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Peer Influences on Sexual Activity among Adolescents in Ghana

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Abstract

Little is known about the influences of peers on the sexual activity of adolescents in sub-Saharan Africa. Better understanding of these issues could lead to more effective interventions promoting sexual and reproductive health. Using two waves survey data from adolescents ($n=1275$) in two towns in southeastern Ghana, we examined age, gender, and community differences in peer group characteristics. We also examine prospective associations between peer group characteristics and self-reported sexual initiation, multiple partnerships, and lack of consistent condom use with most recent partner over a 20-month follow-up period. Gender differences in peer context variables were small. Affiliation with antisocial peers and perceived peer norms favoring sex increased the odds of transition to first sex. Having more friends increased the odds of accruing multiple new sexual partners among younger respondents. Among males, perceived peer norms favoring sex increased the odds of accruing multiple partners. No peer context variables were significantly associated with condom use with most recent partner. We discuss the implications of these findings for adolescent sexual and reproductive health intervention strategies in sub-Saharan Africa.

Keywords

Peer influences; gender; sexual behavior; sub-Saharan Africa

Reproductive and sexual health problems attributable to sexual behaviors such as early initiation of sex, lack of condom or other contraceptive use, multiple partners, and high risk partners are widespread among adolescents and young adults in sub-Saharan Africa (Bearinger, Sieving, Gerguson, & Sharma, 2007; Blum, 2007; Hindin & Fatusi, 2009). In many countries in the region, the incidence of HIV infection is very high between the ages of 15 and 25 years, especially among females (Glynn, Caraël, Auvert, Kahindo, Chege, et al., 2001; Gouws, Stanecki, Lyerla, & Ghys, 2008). According to UNAIDS and UNICEF, approximately one-third of all new HIV infections in 2012 occurred among people between

the ages of 15 and 24, and that age range was the only one in which AIDS-related deaths increased over the past decade (UNAIDS, 2013; UNICEF, 2013).

Although less well documented than HIV, other sexually transmitted infections (STIs) are thought to be widespread among young people in sub-Saharan Africa and may contribute to numerous long-term health problems including infertility and cervical cancer (Dehne & Fiedner, 2005; Siemer, Theile, Larbi et al., 2008; WHO, 2001). Additionally, several negative consequences are linked to pregnancy, unsafe abortion, and youthful childbearing. Many adolescent pregnancies in the sub-Saharan Africa are unwanted and end in unsafe abortion (Olukoya, Kaya, Ferguson, & AbouZhar, 2001; Shah & Åhman, 2012), the complications of which are a leading cause of mortality among young women in such settings (Haddad & Nour, 2009; WHO, 2011). Adolescent childbearing is also linked to negative health (Hill, Thomas, AbouZhar, et al., 2007; Lazano, Naghavi, Foreman, et al., 2012; Patton, Coffey, Sawyer, et al., 2009; UNFPA, 2013) and social consequences (Ampofo, 2001; Bledsoe & Cohen, 1992; Kumi-Kyereme, Awusabo-Asare, & Biddlecom, 2007; UNFPA, 2013; Zwang & Garenne, 2008) for young women in the region.

The need for effective interventions to reduce these risks is widely recognized (Coates, Richter, & Caceres, 2008; UNAIDS, 2003; UNFPA, 2008). Unfortunately, recent systematic reviews and meta-analyses suggest that behavioral interventions to promote the sexual and reproductive health of young people in sub-Saharan Africa have had little effect (Gallant & Maticka-Tyndale, 2004; Michielsen et al., 2010). There is some evidence that peer-based strategies have been effective in reducing HIV risk behaviors in some populations (Simoni et al., 2011), and several evidence-based prevention programs for adolescents in the United States seek to leverage or counteract peer influences. Some teach skills for resisting peer pressure (Jemmott, Jemmott, & Fong, 1998). Others mobilize influential young people to promote positive norms (Basen-Engquist et al., 2001; Sikkema et al., 2005). But rigorous evaluations of HIV prevention programs for adolescents in sub-Saharan Africa, including those featuring peer education strategies, have often produced disappointing results (Atwood, Kennedy, Shamblen, et al., 2012; Mason-Jones, Mathews, & Flisher, 2011; Ross et al., 2007).

The use of peer-based strategies with adolescents in the United States builds upon decades of observational research. The broader literature on adolescent development and behavior has long emphasized the growing importance of friends and peers as socializing agents during this stage of the life course (Arnett, 2001; Smetana, Campione-Barr and Metzger, 2006). Investigators have examined several interrelated processes to account for how peer influences occur. One approach focuses on how an adolescent's peer group provides (or does not provide) opportunities for meeting potential sexual partners and engaging in sexual activity. Accordingly, some studies suggest that having a larger network of friends, or a network that includes a higher proportion of older or opposite sex friends, may be linked to sexual activity (Cavanagh, 2004; Miller et al., 1997).

Another approach focuses on social norms within the peer group, sometimes drawing a distinction between descriptive norms, injunctive norms, and active peer pressure (van de Bongardt, Reitz, Sandfort, and Dekovic, 2014). The most consistent finding in the literature

on adolescent sexual activity in the United States is the strong statistical association between adolescents' self-reported sexual initiation and their perceptions about the sexual activity of their close friends (e.g., Billy and Udry, 1985; Bersamin Walker, Fisher, and Grube, 2006; Rai et al., 2003; Romer et al., 2004). These findings support the descriptive norms approach: adolescents tend to do what they believe their friends are doing. Other investigators have considered the role of injunctive norms. Numerous studies in the United States have shown that adolescents who report more restrictive attitudes toward sex among their friends are less likely to have had sex themselves (e.g., Carvajal et al, 1999; Kapidia, Frye, Bonner, Emmanuel, Samples, and Latka, 2012; Manguen and Armistead, 2006; Santelli et al., 2004). Similarly, adolescents who perceive that sexual activity will increase the extent to which they are respected by peers are more likely to engage in sex (Kinsman, Romer, Furstenburg, and Schwartz, 1998; Sieving et al., 2006). These findings are consistent with the injunctive norms perspective: adolescents do what they believe their friends think they should do.

Another approach to peer influences goes beyond the effects of norms related specifically to sexual activity, and attempts to situate adolescent sexual behavior within the broader framework of Problem Behavior Theory (Donovan and Jessor, 1995). According to this view, early or high-risk sexual activity among adolescents is part of a "syndrome" or interrelated problem behaviors (also termed "deviant" or "antisocial" behaviors) that include rejection of adult authority, affiliation with antisocial peers, disengagement from school, involvement in petty crime, and the use of tobacco, alcohol, and illegal drugs. These problem behaviors may, furthermore, be negatively correlated with prosocial behaviors such as church attendance and school achievement (Donovan, Jessor, and Costa, 1998). Numerous studies have found that, in the United States, adolescent sexual activity is positively associated with indices measuring overall antisocial peer affiliation (e.g., Capaldi, Stoolmiller, Clark, and Owen, 2002; Whitbeck Yoder, Hoyt, and Conger, 1999).

