we fitted population-averaged multiple logistic regression models with GEE. We modeled our binary outcomes by logistic regression due to numerical instability of log-binomial regression, which is well documented [26]. To improve interpretability of our results, we report predicted probabilities at different levels of covariates to demonstrate covariate associations instead of reporting the odds ratios determined by regression parameters, which may overstate associations when outcomes are not rare [27].

Population-averaged models were preferred over multi-level mixed-effects models for their population-level interpretation and robustness of estimates to make assumptions about the correlation among individuals within the same census block group [26]. We tested for interaction effects between the predictor variables on transactional sex, including all potential variable pairs in the model as a group. We used Stata version 13 for all analyses.

Results

Table 1 presents characteristics of the participants and their neighborhoods overall and separately by transactional sexual behavior and bivariate tests of relations of the characteristics to transactional sex. The participants included in this analysis were 564 African American MSM whose age ranged from 18 to 69 years (mean = 41.7; SD = 10.7); 29 MSM whose address data were missing or insufficiently complete for geocoding were excluded from the analyses. About 20.0% of participants engaged in transactional sex. About 29.7% said they were HIV-positive. About 52.7% did not complete high school or obtain a GED, and 62.6% earned less than \$851 per month. About 36.4% lived in their own

house or apartment. A total of 321 census block groups were included in the analysis; the mean number of participants per block was 1.7 (SD = 2.86).

Table 1 also depicts unadjusted mean and percentage differences in individual- and neighborhood-level factors by transactional sex behavior. As shown in Table 1, the bivariate GEE analyses revealed that men who did not complete high school had significantly higher odds of reporting transactional sex than did those who completed high school. The participants who resided in their own home had lower odds of reporting transactional sex compared with those not residing in their own home. The participants in the highest income category (more than \$850 monthly) had higher odds of reporting transactional sex as compared with those in the lowest income category (less than \$400 monthly). The analyses also revealed that the greater the participants reporting greater drug use problems, the higher their odds of reporting transactional sex. Table 1 shows no significant differences in age, serostatus, or neighborhood characteristics among those who participate in transactional sex and those who do not.

The results of the multiple logistic regression GEE models in Table 2 indicate that individual- and neighborhood-level educational status were both associated with participation in transactional sex, adjusting

Table 1 Individual-level and neighborhood-level sample characteristics and bivariate relations to transactional sex behavior. PA Philadelphia, *N* = 564

Characteristic	Total no. (%) or mean (SD)	No transactional sex (<i>n</i> = 448)	Yes transactional sex (<i>n</i> = 116)	Odds ratios (<i>p</i> value) from single predictor GEE models
Individual-level				
Age (years)	41.73 (10.7)	41.48 (10.8)	42.73 (10.0)	1.01 (.26)
HIV-positive	161/542 (29.7)	131/433 (30.2)	30/109 (27.5)	0.88 (.59)
High school non-completion—individual	297/564 (52.7)	223/448 (49.8)	74/116 (63.8)	1.77 (.003)
Monthly income				
Less than \$400	152/564 (27.0)	130/448 (29.0)	22/116 (19.0)	Reference
\$400 to \$850	201/564 (35.6)	159/448 (35.5)	42/116 (36.2)	1.56 (.162)
More than \$850	211/564 (37.4)	159/448 (35.5)	52/116 (44.8)	1.93 (.019)
Reside in own home	205/564 (36.4)	180/448 (40.2)	25/116 (21.6)	0.41 (.001)
Problem drug use score	1.05 (1.93)	0.69 (1.48)	2.48 (2.67)	1.49 (.001)
Neighborhood-level				
Neighborhood high school non-completion	25.3 (13.0)	24.7 (13.0)	27.3 (12.9)	4.44 (0.107)
Neighborhood poverty	30.5 (17.2)	30.9 (17.1)	28.8 (17.7)	1.36 (0.45)

Table 2 Generalized estimating equations multiple logistic regression model of the relation of individual- and neighborhood-level variables to transactional sex among African American MSM, Philadelphia, PA ($N = 542$)

Variable	Odds ratio	95% CI	<i>p</i> value
Individual-level variables			
Age	1.01	(0.99, 1.04)	0.165
HIV-positive	0.80	(0.48, 1.33)	0.392
Individual high school non-completion	1.78	(1.14, 2.79)	0.011
Monthly income			
\$400–\$850/month	1.11	(0.56, 2.17)	0.773
\$851+/month	1.13	(0.59, 2.19)	0.700
Reside in own home	0.56	(0.30, 1.04)	0.070
Problem drug use score	1.48	(1.33, 1.63)	<0.001
Neighborhood-level variables			
Neighborhood high school non-completion	7.70	(1.14, 51.8)	0.036
Neighborhood poverty rate	0.49	(0.14, 1.70)	0.260

