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SOCIO-ECOLOGICAL PREDICTORS OF INTERCOURSE FREQUENCY AND NUMBER OF SEXUAL PARTNERS AMONG MALE AND FEMALE AFRICAN AMERICAN ADOLESCENTS

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Abstract

The current study examined 14 waves of data derived from a large, community-based study of the sexual behavior of impoverished youth between 12 and 17 years of age residing in the Deep South. We used multilevel linear modeling to identify ecological predictors of intercourse frequency and number of sexual partners among gender-specific subsamples. Results indicated that predictors of adolescent sexual behavior differed by both type of sexual behavior and gender. For males, age, maternal warmth, parental knowledge, curfew, self-worth, and sense of community predicted intercourse frequency, while age, parental knowledge, curfew, self-worth, friend support, and sense of community were significantly associated with having multiple sexual partners. Among females, age, curfew, and self-worth exerted significant effects on intercourse frequency, while age, parental knowledge, curfew, and self-worth exerted significant effects on having multiple sexual partners. Implications and future directions are discussed.

Sexual behavior often begins during the mid- to late-adolescent years; however, over the past two decades, the transition to sexual intercourse is beginning at progressively younger ages, especially among females (Kaestle, Halpern, Miller, & Ford, 2005). Early transition to sexual intercourse has been associated with a host of negative consequences, including growth in sexually transmitted infections (STIs). The impact of rising STI rates has had a devastating impact on the African American community, with impoverished, African American youth being at increased risk for infection (e.g., Centers for Disease Control and Prevention [CDC], 2006). African American males, compared to males and females from

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other ethnic groups, appear to be particularly vulnerable, as they tend to report more engagement in sexual behavior that increases their risk for infection (e.g., Zimmer-Gembeck & Helfand, 2008). Furthermore, African American boys report more frequent intercourse and a greater number of lifetime sexual partners than their female peers (e.g., CDC, 2009). Given these dire facts, researchers have the important task of designing effective prevention programs aimed at reducing the impact of STIs on this community (e.g., Ellis et al., 2012).

Considering that the primary goal of STI prevention programs is to reduce sexual risk and increase protective behaviors, many studies often focus on improving attitudes about, as well as increasing intention to use, condoms (Noar, Cole, & Karlye, 2006). Fewer studies, however, have identified socio-ecological factors beyond those related to condom use that reduce sexual behavior among African American boys and girls over time. Therefore, the purpose of the present study is to longitudinally compare gender-based models of socio-ecological predictors of intercourse frequency and number of sexual partners among a sample of high-risk primarily African American youth. The examination of these two types of sexual behaviors may enable researchers to better understand how predictors of different types of sexual behaviors vary (Schuster, Mermelstein, & Wakschlag, 2012), while providing a better understanding of gender differences in the predictors of sexual behavior among high-risk, impoverished African American youth. In turn, this increased understanding has the potential to inform the development of more effective and targeted interventions.

Previous research on adolescent sexual behavior has emphasized the predictive role of individual characteristics. However, less attention has been paid to the direct and indirect influences of contextual factors (DiClemente, Salazar, Crosby, & Rosenthal, 2005). The socio-ecological model (SEM; DiClemente et al., 2005), which is based on Bronfenbrenner's (1979) ecological model, lends itself well to investigations of sexual behavior among youth, as this theoretical model considers the impact of one's social and physical environment on behavior. From the SEM perspective, individual behavioral choices, including those related to sexual behavior, are greatly influenced by one's personal characteristics, the social influence of others, and neighborhood factors (DiClemente, Crosby, & Kegler, 2002). In this study, we used the SEM as a framework for selecting psychosocial variables in an effort to assess their impact on changes in sexual behavior over time within the population of interest.

Self-Worth and Sexual Behavior

The SEM acknowledges that individual factors, such as psychosocial characteristics, influence decisions to engage in sexual behaviors (DiClemente et al., 2002). Given that the individual characteristics of adolescents, themselves, are within the center of the SEM, a greater understanding of those factors that may promote or hinder participation in sexual behavior is a crucial step in designing effective prevention programs. One potential moderator of the relation between various socio-ecological factors and adolescent sexual behavior is self-worth. Self-worth concerns the belief that one is valuable and it influences one's thoughts and attitudes about the self, others, and life events, which all have the potential to affect health behaviors (Crocker, Karpinski, Quinn, & Chase, 2003). It is

possible that youth who report lower levels of self-worth engage in sexual behavior to cope with isolation, loneliness, and peer rejection. They also may view opportunities to be involved in romantic relationships as a way to attract others and gain acceptance (Wild, Flisher, Bhana, & Lombard, 2004). Consistent with this idea, research has shown that adolescents with lower levels of self-worth report more sexual behavior than their peers with higher levels of self-worth (Crockett, Moilanen, Raffaelli, & Randall, 2006).