In contrast to the United States, research on the social contexts of adolescent sexual activity in sub-Saharan Africa remains relatively underdeveloped. Certain aspects of this topic, such as the prevalence and implications of age-disparate and transactional sexual relationships, have been the subjects of voluminous literature (e.g., Bajaj, 2009; Clark, Poulin, & Kohler, 2009; Luke, 2003; Moore, Biddlecom, & Zulu, 2007; Silberschmidt & Rasch, 2001; Wamoyi, Wight, Plummer, Mshana, & Ross, 2010). Others aspects, such as the influences of household composition and parental monitoring on adolescents' sexual activity, have begun to receive some attention (e.g., Babalola, Tambashe, & Vondrasek, 2005; Dimbuene & Defo, 2011; Biddlecom, Awusabo-Asare, & Bankole, 2009; Kumi-Kyereme, Awusabo-Asare, Biddlecom, & Tanle, 2007; Puffer et al., 2011; Wamoyi, Fenwick, Urassa, Zaba, & Stones, 2011).

To date, however, investigators have devoted little attention to the topic of peer influences on the sexual and contraceptive use behaviors of young people in the region, and most of the research that has been done is cross-sectional or focuses on just one aspect of the peer group context. Cross-sectional surveys have also documented associations between perceived peer sexual activity and self-reported sexual experience among adolescents in Ghana (Karim, Magnani, Morgan, & Bond, 2003), Kenya (Kiragu & Zabin, 1993), Rwanda (Babalola, 20004), and Zambia (Magnani et al., 2002). One study showed that, among unmarried

young people in Lusaka, Zambia, having more friends was associated with reporting a larger number of sexual partners among boys but not girls (Magnani et al., 2002). To our knowledge, only one prospective study has addressed this topic in sub-Saharan Africa: in Cape Town, South Africa, perceived restrictive attitudes of friends had no influence on self-reported sexual activity once other variables were controlled (Mathews et al., 2009). The purpose of the current study is to add to this small body of research with longitudinal data covering multiple aspects of peer group contexts.

Methods

Setting, Sample, and Participants

As a whole, Ghana is a low HIV prevalence country by sub-Saharan African standards. With an estimated 210,000 adults aged 15–49 years infected with HIV, prevalence at the national level stands at just 1.4% (Joint United Nation Programme on HIV/AIDS, 2013). The low prevalence of HIV at the national level, however, masks sharp local variations. Since the late 1980s or early 1990s a severe localized HIV epidemic has affected the Krobo districts in Ghana's Eastern Region. An antenatal clinic that serves as a sentinel surveillance site in that area has consistently recorded the highest levels of HIV prevalence among all 40 of Ghana's sentinel surveillance sites; in 2012 it was 10.1% at this clinic compared to the national average of just 2.1% (National AIDS/STI Control Programme, 2013). Observers believe that this local HIV epidemic was touched off by circular migration of young Krobo women to Abidjan, Côte D'Ivoire, where many participated in commercial sex work (Anarfi, 1992; Decosas, 1996; Sauv , Dzokoto, Opare et al., 2002). Moreover, according to the most recent available Demographic and Health Survey (DHS) data for Ghana, 5.2% and 3.2% of sexually active females and males, respectively, between the ages of 15 and 24 reported having had an STI in the past 12 months; and 26.4% and 8.3% of sexually active females and males, respectively, in the same age range reported experiencing STI symptoms including abnormal discharge and genital sores and ulcers (Ghana Statistical Service, Ghana Health Service, & ICF Macro, 2009). Data from the same survey reveal that 28.9% of female adolescents in Ghana have had a child or are currently pregnant by age 19 (Ghana Statistical Service, Ghana Health Service, & ICF Macro, 2009).

The data for our study come from Waves 1 and 2 of a longitudinal cohorts study in two towns in southeastern Ghana. Both are market towns along a major road with populations of around 15,000. The first town is located within the HIV prevalence area described above. The other town, just 40km further along the same paved road that connects the national capital Accra to the capital of Volta region, has seen very few cases of HIV over more than two decades of sentinel surveillance (National AIDS/STI Control Programme, 2013). These sites were selected for the study in order to provide a contrast between high and low HIV prevalence settings.

In the summer of 2010, field teams enumerated all unmarried girls and boys age 13–14 years (the younger cohort) or 18–19 years (the older cohort) these towns. We drew a simple random sample from this list. A total of 1,275 girls and boys agreed to participate and were interviewed, for a response rate of 75%. Twenty months later, field teams conducted Wave 2 interviews with 1,206 of the original participants, for a follow-up rate of 94.6%.

Interviewers were generally in their 20s and included both women and men. All had earned at least an undergraduate degree and most had considerable interviewing experience on previous projects. Field supervisors attempted insofar as it was practical to match interviewers and respondents on gender. The protocol was approved by Institutional Review Boards at the George Washington University and the Noguchi Memorial Institute for Medical Research at the University of Ghana.

Measures

The independent variables for this study are aspects of peer group contexts assessed during Wave 1 interviews. Participants were asked, "How many friends would you say you have?" Responses served as the basis for the variable *Number of Friends*. Those who reported having at least one friend were asked how many of their friends were girls and how many were boys. We derived a dichotomous indicator of *Opposite Sex Friends*. To assess *Affiliation with Antisocial Peers* we used 13 items adapted from an existing instrument (Huizinga, Esbensen, & Weiher, 1991). Five assessed friends' prosocial behaviors, and eight assessed friends' antisocial behaviors (see Supplemental Table 1 for details). After reverse coding the prosocial items, we derived a scale (Cronbach's alpha = 0.84) by averaging the 13 items. Our measure of *Perceived Peer Norms Favoring Sex* consisted of 13 items adapted from three existing instruments (Kinsman et al., 1998; Huizinga et al., 1991; Basen-Engquist et al., 1999). Details are presented in Supplemental Table 2. We derived a scale (Cronbach's alpha = 0.85) by averaging these 13 items. The correlation between the *Affiliation with Antisocial Peers* and *Perceived Peer Norms Favoring Sex* scales was 0.39 ($p < 0.001$) suggesting that the scales measure distinct but interrelated aspects of respondents' peer group contexts.

