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Original article

Socioeconomic-Related Risk and Sexually Transmitted Infection Among African-American Adolescent Females

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A B S T R A C T

Purpose: Virtually no studies have examined the potential role that chronic stress, particularly the stress associated with socioeconomic status (SES) strain, may play on sexually transmitted infection (STI) risk. This study examined the association between SES-related risk at baseline to STI acquisition and reinfection over 36 months of follow-up.

Methods: Six hundred twenty-seven African-American female adolescents, ages 14–20 years, recruited from sexual health clinics in Atlanta, GA, participated in a randomized controlled HIV prevention trial and returned for at least one follow-up assessment. Following baseline assessment, six waves of data collection occurred prospectively over 36 months. Chronic SES-related risk was assessed as a sum of yes–no exposure to seven risk indicators. Laboratory-confirmed tests for *Chlamydia trachomatis* and *Neisseria gonorrhoeae* were performed at each follow-up.

Results: In multivariable regression analysis, SES-related risk significantly predicted STI acquisition over 36 months (adjusted odds ratio = 1.22) and STI reinfection (adjusted odds ratio = 1.16) above and beyond other known correlates of STI.

Conclusions: Findings demonstrate that SES-related risk was predictive of both STI acquisition and reinfection among young African-American females. They are consistent with propositions that some health disparities observed in adulthood may be linked to earlier chronically stress-inducing life experiences, particularly experiences associated with low SES conditions. Although various explanations exist for the observed connection between SES-related risk and subsequent STI acquisition and/or reinfection across 36 months of follow-up, these findings highlight the need for further research to elucidate the exact pathway(s) by which SES-related risk influences later STI acquisition to refine STI prevention interventions for this population.

IMPLICATIONS AND CONTRIBUTION

Socioeconomic status–related risk, a proxy for chronic stress resulting from residing in low SES conditions, is related to sexually transmitted infection acquisition, although there are many possible explanations for the connection between SES-related risk and subsequent sexually transmitted infection acquisition and/or reinfection.

Adolescents, particularly females, are disproportionately affected by sexually transmitted infections (STIs) [1]. One in four females 14–19 years of age in the United States (U.S.) is infected with *Neisseria gonorrhoeae*, *Chlamydia trachomatis*, *Trichomonas vaginalis*, herpes simplex virus type 2, and/or human papillomavirus [2]. However, among the same-age African-American females, nearly one in two (48%) had an STI [2]. STI prevalence is

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particularly high in the Southern U.S. relative to other U.S. regions, and African-American adolescent females in the south have Chlamydia and gonorrhoeae rates far above national and regional averages [3].

There are several recognized risk factors associated with increased STI rates among adolescent females; many are closely linked to developmental trajectories (e.g., coping, sexual behaviors, physical and/or mental health) and life transitions (e.g., substance use, interpersonal stress) that affect females physically and behaviorally [4]. Biologic differences also increase their STI risk. During adolescence, the ectocervix develops a large ectropian of columnar epithelium, which may be more susceptible to sexually transmitted organisms such as Chlamydia than the squamous epithelium that develops with maturation [5].

African-American females are at disproportionate risk of STI compared with white and Hispanic peers, despite normative sexual behavior [6], suggesting that the observed STI disparity may not be fully explained by the prevalence of sexual risk behaviors. Racial disparities in STIs typically reflect environmental and social differences between racial groups [6–8]. For example, high levels of disassortative mixing (i.e., partners with dissimilar levels of sexual risk) among African-Americans in terms of sexual risk behavior and high levels of assortative mixing (i.e., partners from similar racial backgrounds) according to race may help explain high STI rates among African-Americans and racial disparities in STI rates [9]. Thus, even if African-American women have low or moderate HIV sexual risk behaviors, they are vulnerable to STI because their sexual partners are typically African-American males, a population with high rates of STIs [6].