Longitudinal research in this area, however, has suggested that gender differences exist in the relation between sexual behavior and self-worth, such that low levels of self-worth were linked to more sexual behavior among female youth (Ethier et al., 2006; Spencer, Zimet, Aalsma, & Orr, 2002). A separate study on a related concept showed that lower self-esteem was associated with the delayed onset of sexual activity among male youth (Spencer et al., 2002). These studies, however, were conducted with different samples and did not focus on African American boys and girls making interpretation of the findings regarding gender differences inconclusive. Furthermore, given that early to mid-adolescence is a time of significant changes in individual characteristics, as well as in social and environmental factors, a greater understanding of the influence of self-worth on SEM domains could have significant implications for prevention programs.

Social Relationships and Self-Worth

Parents

The SEM of human development emphasizes the importance of social relationships in the development of adolescent risk behaviors. One of the first and most influential relationships for youth involves their parents. Parental influence is often conceptualized as a system of interrelated components that include knowledge of adolescents' daily activities, monitoring, and parent–child relationship quality (Borawski, Ivers-Landis, Lovegreen, & Trapl, 2003). Zimmer-Gembeck and Helfand (2008), for example, suggested that, over time, parental support and monitoring reliably predicted adolescent sexual activity. Research has shown that adolescents are more likely to disclose information to their parents when they perceive a warm and trusting parent–child relationship (e.g., Kotchick, Shaffer, Miller, & Forehand, 2001).

Parent–child relationships characterized by high levels of maternal warmth may allow parents to convey their values to their children and influence their decisions regarding intercourse, thereby reducing their engagement in sexual behaviors (e.g., Coley, Votruba-Drzal, & Schindler, 2009) and increasing self-worth, as these youth appear to internalize positive feelings about the self more readily (e.g., Behnke, Plunkett, Sands, & Bámaca-Colbert, 2011). Consistent with these ideas, Murry, Berkel, Brody, Gerrard, and Gibbons (2007) reported parental monitoring and warmth were associated with reductions in sexual behavior among African American youth. Although African American female youth tend to report more parental monitoring than males (Li, Feigelman, & Stanton, 2000), studies have suggested that monitoring may be more salient for males (e.g., Kincaid, Jones, Sterrett, & McKee, 2012). To date, no study has examined the impact of self-worth on the relationship between parenting practices and sexual behavior among African American boys and girls.

Peers

Another important consideration within the social domain of the SEM involves relationships with one's peers. During adolescence, there is often a shift in the perceived importance of family versus peers, such that greater emphasis is placed on peer relationships and social acceptance (e.g., Eccles, 2004). Some researchers have argued that the nature of the peer relations must be considered if we are to understand the impact of peers on youth sexual behavior. However, few studies have examined the degree to which certain aspects of friendship, such as perceived support, influence sexual behaviors (e.g., Brady, Dolcini, Harper, & Pollack, 2009). Of the two studies conducted, both longitudinal, the results were inconsistent. One study of high-risk African American youth found that youth reporting supportive friendships also reported moderate to high levels of sexual behaviors (Brady et al., 2009). Another study did not find an association between sex and supportive friendships among African American youth (Henrich, Brookmeyer, Shrier, & Shahar, 2006). These studies did not consider the potential impact of self-worth on the relationship between peer influence and sexual behavior, as adolescents concerned about social acceptance within their peer group may report greater changes in their self-worth, which could impact their engagement in various risk behaviors (Crocker & Park, 2004). Furthermore, protective effects of self-worth may be moderated by gender.

Neighborhood Factors

In addition to individual and social factors, the SEM suggests that because of the limited mobility of many adolescents, neighborhoods represent important environments in which youth risk behaviors may develop (Berkman, Glass, Brissette, & Seeman, 2000). Therefore, neighborhoods are environments in which individual-level characteristics interact with relational and environmental factors to shape behavior (Berkman et al., 2000). Much of the extant literature on youth sexual behavior has not longitudinally examined the predictive impact of neighborhood sense of community, or what is also referred to as social capital, within this population. Of the research that has been conducted, findings indicate that greater sense of community is negatively related to adolescent teen pregnancy (e.g., Crosby & Holtgrave, 2006) and sexual behavior (e.g., Crosby, Holtgrave, DiClemente, Wingood, & Gayle, 2003). Therefore, we expected that there would be a negative relation between sense of community and sexual behavior, as youth who feel more connected to their neighborhoods may engage in fewer sexual behaviors due to collective expectations and increased monitoring.

Self-worth may be particularly salient for youth residing in high-poverty neighborhoods, as previous longitudinal research has suggested that neighborhood disadvantage is related to self-worth among African American youth (McMahon, Felix, & Nagarajan, 2011). Research on the gender differences in the relationship between sense of community and sexual behavior, moderated by self-worth is lacking and essential if we are to develop effective prevention programs targeted at youth sexual behavior.