We examined two dependent variables. In each Wave, respondents were asked if they had ever had sex and, if so, how many partners they had had in their entire lives. On the basis of answers to these Wave 1 and Wave 2 questions, we derived a variable called *Sexual Initiation between Waves*. It is coded 1 if the respondent had already had sex by Wave 1, 2 if the respondent had not had sex at Wave 1 and did not initiate sex between Waves 1 and 2, and 3 if the respondent had not had sex at Wave 1 but initiated sex between Waves 1 and 2. We also derived from the same items a variable called *Multiple New Partners between Waves*. Respondents who had the same number of partners at the two waves, or who reported just one more partner at Wave 2 than at Wave 1, received a code of 0 on this variable. Those who reported having two or more new partners at Wave 2 than at Wave 1 received a code of 1.

Our analyses also made use of several sociodemographic variables, all measured at Wave 1. These included each respondent's sex, age, school status (in versus out of school), highest level of school attended, household composition, and an index (Cronbach's alpha = 0.73) of household wealth similar to that used in the Demographic and Health Surveys (Rutstein & Johnson, 2004).

Data Analysis

Our data analysis consisted of five stages. First, we used the multiple imputation technique of iteratively chained equations (Royston, 2004; White, Royston, & Wood, 2011) to create ten completed datasets. Statisticians increasingly recognize that conventional approaches to handling missing data, such as case-wise deletion, lead not only to smaller analytical sample sizes and reduced statistical power, but also to biased parameter estimates, particularly when the missing data pattern is not completely random. Current approaches to counteracting these problems include multiple imputation, in which observed data are used to derive distributions of predicted values for each missing datum, and imputations are then made via random draws from these distributions (Allison, 2002; Enders, 2010). The process is repeated several times, and then each completed dataset is analyzed separately and the results are aggregated across the multiple completed datasets in the manner described by Little and Rubin (1997). In general the extent of missing values on Wave 1 variables in our dataset was low (e.g., 3 of the 1275 respondents did not answer the question about their number of friends), but 5.4% of participants in the original sample were lost to follow-up prior to, or declined to participate in, Wave 2. Our imputations drew upon information from all independent and dependent variables discussed above, plus numerous other variables measured at Wave 1. These imputations were carried out using the *mi impute chained* command in Stata 13. All subsequent analyses used Stata's *mi estimate* prefix.

Second, we examined the distributions of the four independent variables and three dependent variables in relation to sex, cohort (older versus younger), and community of residence (high versus low HIV prevalence town). We did this by running linear regression, logistic regression, ordered logit regression, and multinomial logit regression for each variable using dummy indicators for male sex, older cohort membership, and community of residence. From these models we obtained marginal means and percentages according to sex, age, and community.

Third, we examined bivariate associations between each dependent variable and each independent variable using logistic (for *Multiple New Partners between Waves*) and multinomial logistic (for *Sexual Initiation between Waves*) regression. Fourth, we fit models in which each association was adjusted for sociodemographic controls. Last, we fit for each dependent variable a single model that included all four peer context variables plus the sociodemographic controls. In all models, we tested interactions with gender, cohort, and gender-by-cohort for each of the four peer context variables. In our final models we included those interactions that, for a given dependent variable, were statistically significant at the 0.10 level in at least one model. For multinomial logistic regression models of *Sexual Initiation between Waves*, respondents who had not had sex at Wave 1 and did not initiate sex between Waves 1 and 2 served as the reference category. The equation comparing those who had already had sex at the time of the Wave 1 interview to the reference category is not of substantive interest and is not reported here. Our focus is on the equation comparing those who initiated sex between Waves 1 and 2 to those who remained sexually inexperienced at Wave 2. Because multinomial logistic regression model results are sensitive to violations of the independent-of-irrelevant-alternatives (IIA) assumption (Dow & Endersby, 2004), we ran a corresponding multivariate probit regression model as a of sensitivity analysis for each

multinomial logistic regression model. In every case, the direction and statistical significance of effects obtained from the multinomial logistic regression model was confirmed by the results of the corresponding multinomial probit model. We present results from the multinomial logistic models because those exponentiated coefficients have the relatively straight-forward interpretation as being relative-risk ratios, whereas coefficients from multinomial probit models are more difficult to interpret.

Results

Table 1 presents a description of the sample. More girls than boys participated. The two towns were approximately equally represented. There were somewhat more participants in the younger than in the older cohort, especially for girls. Most participants were currently attending school at Wave 1, but a substantial minority of participants, especially girls in the older cohort, was not in school. Many were living with neither biological parent; households including both biological parents were not the norm for either girls or boys.

Overall and cohort-, sex-, and community-specific distributions of the four peer context variables are displayed in the upper portion of Table 2. Several patterns are apparent. First, male participants on average reported having more friends than female participants. Second, although the majority of respondents reported having no opposite sex friends, such friendships were more common among members of the older cohort. Third, the majority of participants reported that none of their friends were sexually active, and only a small minority reported that all of their friends were sexually active. Although the main effect of gender was not statistically significant for this variable, there were significant cohort and gender-by-cohort effects, as well as a significant effect of community. Members of the older cohort were significantly more likely than members of the younger cohort to report that some or all of their friends were sexually active, but a higher proportion of older males than older females reported that none of their friends were sexually active. Residents of the high prevalence town were somewhat more likely than residents of the low HIV prevalence town to report that some or all of their friends were sexually active. Scores on the *Affiliation with Antisocial Peers* scale were low in all groups (the range of possible values was 1 through 3), but were somewhat higher among boys, members of the older cohort, and residents of the low HIV prevalence town than among girls, members of the younger cohort, and residents of the high HIV prevalence town. Scores on the *Perceived Peer Norms Favoring Sex* scale were also low in all groups (again, the possible range was 1 to 3). Mean scores on this scale were higher among male participants and older cohort members than among female participants and younger cohort members, but no difference was observed with respect to community of residence.

The overall and sex-, cohort-, and community-specific distributions of the three sexual behavior variables appear in the lower segment of Table 2. Just over one in five participants reported already having had sex at Wave 1, and an additional 13% of participants reported initiating sexual activity between Waves 1 and 2. Among those who had not already initiated sexual activity at Wave 1, female participants, older cohort members, and residents of the high HIV prevalence town were more likely than male participants, younger cohort members, and residents of the low HIV prevalence town to initiate sexual activity between

Waves 1 and 2. Only a small minority of participants reported having multiple new sexual partners between Waves 1 and 2. There was no sex difference on this variable, but older cohort members and residents of the high HIV prevalence community were more likely than younger cohort members and residents of the low HIV prevalence community to report multiple partners between Waves.

