Published in final edited form as:

Sex Transm Dis. 2012 June ; 39(6): 431–432. doi:10.1097/OLQ.0b013e318259482a.

Context, Networks, and Sexually Transmitted Infections: A Study of Sex Ratios and Male Incarceration

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It is not profound to declare at this point in the history of the investigation of determinants of acquisition and transmission of sexually transmitted infections (STIs) that attitudes and personal behaviors alone do not account for the observed spread of STIs and in particular the racial/ethnic disparities we see in prevalence and incidence of STIs. Research has established that after adjusting or stratifying on personal behavior, there exist significant differences in rates of STIs between African Americans and other racial/ethnic groups of adolescents and young adults. Notably observed racial/ethnic differences in STIs are found for most STIs suggesting a limited role for biological vulnerabilities in the explanation of inequities in the burden of infection.

A growing body of research demonstrates that the qualitative and quantitative characteristics of sex networks play a large role in determining who will get infected and who will transmit their infections to others. The interaction between alignment of the connections within networks (e.g., dense redundant connections caused by concurrent sex partnerships) and the social behaviors of the network members (e.g., female sex workers, drug dealers) create pathways for spread of STI between and among the members of networks.

Evidence also suggests that these networks may be shaped by social conditions. Racial/ethnic residential and social segregation result in racially and ethnically segregated networks. Consequently, social conditions that differentially affect residents of one community create sex networks that uniquely put their members at risk for acquisition and transmission of STIs. For example, African American residents of a poor urban historically segregated community may be members of a sex network that put them at greater relative STI risk compared with African American residents of a suburban racially integrated community, independent of their own personal behaviors. And, while it may be impossible to separate the characteristics of the community from the networks that form in the communities, a burning question remains about what is the social context of certain communities that may facilitate or support the qualitative and quantitative characteristics of sex networks that create STI risk.

The paper in this journal by Green et al. addresses the question of whether county-level factors, in this case male incarceration rates and male-to-female sex ratios, may affect network-level STI risk. The proposed causal pathway is that the absence of men relative to women create a greater likelihood that men will have multiple concurrent partners because they have more choice and women will have high risk partners, i.e., partners with multiple concurrent partners, because they have less choice. The study population consisted of 1287 drug abusing men and women on probation and parole in seven cities from different regions of the country

The investigators used two individual-level characteristics as proxies for network-level assessments of qualitative and quantitative STI risk: (1) unprotected sex with a high risk person defined as non-primary partner, injection drug user, someone who trades sex for money or drugs; and (2) number of sex partners in past 30 days.

The researchers geocoded each of the individuals to their county of residence and then tested whether there were differences in these network characteristics for those in counties with higher rates of incarceration and lower male to female ratio. They correctly stratified their analytic models by race/ethnicity and gender and adjusted their models for county-level poverty status and individual-level age and marital status. Although the findings were not consistent across racial/ethnic and gender strata, the investigators found in general that lower sex ratios were associated with having a risky sex partner. In contrast, there was no consistent association between male incarceration rate and either network risk variable. There also was not a consistent relationship between either context variables and multiple sex partners.

There is an argument to be made that male to female sex ratio and male incarceration rates are two views on the same phenomenon. Economic shifts of the second half of the 20th century that lead to fewer industrial job opportunities in some communities, combined with harsher penalties for some drug crimes have lead to higher rates of incarceration and deaths among young men, and therefore a lower male to female ratio particularly in racial and ethnic minority communities. The findings of this study suggest however that male incarceration and the sex ratio may not be related to STI risk in the same way. The failure of Green to show that incarceration rates were significant predictors of the outcome suggest that these two social factors are not completely overlapping constructs. And the fact that sex ratios were not associated with multiple partners suggest that sex ratios may not lead to increased sex partner options for males. An alternative explanation that merits future study is whether a lower male to female sex ratio is merely a marker for drug markets and that people who congregate at drug markets are more likely to have multiple partners and high-risk sex partners. While this explanation still supports importance of context, it argues for a different policy intervention.

The study has several core limitations that may also affect the direction and statistical significance of the findings. With only seven cities (and thus few numbers of counties), the study has low power to see differences based on county level determinants. The other limitation is the cities are not representative of the US and that the study population is not representative of residents within the study cities. However, the participants represent the

population that should be at highest risk for STI based on individual behaviors and so sheds light on the importance of two intriguing social contextual factors.

It is clear that future research must focus on social conditions affecting STI risk. But, there is accumulating evidence that call for an increased focus on policies and practices at a community level that shape social conditions in the community if we wish to reduce prevalence and incidence of endemic STIs.