Study Purpose

Two major gaps exist in the literature on determinants of sexual behavior among youth. First, few investigations have examined this phenomenon longitudinally among impoverished, high-risk African American youth. This is critical from an intervention and prevention standpoint, particularly because both impoverished and inner city African American youth comprise the largest group of newly diagnosed cases of HIV and bear the highest rates of STIs (CDC, 2007). Second, studies are needed that assess the utility of contextual factors, including neighborhood influences and gender. Previous studies have suggested that males and females may follow different paths to risky behaviors and some socio-ecological factors may not provide the same degree of risk or protection for both males and females (e.g., CDC, 2004). To address these major voids, this study explored the potential moderating effects of gender and self-worth on the relationship between a number of socio-ecological factors and the change in sexual behavior of a sample of predominantly impoverished African American youth over time.

METHOD

Sample

This study utilized 14 waves of annual survey data collected between 1998 and 2011 as part of the Mobile Youth Survey (MYS), a large community study of adolescent risky behavior (Bolland, 2003). Using a community epidemiological framework (Kellam & Van Horn, 2006), the effects of neighborhood and poverty were restricted due to the high level of homogeneity of the sample. Participants aged 9–19 years were recruited from 13 high-poverty neighborhoods in Mobile, Alabama (based on 1990 census data reports). Approximately 73% of the residents lived beneath the poverty level; the median household income was $5,000. About 99% of the residents in the targeted neighborhoods identified as African American and roughly half (n = 7) of the 13 targeted neighborhoods constituted public housing.

Procedures

The Mobile and Prichard Housing authorities provided the research team with a list of households in which children and adolescents aged 10–18 years were listed on the lease. While the target age was between 10 and 18 years, 9-year-olds who had birthdays prior to August 30 and 19-year-olds whose birthdays were after June 1 were also allowed to participate in the study. Of the households with youth, 50% were randomly selected and contacted. As there was no list available for those living in nonpublic housing neighborhoods, half of the residences were also randomly selected and contacted to determine if there were youth residing in the household. Youth from nontargeted communities were also recruited into the study by means of responding to posted fliers and word of mouth. We explained the study to both caregiver and youth(s). After parental consent and assent of youth(s) were obtained, the adolescents participated in a group-administered survey. Usually, groups comprised 15–30 youth. For younger participants and those experiencing difficulties, the questions were read aloud to ensure that reading ability did not interfere with their ability to comprehend the survey questions. Participants were

informed of measures taken to ensure confidentiality and were paid $10 for their participation in the approximately 1-hour survey.

A total of 1,771 youth were surveyed in 1998. Across all targeted households, the response rate was between 60% and 70%. An estimation of the response rate was provided because the exact response rate was unknown. Researchers estimated the range by determining the number of eligible participants living in selected residences who could not be contacted. In the following year, researchers made attempts to contact previous participants and a new random sample was actively recruited. During subsequent years, the researchers engaged in a similar recruitment and retention procedure: Each year, we added a new group of participants who meet the inclusionary criteria and attempted to interview adolescents from previous cohorts until they aged out of the study. By 2011, over 12,448 youth were surveyed, with 64.7% of them having provided data at more than one time point; the mean number of time points for each youth was 2.91. Table 1 contains information on the age and ethnic distribution of MYS participants at baseline by gender. Additional information regarding the unique characteristics of the MYS sample can be found in Bolland and colleagues (2005).

The MYS contained 294 items that focused on a variety of psychosocial characteristics between 1998 and 2005. Many of the items were adapted from existing scales to address the unique qualities of respondents, such as the wide age range and the use of street vernacular. The survey also includes questions regarding the respondent's engagement in risk behaviors (e.g., sexual intercourse), feelings (e.g., self-worth), contextual factors (e.g., maternal warmth, parental knowledge, and friend support), and neighborhood connectedness. Beginning in 2006, additional questions were added and participants were paid $15.

The format of the survey enables researchers to evaluate the consistency of responses across the measured variables. For each study variable, participants were asked to indicate if they had ever engaged in the behavior and if they had engaged in the behavior in a specified period of time (i.e., most recent, in the past week, month, 3 months, or 1 year). Inconsistent response sets are those in which the participant indicated that he or she had never engaged in a particular behavior, but also notated that he or she had engaged in the behavior in a given referent time period. For any given behavior, only a small percentage of participants were inconsistent in their responses. Inconsistencies were found to be associated across waves, with reported correlations (r) between .26 and .31. Participants with more than three inconsistent response patterns in a given year were excluded from that year's analyses. This method led to the exclusion of the following percentage of participants: 6.5% (1998), 14.4% (1999), 8.2% (2000), 3.5% (2001), 6.3% (2002), 8.0% (2003), and less than 8.0% in the following waves (see Bolland et al., 2007).

Measures

The following variables were used to represent socio-ecological domains of influence: the individual (self-worth), peer (friend support), family (maternal warmth, parental knowledge, curfew), and community (sense of community).

Individual factors—Individual factors included gender, age, and self-worth. Measurements of gender (male = 0, female = 1) and age (mean [*M*] = 13.56, standard deviation [*SD*] = 2.55) were based on annual self-reports. Self-worth (*M* = 6.58, *SD* = 1.64; α = .62 – .65) was measured using eight items adapted from the Perceived Competence Scale for Children (Harter, 1982). Respondents were asked to agree or disagree (disagree = 0, agree = 1) with each statement. The responses were summed and used as a measurement of self-worth.