Results of analyses linking peer context variables at Wave 1 to initiation sexual activity between Waves 1 and 2 are shown in Table 3. We obtained no statistically significant interactions between gender and peer context variables, between cohort and peer context variables, or between gender-by-cohort and peer context variables in any of our models of sexual initiation between Waves (results not shown but available from the first author upon request). In bivariate analyses, having opposite friends, scoring higher on the *Affiliation with Antisocial Peers* scale, and scoring higher on the *Perceived Peer Norms Favoring Sex* scale were positively associated with the odds of initiating sexual activity between Waves. In the full multivariate model, only one peer context variable, *Perceived Peer Norms Favoring Sex*, remained significantly associated with the odds of initiating sexual activity. Other factors that increased the odds of sexual initiation between Waves 1 and 2 included female sex, older age, residence in the high HIV prevalence town, being out of school, and living with either no family adult or extended family adults only.

Table 4 presents the results of models linking peer context variables to having multiple new sexual partners between Waves. For this outcome, we found statistically significant interactions with gender and/or cohort for three of the four peer context variables, but no statistically significant interactions between gender-by-cohort and peer context variables (results not shown but available from the first author upon request). Having more friends was associated with increased odds of accruing multiple new sexual partners between Waves for members of the younger cohort only. This was true in all three models: the bivariate model, the model with sociodemographic controls, and the full multivariate model. Having opposite sex friends was associated with increased odds of accruing multiple new partners between Waves in our bivariate model, but this effect became statistically indistinguishable from the null in our model with sociodemographic controls and our full multivariate model. *Affiliation with Antisocial Peers* had an inconsistent effect on the odds of having multiple new partners. Its association with the odds of reporting multiple partners between Waves was positive and statistically significant for younger cohort members but only in one of the three models. *Perceived Peer Norms Favoring Sex* was associated with increased odds of multiple partners for males in all three models, but was statistically significant for females in the bivariate model only. Other factors that increased the odds of reporting multiple new partners between Waves 1 and 2 included female sex, older age, and living in the high HIV prevalence town.

Discussion

Our findings reinforce and extend the results of previous research on the social contexts of sexual activity among sub-Saharan African adolescents. Our data indicate that teenagers in these Ghanaian towns generally perceive that their friends disapprove of adolescent and premarital sexual activity, and that engaging in such behavior results in a loss of respect

within the peer group. This echoes the findings of qualitative studies in KwaZulu-Natal (Harrison, 2008), Nigeria (Smith, 2004), and Tanzania (Wight et al., 2006) which found that social norms in those settings generally equate adolescent sexual activity with sin and a lack of personal respectability. Thus, it does not appear to be the case that the typical teenager in these towns is under intense pressure from peers to become sexually active or accrue sexual partners.

Nevertheless, there are measurable individual differences in these perceptions, and these differences are socially patterned. Our data indicate that perceptions of peer norms favoring sex increase with age. Qualitative data from Tanzania (Harrison, 2008) and Cape Town, South Africa (Selikow, Ahmed, Flisher, Mathews, & Mukoma, 2009) suggest that norms related to adolescent sexual activity may be gendered, with adolescent boys being more likely than girls to be pressured by their peers into sexual activity, and to believe that they can derive status within peer groups through having sexual partners. We find, however, that the sex difference in our *Perceived Peer Norms Favoring Sex* scale is not statistically significant, and is very small in comparison to the cohort difference in the same variable. Statistically significant gender differences were apparent, however, for two peer context variables: number of friends and our *Affiliation with Antisocial Peers* scale. Female respondents on average reported fewer friends overall, and had lower mean scores on the *Affiliation with Antisocial Peers* scale, than male respondents. Overall, peer contexts appear to be patterned more strongly by age than by sex or community of residence.

In spite of the generally restrictive peer norms related to adolescent sexual activity that appear to prevail in this setting, self-reported sexual activity and even multiple partnerships by adolescents are not uncommon, especially in our older cohort. This is not entirely surprising, as perceived norms may influence but do not completely determine individuals' self-standards, and individuals' self-standards may influence but do not completely determine their behaviors (Stone & Cooper, 2001). We show that individual differences in peer context variables, especially *Perceived Peer Norms Favoring Sex*, are positively and prospectively associated with the initiation of sexual activity, and (for boys) with the acquisition of multiple new sexual partners, over a 20 month period. Previous studies in Ghana (Karim et al., 2003) and elsewhere in sub-Saharan Africa (Magnani et al., 2001; Kiragu & Zabin, 1993; Babalola, 2004) have documented cross-sectional associations between perceived peer sexual behavior and self-reported sexual activity among adolescents. Yet cross-sectional associations may be attributable to an effect of behavior on perceived peer norms rather than an effect of peer norms on behavior. Only one previous longitudinal study addressed this topic in sub-Saharan Africa, and found that perceived restrictive attitudes of friends had no influence on self-reported sexual activity once other variables were controlled (Mathews et al., 2009). Thus, our study provides the first longitudinal evidence of effects of perceived peer norms on sexual activity among adolescents in sub-Saharan Africa, and suggests that the desire to impress friends or conform to perceived peer norms may be an important driver of sexual initiation or multiple partnerships among young people, especially male, in sub-Saharan Africa. This is consistent with qualitative data from Tanzania (Wight, Plummer, Mshana, Wamoyi, Shigongo, & Ross, 2006) and South Africa

(Selikow, Ahmed, Flisher, Mathews, & Mukoma, 2009) suggesting that peer pressure for sexual activity may be substantial for boys but limited for girls.

Our findings with respect to the *Affiliation with Antisocial Peers* scale are less robust. Scores on that scale are positively associated with the likelihood of sexual initiation between Waves in bivariate analyses and in analyses that adjust for sociodemographic background variables, but this association becomes statistically indistinguishable from zero when other peer context variables are added to the model. This suggests that the effect of being affiliated with antisocial peers on sexual initiation is difficult to distinguish from the effects of other associated peer context variables. The *Affiliation with Antisocial Peers* scale is also positively associated in our data with having multiple partners between Waves, but only among members of the younger cohort, and again this association becomes statistically insignificant when other peer context variables are added to the model. These findings are consistent with the view that adolescent sexual activity in these settings may be partially understood within a Problem Behavior Theory (Donovan & Jessor, 1985; Donovan et al., 1988) framework. The fact that the effect of *Affiliation with Antisocial Peers* on having multiple new sexual partners is limited to the younger cohort suggests that sexual activity may function as a problem behavior primarily among those for whom it is most strongly proscribed, namely younger adolescents.