95% CI 95% confidence intervals

for the other variables in the model. The participants who did not complete high school had higher odds of engaging in transactional sex compared with those who did. Based on the model in Table 2, the predicted probability of transactional sex increased from 12.8% for high school graduates to 20.8% for non-graduates ($OR = 1.78$, $p = .011$, 95% CI [1.14, 2.79]). In addition, participants residing in neighborhoods with higher high school non-completion rates also exhibited higher odds of transactional sex behavior. When a third of the neighbors failed to complete high school, the predicted probability of an individual engaging in transactional sex was 23.4%, compared to 14.6% when 10% of the neighborhood did not complete high school ($OR = 7.70$, $p = .036$, 95% CI [1.14, 51.8]). Problem drug use was also associated with higher odds of transactional sex. Among individuals scoring 4 or more on the problem drug scale, the predicted probability of transactional sex was 38.7% compared to 11.6% among those scoring 0 ($OR = 0.56$, $p = .070$, 95% CI [0.30, 1.04]). Residing in one's own house or apartment had a non-significant protective effect in reducing the odds of transactional sex. There were no differences in transactional sex based on income, neighborhood poverty, age, or HIV serostatus. Additional tests of moderation revealed no interactions between problem drug use, individual or

neighborhood level, high school non-completion, and residing in one's own home on transactional sex.

Discussion

We found that about one in five participants reported engaging in transactional sex, which is comparable to rates found in studies of other high-risk MSM populations [18]. The multiple logistic regression GEE model revealed that transactional sex behavior among low-income African American MSM was associated with individual educational attainment, as well as the average educational attainment level of their neighbors. As formal employment is often influenced by one's educational status, low educational status, more specifically the lack of high school diploma or equivalent, is also associated with participation in transactional sex. In this study, educational attainment had significant associations at both the individual level and neighborhood level. The participants were more apt to engage in transactional sex if they did not complete high school and if their neighbors did not finish high school, even after controlling for age, HIV status, residing in own home, problem drug use, and individual income and poverty measures as well as clustering among participants within neighborhoods. It is important to note the wide confidence interval around odds of transactional sex based on neighborhood education level, which suggests that further investigation into the role of neighborhood is needed.

As found in similar work from this study, education is not a proxy for income and offers an additional dimension to the construct of socioeconomic status [21]. Neither individual income nor residence in a high-poverty neighborhood was associated with engaging in transactional sex. Rather, self-reports of engaging in transactional sex were greatest among the uneducated, not among the poor. Transactional sex is an HIV risk behavior directly linked to the informal economic sector, sometimes termed “the street economy.” It is plausible that in undereducated neighborhoods, more residents participate in informal or street economies, as the more formal sectors of employment are inaccessible without a high school diploma.

Thus, educational attainment is critical for African American MSM's health. Several studies highlight the diminishing quality of public education in urban areas and the increasing discrimination against, and micro-aggressions experienced by, gay youth in schools [28]. A hostile school environment can lead to dropping out, limiting career opportunities, potentially undermining future

housing stability, and ultimately, increasing the risk for participation in transactional sex. Education is a social structure that does not exist in a vacuum, and quality is heavily dependent on geography, public policy, and funding [7]. Investment in quality public education is an important step for the sexual health of African American MSM. In addition, strategic support of African American MSM youth in schools to ensure retention and graduation can be viewed as a viable prevention strategy. Interventions and policies that minimize discrimination and marginalization based on gender, sexual orientation, race, and SES, as well as the intersections of those identities are critically important.

Problem drug use was also a key correlate of transactional sex and warrants thorough investigation in future research. The relationship between drug use and sexual risk behavior is complex. In addition to problem drug use, substances are used for recreation that includes enhancing sexual intercourse [29]. Among MSM, problem and recreational drug use are both associated with HIV risk behavior [29]. Transactional sex is also a method to obtain substances, where substance use, rather than enhanced sexual pleasure, is the desired outcome [8]. While we cannot disentangle the motivational factors that drive this association, further investigation is warranted. Though no longer significant in the multiple logic regression model, residence in one's own home or apartment was a protective factor for transactional sex in the bivariate model not adjusting for other predictors. We can speculate that living in one's own dwelling may provide greater housing stability than other living arrangements. Also warranted is research on the aspects of housing stability that are most protective, particularly as housing instability and homelessness are established correlates of transactional sex among MSM [18, 19].