Social factors—Family influence includes maternal warmth, parental knowledge, and curfew. Maternal warmth (*M* = 8.94, *SD* = 2.14, α = .61 – .71) was measured with six items adapted from the Warmth Toward Mother scale (Lamborn, Mounts, Steinberg, & Dornbusch, 1991). Participants agreed or disagreed with statements assessing their perception of maternal warmth (e.g., "[my mother] spends time just talking to me" and "[my mother] usually helps me if there is something that I don't understand") and items were summed. Parental knowledge (*M* = 9.63, *SD* = 1.91; α = .61 – .74) was measured with six items adapted from a parental monitoring scale (Lamborn et al., 1991). Two items asked participants to agree or disagree with statements about their parents' knowledge of their behavior. Four items asked participants to rate how much their parents knew about their whereabouts. Responses ranged from "not applicable" to "they know a lot." We used four items to measure participants' perceptions of the existence of a curfew (α = .63 – .71), where scores ranged from 0 (*no curfew*) to 5 (*more limits or curfews*). Respondents either agreed or disagreed with statements intended to assess whether they believed that their parents had set curfews.

We measured peer influence using an assessment of friend support. Friend support was measured using 13 items from the Peer Attachment Scale (α = .72 – .74) of the Inventory of Parent and Peer Attachment (Armsden & Greenberg, 1987). The respondents agreed or disagreed with statements assessing their feelings regarding support, trust, and support from friends (e.g., "I trust them," "They accept me as I am," and "I feel alone when I am with them").

Neighborhood factors—Sense of community (*M* = 3.68, *SD* = 1.37, α = .60 – .71) was measured using six items from the Psychological Sense of Community Scale (Glynn, 1981). Using an agree–disagree response format, this measure focuses on the participant's positive feelings about his or her neighborhood. Items such as "There are people in my neighborhood, other than my family, who really care about me" were included. Scores ranged from 0 to 6.

Dependent Variables

The two dependent variables examined in the current study, frequency of sexual intercourse and number of sexual partners, were measured using questions adapted from the Youth Risk Behavior Survey. Frequency of sexual intercourse was measured using three items; sexually active respondents were asked whether they had engaged in sexual intercourse in the past 90 days, 30 days, or 7 days. Response choices included "No," "Yes, just once," and "Yes, more than once" (no = 1; yes, but once = 2; yes, more than once = 3). Answer choices were

recoded with responses ranging from 0 (*never had sex*) to 7 (*had sex more than once in past 7 days*) to create a measure of intercourse frequency-recency. To measure number of sexual partners, participants were asked how many different sexual partners they had in the past 12 months. Responses ranged from 0 (*single sexual partner*) to 6 (*5 or more partners*).

Attrition and Missing Data

High levels of attrition are often expected in high-risk longitudinal samples (Bolland, 2003). We found that year-to-year attrition was in the modest range at approximately 30%. Bolland (2012) found that dropouts between times t and t-1 were not significantly different from participants on several school-related variables based on school records (e.g., behavioral infractions and standardized test scores). Furthermore, dropouts did not significantly differ in their MYS responses at time t-1. These findings suggest that missing data can be treated as missing at random (MAR); however, this assertion cannot be accepted definitively. It is notable that despite small effect sizes, MYS participants were significantly different from nonparticipants residing in the same neighborhood, such that participants were more likely to be African American and were more likely to qualify for free or reduced lunch (Bolland, 2012). This study suggests that the MYS successfully recruited youth at greatest risk from these neighborhoods.

Analysis Plan

Descriptive and univariate statistics (means, standard deviations, and proportions) were employed to investigate respondent characteristics and assess the quality of the data. Bivariate correlations between each independent and dependent variable were then calculated to assess collinearity between the two outcome variables across waves. Analyses were limited to respondents aged 12–16 years at time *t*-1 who also had data at time *t*. We also excluded respondents who had large numbers of inconsistencies at either time *t*-1 or time *t* (see Bolland et al., 2008, for a discussion of this exclusion criterion). This limited the sample to 5,152 respondents with a total of 10,981 pairs of consecutive observation points. Initially, both genders were analyzed together. Individual, social, and neighborhood variables were included in each analysis, as were gender interactions; to assess developmental effects, we examined self-worth interactions with social and neighborhood variables and with gender interactions (the latter set of terms are three-way interactions between gender, self-worth, and social/neighborhood variables). To make the results more interpretable, all continuous variables were centered on zero for these analyses.