Our findings also provide some evidence that the size and composition of adolescents' peer networks influence their involvement in sexual activity. Having opposite sex friends is positively associated with the odds of initiating sexual activity between Waves in bivariate analyses, but this effect vanishes in multivariate analysis. This suggests that having opposite sex friends may have no independent effect on sexual activity among adolescents in these settings. In contrast, having a larger number of friends is associated with increased odds of having multiple sexual partners in all of our models, but only among members of the younger cohort. The association between number of friends and multiple partners may be attributable to the peer network being a primary source of potential partners: Those who have more friends may meet more potential partners and have greater opportunity to form sexual relationships. It is unclear, however, why this association would only pertain to younger adolescents.

Several limitations of this study should be borne in mind when considering the results. First, the age of one's friends is a potentially important aspect of the peer context that was not assessed in this study. Having significantly older friends has been associated with a range of problem behaviors including early sexual initiation among adolescents in the United States (Kirby, 2002; Leatherdale et al., 2006), and a recent study from Cape Town, South Africa showed that elevated exposure to classmates who are at least two years older increased the risk of early sexual initiation among adolescent females in that setting (Lam, Marteleto, & Ranchhod, 2013). Thus, future studies on the social contexts of adolescent sexual and condom use behaviors should include measures of perceived peer norms about condoms and having older friends.

The primary limitation of this study, however, is its reliance upon self-reports. It is widely believed by investigators working in sub-Saharan Africa that young people there, especially

girls, tend to understate their sexual activity in survey interviews due to social desirability (Nnko, Boerma, Urassa, Mwaluko, & Zaba, 2004; Plummer et al., 2004). Their reports of other behaviors and events, such as school-leaving and marriage, may also be unreliable (Mensch, Soler-Hampejsek, Kelly, Hewett, & Grant, 2014). Thus, our data almost certainly understate the extent of sexual activity among adolescents in these areas. They may also understate the prevalence of other socially disapproved behaviors, of affiliation with friends who engage in such behaviors, and of social norms favoring sexual activity.

A thornier issue is the potential for socially desirable responding to produce bias in measures of association. If socially desirable reporting is uniform across respondents, it may have little effect on measures of association. But if some adolescents are more prone to socially desirable reporting than others, and if those variations are consistent across domains of reporting (e.g., perceived peer norms and own behaviors) then it could be a serious source of bias. Future research could address this by using objective measures of biological outcomes associated with sexual activity (Hewett et al., 2008; Minnis et al., 2009). Additionally, rather than relying on respondents' reports of their perceptions of their friends' attitudes about sexual activity, a social network approach could be used to link to each respondent data from individuals who she or he identified as friends (Maxwell, 2001; Sieving, Eisenberg, Pettingill, & Skay, 2006). Such data would provide more compelling evidence that the associations between peer context and sexual activity variables are attributable to a causal effect of the former on the latter, rather than to reverse causation or confounding.

Another important limitation is the potential for associations reported here to be attributable to the confounding influences of omitted variables. Although we controlled for a number of potential confounding variables in our analyses, we may have omitted others either because we did not measure them in this study or because we neglected consider their potential confounding influence on the associations under study here. Plausibly, for example, individual adolescents may vary in the extent to which they are interested in sex, and these differences may influence both adolescents' likelihood of becoming sexually active or having multiple partners, as well as the types of peers with whom they tend to affiliate. But sex drive was not measured in this study and therefore cannot be included as a control variable in our regression models. If so, then the associations reported here may be attributable, in whole or in part, to omitted variable bias. The use of a prospective design reduces but does not eliminate this possibility.

Finally, our work is limited to adolescents originally residing in two towns in southeastern Ghana. Our sample is representative of adolescents in those towns, and those towns seem typical of periurban communities in this part of Ghana. Caution should be exercised, however, in generalizing our results to rural or large-scale urban settings in southeastern Ghana, to other parts of Ghana, or to the sub-Saharan Africa region as a whole.

The main policy implication of our findings is that some peer-related components of adolescent sexual and reproductive health interventions that have proven effective in the United States may have limited utility in sub-Saharan Africa. Specifically, some programs in the United States mobilize popular or socially influential young people to promote norms

discouraging sexual activity (Basen-Engquist et al., 2001; Sikkema et al., 2005). In our study sites, however, most respondents already report that the norms among their peers proscribe adolescent sexual activity. There may be little benefit to interventions that further reinforce these norms. There may, however, be a minority of young people, especially boys, in whose social networks sexual activity is celebrated rather than censured. Programs that target such adolescents with interventions that teach skills for resisting peer pressure (Jemmott et al., 1998) may represent a better use of prevention resources than programs that provide the same skills to more general adolescent populations in this region, many of whom appear to experience little peer pressure to have sex, and who would therefore have limited use for resistance skills.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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References

- Allison, P. *Missing Data*. Thousand Oaks, CA: Sage; 2002.
- Ampofo AA. "When men speak women listen": Gender socialization and young adolescents' attitudes to sexual and reproductive issues. *African Journal of Reproductive Health*. 2001; 5(3):196–212. [PubMed: 12471941]
- Anarfi, J. Sexual networking in selected communities in Ghana and the sexual behaviour of Ghanaian female migrants in Abidjan, Cte D'Ivoire. In: Dyson, T., editor. *Sexual Behaviour and Networking: Anthropological and Sociocultural Studies on the Transmission of HIV*. Liege: Editions Derouaux-Ordina; 1992. p. 233-247.
- Arnett, JJ. *Adolescence and emerging adulthood: A cultural approach*. Upper Saddle River, NJ: Prentice-Hall; 2001.
- Atwood KA, Kennedy SB, Shamblen S, Tegli J, Garber S, Fahnbulleh PW, Korvah PM, Kolubah M, Mulbah-Kamara C, Fulton S. Impact of school-based HIV prevention program in post-conflict Liberia. *AIDS Education and Prevention*. 2012; 24:68–77. [PubMed: 22339146]
- Babalola S. Perceived peer behavior and the timing of sexual debut in Rwanda: A survival analysis of youth data. *Journal of Youth and Adolescence*. 2004; 33:353–363.
- Babalola S, Tambashe BO, Vondrasek C. Parental factors and sexual risk-taking among young people in Côte d'Ivoire. *African Journal of Reproductive Health*. 2005; 9(1):49–65. [PubMed: 16104655]
- Bajaj M. Sugar daddies and the danger of sugar: Cross-generational relationships, HIV/AIDS, and secondary schooling in Zambia. *International Perspectives on Education and Society*. 2009; 10:123–143.
- Basen-Engquist K, Coyle KK, Parcel GS, Kirby D, Banspach SW, Carvajal SC, Baumler E. Schoolwide effects of a multicomponent HIV, STD, and pregnancy prevention program for high school students. *Health Education and Behavior*. 2001; 28:166–185. [PubMed: 11265827]
- Basen-Engquist K, Mâsse LC, Coyle K, Kirby D, Parcel GS, Banspach S, Nodora J. Validity of scales measuring the psychosocial determinants of HIV/STD-related risk behaviors in adolescents. *Health Education Research*. 1999; 14:25–38. [PubMed: 10537945]