This study has several limitations. One significant limitation of this study is that we are unable to distinguish trans-women from cis-men and therefore cannot account for the role of gender identity in these relationships. Census-level measures provide estimates of area characteristics, not necessarily of neighborhoods as experienced by the residents [30]. As such, measures derived from census block groups offer a first look at area effects and can provide support for more focused research at the neighborhood level using finer measurement approaches. As with all cross-sectional data, we caution against arguments of causality. The findings are not generalizable to all African American MSM, as the study was not designed to generate population-level estimates. Unfortunately, we do not know the motivations for sex exchange or the amount

of HIV/STI risk incurred, which would be a function of the HIV status of both partners and whether safer sex practices were employed. Finally, the wording of the transactional sex behavior measure does not allow for differentiation between trading money versus drugs or between "buying" and "selling" behaviors. However, both buying and selling sex are risky behaviors, and although it would be desirable to employ a finer measure, this study provides a first step at examining the trading behaviors in this community. We also do not account for other factors which contribute to sexual exchange. The study strengths include a large sample size of African American MSM who report a high rate of transactional sex, providing insight into a high-risk sample. This study also integrates the role of neighborhood characteristics into our understanding individual sexual risk behavior.

Conclusion

In conclusion, education level of both the individual and the neighborhood is a clear factor in transactional sex. In many cases, it is more difficult to implement interventions at the neighborhood, structural or community level, due to the needed multi-level (e.g., political, social) support and allocation of resources. Still, the association of transactional sex with structural factors is evident in this population, and individual interventions alone may be insufficient. It is important for researchers to continue to illuminate the role of macro-systems like the educational and employment sectors that impact the daily lives of individuals. In addition, individual problem drug use remains a risk factor for engaging in HIV risk behavior for Black MSM. While we are unable to distinguish between trading sex for drugs versus for money, interventions that address substance abuse and sexual risk behavior in tandem continue to be necessary to fight the epidemic.

Compliance with Ethical Standards Institutional review boards (IRB) at the University of Pennsylvania and Temple University approved this study. The data for this article were from the baseline sample of the Being Responsible for Ourselves (BRO) HIV Risk-Reduction Intervention randomized controlled trial [20, 21].