The results of this model produced significant interactions between gender and predictor variables, suggesting that there were different slopes for males compared to females. Therefore, we conducted separate analyses for males and females. For the first set of analyses involving intercourse frequency-recency, we analyzed the data using SAS PROC MIXED with repeated measures and restricted maximum likelihood; we assumed a first-order autoregressive covariance structure for the repeated measures (see Figure 1). These models predicted intercourse frequency-recency at time *t* as a function of the following domains measured at *t*-1: individual factors (i.e., age and self-worth), familial factors (i.e., maternal warmth, parental knowledge, and curfew), peer influence (friend support), neighborhood factors (i.e., sense of community), and intercourse frequency.

For the second set of multivariate models predicting number of sexual partners, where the dependent variable involves a count, we used SAS PROC GENMOD to conduct analyses using a generalized estimating equation (GEE) framework (e.g., Diggle, Heagerty, Liang, & Zeger, 2002) with a log link function and a poisson error distribution. Just as in the first set of models, we once again analyzed data separately for males and females and modeled the number of sexual partners at time *t* as a function of age, self-worth, friend support, maternal warmth, parental knowledge, curfew, sense of community, and number of sexual partners, all measured at *t*-1. To estimate the degrees of freedom, we used a procedure based on a technique developed by Satterwaite (1941) and later expounded upon by Kenward and Roger (1997). This procedure involves inflating the estimation of the variance-covariance matrix of the random and fixed effects.

The multivariate analyses uses a cross-lagged panel design, whereby the independent variables and the dependent variables measured at time *t*-1 are regressed on the dependent variable measured at time *t*. This allows stronger causal inference than would be possible with strictly contemporaneous independent and dependent variables (Granger, 1969). However, cross-lagged panel analyses are also more conservative than contemporaneous analyses (Keele & Kelly, 2005). Use of such a model has been recommended in previous research with impoverished populations, as there are often unmeasured variables that could potentially influence predictors and outcomes (Bolland et al., 2007).

RESULTS

Table 2 presents the bivariate correlations between all of the predictors and dependent variables. Correlations between variables were relatively small, with one exception. Frequency of sex and multiple partners were moderately correlated (r = .63). We also conducted partial correlations to control for the effects of age and gender. The results indicated that the controls often did not have a significant impact on the results.

To determine if the predictors of intercourse frequency-recency differed by gender, we tested two separate models: one for males and the other for females (see Table 3). Among males, age was a significant predictor of intercourse frequency, such that, compared to their respective counterparts, older males tended to report engaging in intercourse with increasing frequency and recency. Furthermore, lower levels of self-worth, greater maternal warmth, less perceived parental knowledge, fewer curfews, and a greater sense of community predicted engaging in intercourse with increasing frequency and recency. For females, older age, lower levels of self-worth and fewer curfews predicted engaging in intercourse with increasing frequency and recency. To explore the moderating effects of self-worth with risk and protective factors on intercourse frequency-recency, we examined the interactions between self-worth and each variable represented in the SEM. There was one significant interaction for females, such that greater maternal warmth protected against intercourse frequency-recency for those with high levels of self-worth, but was a risk factor for intercourse frequency-recency for those with low levels of self-worth.

To determine if the predictors of number of sexual partners differed by gender, once again, we tested two separate models: one for males and the other for females (Table 4). For males,

older age, lower levels of self-worth, less friend support, less perceived parental knowledge, fewer curfews, and a greater sense of community predicted increases in number of sexual partners. For females, older age, lower levels of self-worth, less parental knowledge, and fewer curfews predicted increases in number of sexual partners. Once again, we explored the moderating effects of self-worth with each variable represented in the SEM. There was one significant interaction for females, such that having more curfews was a greater protective factor against having greater numbers of sexual partners amongst those with high levels of self-worth than for those with low levels of self-worth.

DISCUSSION

The results of this study illustrate the moderating effects of gender and self-worth on psychosocial predictors of change in the sexual behavior of at-risk African American boys and girls in the Deep South. To begin with, we used the socio-ecological model as a framework for examining the psychosocial predictors of two types of sexual behaviors: intercourse frequency and number of sexual partners. Overall, our results indicated that older adolescents reported more positive change in their intercourse frequency-recency, and, similarly, older youth were also more likely to report a greater change in their number of sexual partners in the following year than their younger peers. This result is not surprising and is consistent with previous research on African American youth that found that older youth report more sexual activity than their younger counterparts (e.g., Mandara, Murray, & Bangi, 2003). Over the past decade, many researchers have advocated for a more holistic view of adolescent sexual behavior, such that there would be greater acknowledgement of the developmental appropriateness of reported increases in sexual activity during this important transitional period; however, the increased vulnerability of this group to STI continues to support research focused on identifying risk and protective factors (e.g., Tolman & McClelland, 2011).