- Bearinger LH, Sieving RE, Ferguson J, Sharma V. Global perspectives on the sexual and reproductive health of adolescents: Patterns, prevention, and potential. *Lancet*. 2007; 369:1220–1231. [PubMed: 17416266]
- Bersamin MM, Walker S, Fisher DA, Grube JW. Correlates of oral sex and vaginal intercourse in early and middle adolescence. *Journal of Research on Adolescence*. 2006; 16:59–68. [PubMed: 17710195]
- Biddlecom A, Awusabo-Asare K, Bankole A. Role of parents in sexual activity and contraceptive use in four African countries. *International Perspectives in Sexual and Reproductive Health*. 2009; 35:72–81.
- Billy JO, Udry JR. The influence of male and female best friends on adolescent sexual behavior. *Adolescence*. 1985; 20:21–32. [PubMed: 3984808]
- Bledsoe, CH.; Cohen, C. Social dynamics of adolescent fertility in sub-Saharan Africa. Washington, DC: National Academy Press; 1993.
- Blum RW. Youth in sub-Saharan Africa. *Journal of Adolescent Health*. 2007; 41:230–238. [PubMed: 17707292]
- Capaldi DM, Stoolmiller M, Clark S, Owen LD. Heterosexual risk behaviors in at-risk young men from early adolescence to young adulthood: Prevalence, prediction, and association with STD contraction. *Developmental Psychology*. 2002; 38:394–406. [PubMed: 12005382]
- Carvajal SC, Parcel GS, Basen-Engquist K, Banspach SW, Coyle KK, Kirby D, Chan W. Psychosocial predictors of delay of first sexual intercourse by adolescents. *Health Psychology*. 1999; 18:433–452.
- Cavanagh SE. The sexual debut of girls in early adolescence: The intersection of race, pubertal timing, and friendship group characteristics. *Journal of Research on Adolescence*. 2004; 14:285–312.
- Clark S, Poulin M, Kohler H. Marital aspirations, sexual behaviors, and HIV/AIDS in rural Malawi. *Journal of Marriage and Family*. 2009; 71(2):396–416. [PubMed: 20161389]
- Coates TJ, Richter L, Caceres C. Behavioural strategies to reduce HIV transmission: How to make them work better. *Lancet*. 2008; 372:669–684. [PubMed: 18687459]
- Decosas JF. HIV and development. *AIDS*. 1996; 10(Suppl. 3):S69–S74. [PubMed: 8970714]
- Dehne, K.; Riedner, G. Sexually Transmitted Infections among Adolescents: The Need for Adequate Health Services. Geneva: World Health Organization and Deutsche Gesellschaft fuer Technische Zusammenarbeit; 2005.
- Dimbuene ZT, Defo BK. Risky sexual behaviour among unmarried young people in Cameroon: Another look at family environment. *Journal of Biosocial Science*. 2011; 43:129–153. [PubMed: 21134307]
- Donovan JE, Jessor R. Structure of problem behavior in adolescence and young adulthood. *Journal of Consulting and Clinical Psychology*. 1985; 53:890–904. [PubMed: 4086689]
- Donovan JE, Jessor R, Costa FM. Syndrome of problem behavior in adolescence: A replication. *Journal of Consulting and Clinical Psychology*. 1988; 56:762–765. [PubMed: 3192793]
- Enders, CK. *Applied Missing Data Analysis*. New York: Guildford Press; 2010.
- Gallant M, Maticka-Tyndale E. School-based HIV prevention programs for African youth. *Social Science and Medicine*. 2004; 58:1337–1351. [PubMed: 14759680]
- Ghana Statistical Service (GSS), Ghana Health Service (GHS), & IFC Macro. *Ghana Demographic and Health Survey 2008*. Accra, Ghana: GSS, GHS, and IFC Macro; 2009.
- Glynn JR, Caraël M, Avert B, Kahindo M, Chege J, Musonda R, Kaona F, Buvé A. the Study Group on the Heterogeneity of HIV Epidemics in African Cities. Why do young women have a much higher prevalence of HIV than young men? A study in Kisumu, Kenya and Ndola, Zambia. *AIDS*. 2001; 15:S52–S60.
- Gouws E, Stannecki KA, Lyerla R, Ghys PD. The epidemiology of HIV infection among young people aged 15–24 years in southern Africa. *AIDS*. 2008; 22:S5–S16. [PubMed: 19033755]
- Haddad LB, Nour NM. Unsafe abortion: Unnecessary maternal mortality. *Reviews in Obstetrics and Gynecology*. 2009; 2(2):122–126. [PubMed: 19609407]
- Harrison A. Hidden love: Sexual ideologies and relationship ideals among rural South African adolescents in the context of HIV/AIDS. *Culture, Health, and Sexuality*. 2008; 10:175–189.