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References

- Centers for Disease Control and Prevention. Rates of diagnoses of HIV infection among adults and adolescents, by area of residence, 2011–United States and 6 dependent areas. *HIV surveillance report*. 2013;23:1–84.
- Oster AM, Wejnert C, Mena LA, Elmore K, Fisher H, Heffelfinger JD. Network analysis among HIV-infected young Black men who have sex with men demonstrates high connectedness around few venues. *Sex Transm Dis*. 2013;40(3):206–12.
- Kidder DP, Wolitski RJ, Pals SL, Campsmith ML. Housing status and HIV risk behaviors among homeless and housed persons with HIV. *J Acquir Immune Defic Syndr*. 2008;49(4):451–5.
- Outlaw AY, Phillips G 2nd, Hightow-Weidman LB, et al. Age of MSM sexual debut and risk factors: results from a multisite study of racial/ethnic minority YMSM living with HIV. *AIDS Patient Care STDS*. 2011;Suppl 1:S23–9.
- Ransome Y, Kawachi I, Braunstein S, Nash D. Structural inequalities drive late HIV diagnosis: the role of black racial concentration, income inequality, socioeconomic deprivation, and HIV testing. *Health Place*. 2016;42:148–58.
- Brawner BM, Reason JL, Goodman BA, Schensul JJ, Guthrie B. Multilevel drivers of HIV/AIDS among black Philadelphians: exploration using community ethnography and geographic information systems. *Nurs Res*. 2015;64(2):100.
- Kozol J. *Savage inequalities: children in America's schools*. New York: Crown Publishers Inc; 1991.
- Eaton LA, Driffin DD, Bauermeister J, Smith H, Conway-Washington C. Minimal awareness and stalled uptake of pre-exposure prophylaxis (PrEP) among at risk, HIV-negative, black men who have sex with men. *AIDS Patient Care STDS*. 2015;29(8):423–9.
- Latkin CA, German D, Vlahov D, Galea S. Neighborhoods and HIV: a social ecological approach to prevention and care. *Am Psychol*. 2013;68(4):210–24.
- Raymond HF, Chen YH, Syme SL, Catalano R, Hutson MA, McFarland W. The role of individual and neighborhood factors: HIV acquisition risk among high-risk populations in San Francisco. *AIDS Behav*. 2014;18(2):346–56.
- Vaughan AS, Rosenberg E, Shouse RL, Sullivan PS. Connecting race and place: a county-level analysis of White, Black, and Hispanic HIV prevalence, poverty, and level of urbanization. *Am J Public Health*. 2014;104(7):e77–84.
- Vaughan AS, Rosenberg ES, Sullivan PS. Spatial relationships between gay stigma, poverty, and HIV infection among black and white men who have sex with men in Atlanta. *AIDS Res Hum Retrovir*. 2014;30(8):740–1.
- Kerrigan D, Witt S, Glass B, Chung SE, Ellen J. Perceived neighborhood social cohesion and condom use among adolescents vulnerable to HIV/STI. *AIDS Behav*. 2006;10(6):723–9.
- Halkitis PN, Kapadia F, Siconolfi DE, et al. Individual, psychosocial, and social correlates of unprotected anal intercourse in a new generation of young men who have sex with men in New York City. *Am J Public Health*. 2013;103(5):889–95.
- Bobashev GV, Zule WA, Osilla KC, Kline TL, Wechsberg WM. Transactional sex among men and women in the south at high risk for HIV and other STIs. *J Urban Health*. 2009;86(Suppl 1):32–47.
- Bacon O, Lum P, Hahn J, et al. Commercial sex work and risk of HIV infection among young drug-injecting men who have sex with men in San Francisco. *Sex Transm Dis*. 2006;33(4):228–34.
- Latkin CA, Curry AD. Stressful neighborhoods and depression: a prospective study of the impact of neighborhood disorder. *J Health Soc Behav*. 2003;44(1):34–44.
- Gorbach PM, Murphy R, Weiss RE, Hucks-Ortiz C, Shoptaw S. Bridging sexual boundaries: men who have sex with men and women in a street-based sample in Los Angeles. *J Urban Health*. 2009;86(Suppl 1):63–76.
- Newman PA, Rhodes F, Weiss RE. Correlates of sex trading among drug-using men who have sex with men. *Am J Public Health*. 2004;94(11):1998–2003.
- Jemmott JB III, Jemmott LS, O'Leary A, et al. On the efficacy and mediation of a one-on-one HIV risk-reduction intervention for African American men who have sex with men: a randomized controlled trial. *AIDS Behav*. 2014;
- O'Leary A, Jemmott JB 3rd, Stevens R, Rutledge SE, Icard LD. Optimism and education buffer the effects of syndemic conditions on HIV status among African American men who have sex with men. *AIDS Behav*. 2014;18(11):2080–8.
- Kamb ML, Fishbein M, Douglas JMJ, et al. Efficacy of risk-reduction counseling to prevent human immunodeficiency virus and sexually transmitted diseases: a randomized controlled trial. *J Am Med Assoc*. 1998;280(13):1161–7.
- Lowmaster S, Morey L, Baker L, Hopwood C. Structure, reliability, and predictive validity of the Texas Christian University correctional residential self-rating form at intake in a residential substance abuse treatment facility. *J Subst Abus Treat*. 2010;39(2):180–7.
- Geronimus AT, Bound J. Use of census-based aggregate variables to proxy for socioeconomic group: evidence from national samples. *Am J Epidemiol*. 1998;148(5):475–86.
- Krieger N. A century of census tracts: health & the body politic (1906–2006). *J Urban Health*. 2006;83(3):355–61.
- Carter RE, Lipsitz SR, Tilley BC. Quasi-likelihood estimation for relative risk regression models. *Biostatistics*. 2005;6(1):39–44.
- Last A, Wilson S. Relative risks and odds ratios: what's the difference? *J Fam Pract*. 2004;53(2):108.
- Stevens R, Bernadini S, Jemmott JB. Social environment and sexual risk-taking among gay and transgender African American youth. *Cult Health Sex*. 2013;15(10):1148–61.
- Colfax G, Coates TJ, Husnik MJ, Huang Y, Buchbinder S, Koblin B, et al. Longitudinal patterns of methamphetamine, popper (amyl nitrite), and cocaine use and high-risk sexual behavior among a cohort of San Francisco men who have sex with men. *J Urban Health*. 2005;82:i62–70.
- Duncan DT, Kawachi I, Subramanian SV, Aldstadt J, Melly SJ, Williams DR. Examination of how neighborhood definition influences measurements of youths' access to tobacco retailers: a methodological note on spatial misclassification. *Am J Epidemiol*. 2014;179(3):373–81.