Self-Worth and Sexual Behavior

Our results suggest that there are no significant gender variations in the relation between self-worth and sexual behavior, as lower levels of self-worth predicted greater change in reports of intercourse frequency-recency and number of sexual partners among both boys and girls. As previously mentioned, self-worth and self-esteem are often used interchangeably and are in fact related concepts. Given that few studies have specifically examined self-worth in the context of sexual behavior, we focus our discussion on studies that have examined self-esteem. Our findings are consistent with previous studies that have suggested that female adolescents with lower self-esteem have more sexual partners over time (e.g., Ethier et al., 2006). Our findings, however, are inconsistent with studies that have suggested that African American males with lower self-esteem, specifically during early adolescence, are more likely to delay sexual debut than those with higher self-esteem. Since previous research has linked low self-esteem with depression (Behnke et al., 2011; Orth, Robins, & Roberts, 2008), it is possible that youth who reported lower self-worth have negative self-perceptions and as a result, may be more likely to use sexual intercourse as a way to reduce negative feelings and gain social capital.

Social Relationships and Self-Worth

Parents—The results of this study suggest that there are significant gender differences in the relation between parenting factors and sexual behavior. For males, we found a significant amount of overlap between the predictors of change in intercourse frequency-recency and number of sexual partners. Specifically, our results indicated that fewer curfews and less parental knowledge predicted change in both intercourse frequency-recency and number of sexual partners. Greater maternal warmth was predictive of change in intercourse frequency-recency, but not of change in number of sexual partners. Findings regarding predictability of fewer curfews and less parental knowledge are consistent with previous cross-sectional and longitudinal studies with ethnic minority populations that have observed inverse associations between parental monitoring variables and sexual activity (e.g., Borawski et al., 2003). However, the finding that greater maternal warmth was predictive of sexual risk was unexpected and inconsistent with some studies that have found that warmth was associated with decreased sexual risk (e.g., Coley et al., 2009). Our findings, however, are consistent with studies that have suggested that high warmth, which could be interpreted as parental permissiveness, among African American males is associated with greater risky sexual behaviors, as adolescents perceiving their mothers as permissive may be more likely to spend time outside of the home and have greater opportunities to engage in sexual behaviors (Kapungu, Holmbeck, & Paikoff, 2006).

For females, we observed a slightly different pattern, such that only one variable, having fewer curfews, was predictive of change in intercourse frequency-recency. This finding is not surprising, as youth who have more unsupervised free time will likely have more opportunities to engage in frequent sexual activity (Kogan et al., 2011). Our results also indicated that greater maternal warmth protected against intercourse frequency-recency for those with high levels of self-worth, but was a risk factor for intercourse frequency-recency for those with low levels of self-worth. To our knowledge, no other studies have examined the interaction between self-worth and maternal warmth in predicting sexual behavior. It is possible that these youth reporting higher self-worth may have parents with an authoritative parenting style, which tends to lead to better child outcomes, while children with lower self-worth may have parents with a permissive parenting style, which is associated with greater reports of sexual behavior and other risk behaviors (Landor, Simons, Simons, & Gibbons, 2011).

Regarding the number of sexual partners, there was an interaction between curfew and self-worth, such that having more curfews served as a greater protective factor against increasing sexual partners among those girls with high levels of self-worth than for those with low levels of self-worth. Having more curfews could be an indicator of parental responsiveness, as parents who are more responsive to their children's needs may be more likely to implement behavioral limitations to protect their children from potential risk (Lanza, Huang, Murphy, & Hser, 2013). Furthermore, adolescent girls with higher self-worth and more responsive parents may be more likely to share their parents' values regarding sexual behavior and may perceive curfews as an extension of parental caring and concern.

Peers—Our results indicated that fewer supportive friendships were predictive only of greater change in number of sexual partners in the male-specific model. It was not a significant predictor of change in intercourse frequency-recency and was not a significant factor for females. This finding is consistent with previous research that suggested that supportive friendships may serve a protective function for underrepresented youth (Henrich et al., 2006); however, our findings suggest that this may be especially true for impoverished, African American males. Given that previous research has suggested that African American youth with low levels of support may engage in risky sex as a response to a stressful and unpredictable environment (Brady et al., 2009) and females tend to report more variety in their coping skills than their male counterparts (Wilson, Pritchard, & Revalee, 2005), males may be especially sensitive to external forms of support. More research is needed to explicate the impact of friendship type on sexual behaviors.

Neighborhood Factors

Our findings indicated that a greater sense of community was predictive of sexual behavior for males regardless of type of sexual behavior. This finding is in contrast to previous findings that have focused on the association between neighborhood connection and perpetration of violence among youth and have found that youth with lower connections report more violent behaviors (e.g., Widome, Sieving, Harpin, & Hearst, 2008). It is possible that youth who spend more time outside of the home may also be more likely to report a greater sense of community, leading to greater sexual risk. To our knowledge, our investigation is the only study to date to move beyond examining neighborhood structural characteristics in the investigation of the relation between neighborhood factors and sexual behavior among low-income African American youth, both collectively and by gender, and additional research is needed on this topic.

Limitations

Two major study limitations should be noted. First, one cannot be certain of the degree to which the current results are generalizable beyond a primarily African American sample residing in low-income communities in the Deep South. It is unclear whether the impact of religious values and culture differ significantly in their respective influences on sexual behavior, as compared to other areas of the country. However, the homogeneity of the sample enabled us to examine a high-risk segment of the United States population. As most of the participants were impoverished and resided in inner city neighborhoods, we were able to investigate the effects of a variety of variables without confounding the findings with socioeconomic status. Second, much of the data for this study are based on self-report; therefore, we are unable to verify the truthfulness of the information received.