- Hewett PC, Mensch BS, Ribeiro MCS, Jones HE, Lippman SA, Montgomery MR, van de Wijgert JHHM. Using sexually transmitted infection biomarkers to validate reporting of sexual behavior within a randomized, experimental evaluation of interviewing methods. *American Journal of Epidemiology*. 2008; 168:202–211. [PubMed: 18525081]
- Hill K, Thomas K, AbouZhar C, Walker N, Say L, Inoue M, Suzuki E. on behalf of the Maternal Mortality Working Group. Estimates of maternal mortality worldwide between 1990 and 2005: An assessment of available data. *Lancet*. 2007; 370(9595):1311–1319. [PubMed: 17933645]
- Hindin MJ, Fatusi AO. Adolescent sexual and reproductive health in developing countries: An overview of trends and interventions. *International Perspectives in Sexual and Reproductive Health*. 2009; 35:58–62.
- Huizinga D, Esbensen F, Weiher AW. Are there multiple paths to delinquency? *Journal of Criminal Law and Criminology*. 1991; 82:83–118.
- Jemmott JB, Jemmott LS, Fong GT. Abstinence and safer sex HIV risk-reduction interventions for African American adolescents: A randomized controlled trial. *JAMA*. 1998; 279:1529–1536. [PubMed: 9605896]
- Joint United Nations Programme on HIV/AIDS (UNAIDS). *HIV/AIDS and Young people: Hope for Tomorrow*. Geneva: UNAIDS; 2003.
- Report on the Global AIDS Epidemic 2013; Joint United Nation Program on HIV/AIDS (UNAIDS); Geneva: UNAIDS; 2013.
- Kapadia F, Frye V, Bonner S, Emmanuel PJ, Samples CL, Latka MH. Perceived peer safer sex norms and sexual risk behaviors among substance-using Latino adolescents. *AIDS Education and Prevention*. 2012; 24:27–40. [PubMed: 22339143]
- Karim AM, Magnani RJ, Morgan GT, Bond KC. Reproductive health risk and protective factors among unmarried youth in Ghana. *International Family Planning Perspectives*. 2003; 29:14–24. [PubMed: 12709308]
- Kinsman SB, Romer D, Furstenburg FF, Schwarz DF. Early sexual initiation: The role of peer norms. *Pediatrics*. 1998; 102:1185–1192. [PubMed: 9794952]
- Kiragu K, Zabin LS. The correlates of premarital sexual activity among school-age adolescents in Kenya. *International Family Planning Perspectives*. 1993; 19:92–97. 109.
- Kirby D. Antecedents of adolescent initiation of sex, contraceptive use, and pregnancy. *American Journal of Health Behavior*. 2002; 26:473–485. [PubMed: 12437022]
- Kumi-Kyereme, A.; Awusabo-Asare, K.; Biddlecom, A. *Adolescents' Sexual and Reproductive Health: Qualitative Evidence from Ghana*. New York: Guttmacher Institute; 2007. Occasional Report No. 30
- Kumi-Kyereme A, Awusabo-Asare K, Biddlecom A, Tanle A. Influence of social connectedness, communication and monitoring on adolescent sexual activity in Ghana. *African Journal of Reproductive Health*. 2007; 11:133–147. [PubMed: 20698062]
- Lam D, Marteleto LJ, Ranchhod V. The influence of older classmates on adolescent sexual behavior in Cape Town, South Africa. *Studies in Family Planning*. 2013; 44(2):147–167. [PubMed: 23720000]
- Lazano R, Naghavi M, Foreman K, et al. Global and regional mortality from 235 causes of death for 20 age groups in 1990 and 2010: A systematic analysis for the Global Burden of Disease Study 2010. *Lancet*. 2012; 380(9859):2095–2128. [PubMed: 23245604]
- Leatherdale ST, Cameron R, Brown KS, Jolin M, Kroeker C. The influence of friends, family, and older peers on smoking among elementary school students: Low risk students in high risk schools. *Preventive Medicine*. 2006; 42:218–222. [PubMed: 16406509]
- Little, RJA.; Rubin, DB. *Statistical Analysis with Missing Data*. New York: Wiley; 1987.
- Luke N. Age and economic asymmetries in the sexual relationships of adolescent girls in sub-Saharan Africa. *Studies in Family Planning*. 2003; 34:67–86. [PubMed: 12889340]
- Magnani RJ, Karim AM, Weiss LA, Bond KC, Lemba M, Morgan GT. Reproductive health risk and protective factors among youth in Lusaka, Zambia. *Journal of Adolescent Health*. 2002; 30:76–86. [PubMed: 11755804]

- Maguen S, Armistead L. Abstinence among female adolescents: Do parents matter above and beyond the influence of peers? *American Journal of Orthopsychiatry*. 2006; 76:260–264. [PubMed: 16719645]
- Mason-Jones AJ, Mathews C, Flisher AJ. Can peer education make a difference? Evaluation of a South African adolescent peer education program to promote sexual and reproductive health. *AIDS and Behavior*. 2011; 15:1605–1611. [PubMed: 21809049]
- Mathews C, Aarø LE, Flisher AJ, Mukoma W, Wubs AG, Schaalma H. Predictors of early first sexual intercourse among adolescents in Cape Town, South Africa. *Health Education Research*. 2009; 24:1–10. [PubMed: 18203683]
- Maxwell KA. Friends: The role of peer influence across adolescent risk behaviors. *Journal of Youth and Adolescence*. 2001; 31:267–277.
- Mensch BS, Soler-Hampejsek E, Kelly CA, Hewett PC, Grant MJ. Challenges in measuring the sequencing of life events among adolescents in Malawi: A cautionary note. *Demography*. 2014; 51(1):277–285. [PubMed: 24399140]
- Michielsen K, Chersich MF, Luchters S, De Koker P, Van Rossem R, Temmerman M. Effectiveness of HIV prevention for youth in sub-Saharan Africa: Systematic review and meta-analysis of randomized and non-randomized trials. *AIDS*. 2010; 24:1193–1202. [PubMed: 20375876]
- Miller BC, Norton MC, Curtis T, Hill EJ, Schvaneveldt P, Young MH. The timing of sexual intercourse among adolescents: Family, peer, and other antecedents. *Youth and Society*. 1997; 29:54–83.
- Minnis AM, Steiner MJ, Gallo MF, Warner L, Hobbs MM, van der Straten A, Chipato T, Macaluso M, Padian NS. Biomarker validation of reports of recent sexual activity: Results of a randomized controlled study in Zimbabwe. *American Journal of Epidemiology*. 2009; 170:918–924. [PubMed: 19741042]
- Moore AM, Biddlecom AE, Zulu EM. Prevalence and meanings of exchange of money or gifts for sex in unmarried adolescent sexual relationships in sub-Saharan Africa. *African Journal of Reproductive Health*. 2007; 11(3):44–61. [PubMed: 18458736]
- National AIDS/STI Control Programme. National HIV Prevalence and AIDS Estimates Report, 2012–2016. Accra: Ghana Health Service; 2013.
- Nnko S, Boerma JT, Urassa M, Mwaluko G, Zaba B. Secretive females and swaggering males? An assessment of the quality of sexual partnership reporting in rural Tanzania. *Social Science and Medicine*. 2004; 59:299–310. [PubMed: 15110421]
- Olukoya AA, Kaya A, Ferguson BJ, AbouZhar C. Unsafe abortion in adolescents. *International Journal of Gynecology and Obstetrics*. 2001; 75(2):137–147. [PubMed: 11684109]
- Patton GC, Coffey C, Sawyer SM, Viner RM, Haller DM, Bose K, Vos T, Ferguson J, Mathers CD. Global patterns of mortality in young people: A systematic analysis of population health data. *Lancet*. 2009; 74(9693):881–892. [PubMed: 19748397]
- Plummer ML, Ross DA, Wright D, Changalucha J, Mshana G, Wamoyi J, Todd J, Anemona A, Moshia FF, Obasi AIN, Hayes RJ. “A bit more truthful”: The validity of adolescent sexual behaviour data collected in northern Tanzania using five methods. *Sexually Transmitted Infections*. 2004; 80:ii49–ii56. [PubMed: 15572640]
- Puffer ES, Meade CS, Drabkin AS, Broverman SA, Ogwang-Odhiambo RA, Sikkema KJ. Individual- and family-level psychosocial correlates of HIV risk behavior among youth in rural Kenya. *AIDS and Behavior*. 2011; 15:1264–1274. [PubMed: 20945157]
- Rai AA, Stanton B, Wu Y, Li X, Galbraith J, Cottrell L, Pack R, Harris C, D’Alessandri D, Burns J. Relative influences of perceived parental monitoring and perceived peer involvement on adolescent risk behaviors: An analysis of six cross-sectional data sets. *Journal of Adolescent Health*. 2003; 33:108–118. [PubMed: 12890602]
- Romer D, Black M, Ricardo I, Feigelman S, Kaljee L, Galbriath J, Nesbit R, Hornik RC, Stanton B. Social influences on the sexual behavior of youth at risk for HIV exposure. *American Journal of Public Health*. 1994; 84:977–985. [PubMed: 8203696]
- Ross DA, Changalucha J, Obasi AIN, Todd J, Plummer ML, Cleophas-Mazige B, Anemona A, Everett D, Weiss HA, Mabey DC, Grosskurth H, Hayes RJ. Biological and behavioural impact of an