In addition to heightened susceptibility to STI acquisition due to age-associated factors (e.g., cervical ectopy) [4,5] and potentially higher exposure to STIs in their sexual networks [6–9], African-American adolescent females, especially those in the Southern U.S., may also be at heightened risk for STI acquisition because of socioeconomic status (SES) risk factors prevalent among African-American families in this region [11]. These SES-related risk factors include chronic poverty and limited occupation and educational opportunities, frequent housing relocation, and unstable employment, all of which have adverse consequences for adolescents [10]. Living in low SES conditions can cause significant chronic strain on an individual, which can have deleterious effects on the functioning of biological stress regulatory systems across the lifespan and, ultimately, on later health and well-being [11].

Research suggests that coping with SES-related stressors, which tend to be chronic rather than acute, elicits a cascade of biological responses that are functional in the short term but over time may "weather" or damage systems that regulate the body's stress responses [12], including the sympathetic adrenomedullary system, the hypothalamic-pituitary-adrenal axis, lipid metabolism, fat deposition, indices of inflammation, and immune functioning [12,13]. When coping demands are elevated or prolonged because of exposure to chronic stressors, the body actively mobilizes resources in response to the stressor. Some individuals become less efficient at ceasing the multifaceted physiological response resulting from chronic stress exposure, even during periods of relative calm [12,13]. The inability to "turn off" the demand response results in physiological changes that can play a part in the development of chronic illnesses and poorer reproductive health outcomes, many of which are more prevalent among African-Americans, including hypertension, cardiac disease, diabetes, and preterm and low-weight births [11,13–15]. Chronic stress has also been associated with suppression of both cellular and humoral immune functions, with resulting heightened risk for immune-related disease and infection susceptibility and severity among adult samples [16–19].

Within the STI literature, chronic stress has been associated with HIV susceptibility and progression [17,20] and increased incidence of bacterial vaginosis (BV) even when accounting for common risk factors, such as douching, frequency of sexual intercourse, and lifetime sexual partners [19,21]. Interestingly, BV has a higher incidence among African-American women compared to Caucasians [22,23], and its occurrence can place women at increased risk for acquisition of subsequent STIs, such as Chlamydia and gonorrhea [24].

Despite the role that SES-related stress or other chronic stress exposure may play in the development of chronic diseases and health disparities [11], virtually no studies have focused on this as a potential pathway by which adolescent African-American females may be at increased risk of STI acquisition. Specifically, given the potential for increased STI susceptibility due to reduced immune function and the reported increase in risk for predisposing infections such as BV [17,19–24], the role of chronic stress such as that resulting from exposure to high SES-related risk during childhood and adolescence on prospective Chlamydia and gonorrhea infection is warranted and has yet to be empirically examined among a sample of African-American adolescent females.

Thus, the purpose of this study was to assess the association between SES-related risk exposure during adolescence (i.e., baseline) to STI acquisition and reinfection over 36 months of follow-up, controlling for other factors associated with STI acquisition (i.e., age, coping, interpersonal stress, sexual risk behaviors, mental and physical health, douching, boyfriend, and STI history), among a sample of African-American adolescent females residing in the Southern U.S.

Methods

Participants

African-American adolescent females were recruited from June 2005 to June 2007 from three clinics providing sexual health services in Atlanta, GA. Individuals were approached by an African-American female recruiter who described the study and assessed eligibility. Eligibility criteria included self-identifying as African-American, age 14–20 years, and unprotected vaginal sex in the past 6 months. Exclusion criteria included being married, pregnant, or attempting to become pregnant. Eligible adolescents interested in participating were scheduled to return to the clinic to complete informed consent procedures and baseline assessments and to be randomized to trial conditions. Written informed consent was obtained from all adolescents and parental consent was waived for adolescents <18 years of age. Of eligible adolescents, 94% ($N = 701$) enrolled and were randomized. Participants were reimbursed $75 to complete each assessment. The institutional review board at the affiliated institution approved all study protocols.

Intervention procedures

The parent study was a randomized controlled supplemental treatment trial [25]. All participants received the same "primary" treatment, a group-delivered HIV risk-reduction intervention based on HORIZONS, which is an intervention with demonstrated efficacy among African-American adolescent females [26]. Participants were randomized into one of two supplemental