Implications

Despite these limitations, our findings have important implications for the fields of prevention science and intervention. Namely, the socio-ecological framework should underlie any effort to reduce the sexual behaviors of African American youth in low-income communities. In developing prevention and intervention programs, one must understand how social and environmental factors interact to influence sexual behavior among

adolescents. Furthermore, consideration of the individual and social processes is essential for developing effective interventions. As we observed several of the predictors of sexual behavior among youth differed by gender, examining predictors for male and female sexual behaviors separately may be warranted because of the unique factors that contribute to gender differences, such as differences in development, socialization, and gender-based double standards.

Our findings also suggest that socio-ecological assessments may be essential prior to participating in prevention programs, as it is important to understand youths' individual risk and protective factors. For example, our study showed that predictors differed by gender and type of sexual behavior. These findings imply that programs should be tailored to their population, as male youth engaging in sexual behavior may require more parental involvement and thus a parental component to an intervention, while the focus for females may vary depending on the type of sexual behavior and should be tailored accordingly. Our results indicated that individual and parental factors were predictive of the sexual behaviors examined within this study. This finding may imply that prevention programs that primarily emphasize peer factors may not be as appropriate within this population. Additional research, however, is needed to further explicate these findings.

Future Directions and Conclusion

This study makes several contributions to the current literature. Namely, we examined the impact of socio-ecological factors on the different sexual behaviors among African American males and females. This study raises important questions for future research. First, several levels of the socio-ecological model were not predictive of sexual behavior for both males and females, and results also varied by type of sexual behavior. Additional research is needed to examine interactions between levels in an effort to guide the development of effective programs, as it is possible that individual factors interact with other domains to either increase or reduce sexual behavior. Furthermore, several variables should be considered in future studies on the change in sexual behavior over time, including the effect of older siblings, religiosity, and romantic relationship status. Additional information concerning the nature of peer friendships is necessary to determine the conditions under which friend support serve as protective factors.

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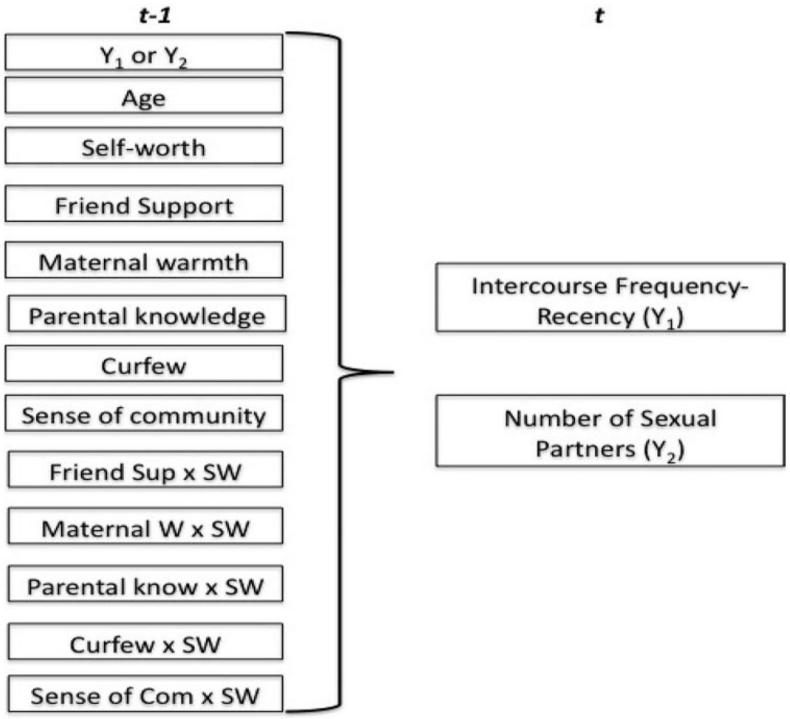

Figure 1.
Lagged linear model of sexual behavior.

Table 1

Demographic Characteristics of Cohorts Reported at Baseline

	Males	Females
Mean age	13.59	13.54
Percent African American	93.9	95.6
Percent receiving free/reduced lunch	84.4	89.1
N	903	867

Table 2

Means, Standard Deviations, and Correlations Among Study Variables at Baseline

	1	2	3	4	5	6	7	8	9	10
1. Age		−.011	.491[a]	.373[a]	.054[c]	−.024	−.022	−.290[a]	−.156[a]	−.114[a]
2. Gender	–		−.208[a]	−.340[a]	.069[b]	.194	.059[c]	.122[a]	.125[a]	−.055[c]
3. Frequency of sex	–	–		.628[a]	−.078[a]	−.039	−.092[a]	−.345[a]	−.256[a]	−.052[c]
4. No. of partners	–	–	.532[a]		−.119[a]	−.048	−.105[a]	−.268[a]	−.256[a]	−.016
5. Self-worth	–	–	−.102[a]	−.123[a]		.027	.208[a]	.047[c]	.233[a]	.144[a]
6. Friend support	–	–	−.044	−.038	.012		.027	.018	.054[c]	.073[b]
7. Maternal warmth	–	–	−.095[a]	−.099[a]	.211[a]	.016		.091[a]	.255[a]	.111[a]
8. Curfew	–	–	−.225[a]	−.160[a]	.049	.028	.084[a]		.205[a]	−.021
9. Parental knowledge	–	–	−.181[a]	−.184[a]	.229[a]	.067[a]	.256[a]	.154[a]		.097[a]
10. Sense of community	–	–	−.056	−.025	.158	.065[c]	.110[a]	−.034	.103[a]	

Note. Cells above the diagonal are Pearson correlation coefficients. Cells below the diagonal are partial correlations controlling for age and gender.

[a] Significant at $p < .001$.

[b] Significant at $.001 < p < .01$.

[c] Significant at $.01 < p < .05$.

Table 3

Lagged Linear Model Results for Intercourse Frequency

	Intercourse frequency							
	Males				Females			
Effect	**β**	**SE**	**Error df**	**F**	**β**	**SE**	**Error df**	**F**
Intercept	−1.26	0.28	3366	−4.46[a]***	−2.99	0.22	3867	−13.43[a]***
Sex frequency	0.37	0.01	3993	704.74***	0.46	0.01	4847	1083.81***
Age	0.24	0.02	3389	125.81***	0.30	0.02	3928	329.57***
Self-worth	−0.07	0.02	4048	13.35***	−0.10	0.01	4316	56.01***
Friend support	−0.01	0.01	4558	1.56	0.01	0.01	4972	1.02
Maternal warmth	0.06	0.03	4292	3.91*	0.003	0.02	4693	0.02
Parental knowledge	−0.05	0.01	4409	11.24***	−0.02	0.01	4778	2.05
Curfew	−0.14	0.03	4308	26.39***	−0.12	0.02	4717	29.48***
Sense of community	0.07	0.01	4100	23.30***	0.01	0.01	4357	0.48
Friend support × self-worth	0.01	0.004	4884	1.72	0.001	0.003	5418	0.15
Maternal warmth × self-worth	0.01	0.02	4839	0.14	−0.04	0.01	5546	8.41**
Parental knowledge × self-worth	−0.01	0.01	4868	3.27	0.01	0.01	5317	3.01
Curfew × self-worth	0.005	0.01	4788	0.12	−0.02	0.01	5318	2.56
Sense of comm. × self-worth	−0.01	0.01	4489	1.98	0.01	0.01	5129	1.04

Note. SE = standard error; df = degree of freedom. Effect *df* = 1.

[a] *t* test results.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

Table 4

Lagged Linear Model Results for Number of Sexual Partners

	Number of sexual partners							
	Males				Females			
Effect	**Estimate**	**SE**	**95% CI**	**χ^2**	**Estimate**	**SE**	**95% CI**	**χ^2**
Intercept	−0.64	0.11	−.85, −.43	–	−3.87	0.21	−4.28, −3.45	–
No. of sexual partners	0.18	0.01	.16, .19	374.30***	0.30	0.01	.27, .33	145.08***
Age	0.07	0.01	.05, .08	72.80***	0.23	0.01	.20, .26	266.18***
Self-worth	−0.03	0.01	−.04, −.01	11.80***	−0.07	0.01	−.08, −.05	35.94***
Friend support	−0.01	0.003	−.01, −.0004	4.34*	0.003	0.005	−.01, .01	0.46
Maternal warmth	0.02	0.01	.005, .04	2.30	0.01	0.02	−.03, .04	0.16
Parental knowledge	−0.01	0.004	−.02, −.01	12.16***	−0.04	0.01	−.05, −.02	18.58***
Curfew	−0.05	0.01	−.07, −.03	29.98***	−0.07	0.01	−.10, −.04	22.33***
Sense of community	0.02	0.005	.01, .03	16.19***	0.01	0.01	−.002, .03	3.02
Friend support × self-worth	0.001	0.002	−0.002, 0.005	0.69	−0.002	0.002	−0.01, 0.002	1.08
Maternal warmth × Self-worth	0.003	0.01	−0.01, 0.01	0.29	−0.001	0.01	−0.02, 0.01	0.01
Parental knowledge × Self-worth	−0.004	0.002	−0.01, 0.01	3.43	−0.003	0.004	−0.01, 0.004	0.57
Curfew × self-worth	0.002	0.005	−0.01, 0.01	0.13	−0.02	0.01	−0.03, −0.01	8.23**
Sense of comm. × self-worth	0.001	0.002	−0.01, 0.01	0.03	−0.004	0.004	−0.01, 0.003	1.32

Note. SE = standard error; CI = confidence interval.

* $p < .05$.

** $p < .01$.

*** $p < .001$.