- adolescent sexual health intervention in Tanzania: A community-randomized trial. *AIDS*. 2007; 21:1943–1955. [PubMed: 17721102]
- Royston P. Multiple imputation of missing values. *Stata Journal*. 2004; 4:227–241.
- Rutstein, SO.; Johnson, K. The DHS Wealth Index. Calverton, MD: ORC Macro; 2004. DHS Comparative Report No. 6
- Santelli JS, Kaiser J, Hirsch L, Radosh A, Simkin L, Middlestadt S. Initiation of sexual intercourse among middle school adolescents: The influence of psychosocial factors. *Journal of Adolescent Health*. 2004; 34:100–208.
- Sauvé N, Dzokoto A, Opere B, Kaitoo EE, Khonde N, Mondor M, Bekoe V, Pépin J. The price of development: HIV infection in a semiurban community of Ghana. *JAIDS*. 2002; 20(4):402–408. [PubMed: 11917246]
- Selikow T, Ahmed N, Flisher AJ, Mathews C, Mukoma W. I am not “umqwayito”: A qualitative study of peer pressure and sexual risk behaviour among young adolescents in Cape Town, South Africa. *Scandinavian Journal of Public Health*. 2009; 37:107–112. [PubMed: 19493988]
- Shah IH, Åhman E. Unsafe abortion differentials in 2008 by age and developing country region: High burden among young women. *Reproductive Health Matters*. 2012; 20(39):169–173. [PubMed: 22789095]
- Siemer J, Theile O, Larbi Y, et al. Chlamydia trachomatis infection as a risk factor for infertility among women in Ghana, West Africa. *American Journal of Tropical Medicine and Hygiene*. 2008; 78(2):323–327. [PubMed: 18256439]
- Sieving RE, Eisenberg ME, Pettingill S, Skay C. Friends’ influence on adolescents’ first sexual intercourse. *Perspectives in Sexual and Reproductive Health*. 2006; 38:13–19.
- Sikkema KJ, Anderson ES, Kelly JA, Winett RA, Gore-Felton C, Roffman RA, Heckman TG, Graves K, Hoffmann RG, Brondino MJ. Outcomes of a randomized, controlled community-level HIV prevention intervention for adolescents in low-income housing developments. *AIDS*. 2005; 19:1509–1516. [PubMed: 16135905]
- Silberschmidt M, Rasch V. Adolescent girls, illegal abortions, and ‘sugar daddies’ in Dar es Salaam: Vulnerable victims and active social agents. *Social Science and Medicine*. 2001; 52(12):1815–1826. [PubMed: 11352408]
- Simoni JM, Nelson KM, Franks JC, Yard SS, Lehavot K. Are peer interventions for HIV efficacious? A systematic review. *AIDS and Behavior*. 2011; 15:1589–1595. [PubMed: 21598034]
- Smetana JG, Campione-Barr N, Metzger A. Adolescent development in interpersonal and social contexts. *Annual Review of Psychology*. 2006; 57:255–284.
- Smith DJ. Youth, sin, and sex in Nigeria: Christianity and HIV/AIDS-related beliefs and behaviour among rural-urban migrants. *Culture, Health, and Sexuality*. 2004; 6:425–437.
- Stone J, Cooper J. A self-standards model of cognitive dissonance. *Journal of Experimental Social Psychology*. 2001; 37:228–243.
- United Nations Population Fund (UNFPA). HIV Interventions for Young People. Interagency Task Team on HIV and Young People. New York: UNFPA; 2008.
- United Nations Population Fund (UNFPA). State of the World Population 2013: Motherhood in Childhood. New York: UNFPA; 2013.
- United Nations Children’s Fund (UNICEF). Towards an AIDS-free generation: Children and AIDS sixth stocktaking report, 2013. New York: UNICEF; 2013.
- van de Bongardt D, Reitz E, Sandfort T, Dekovic J. A meta-analysis of the relations between three types of peer norms and adolescent sexual behavior. *Personality and Social Psychology Review*. 2014:1–32.
- Wamoyi J, Fenwick A, Urassa M, Stones W. Parental control and monitoring of young people’s sexual behaviour in rural North-Western Tanzania: Implications for sexual and reproductive health interventions. *BMC Public Health*. 2011; 11:106. [PubMed: 21324171]
- Wamoyi J, Wight D, Plummer M, Mshana GH, Ross D. Transactional sex amongst young people in rural northern Tanzania: An ethnography of young women’s motivations and negotiation. *Reproductive Health*. 2010; 7:2. [PubMed: 20429913]
- Whitbeck LB, Yoder KA, Hoyt DR, Conger RD. Early adolescent sexual activity: A developmental study. *Journal of Marriage and the Family*. 1999; 61:934–946.

- White IR, Royston P, Wood AM. Multiple imputation using chained equations: Issues and guidance for practice. *Statistics in Medicine*. 2011; 30:377–399. [PubMed: 21225900]
- Wight D, Plummer ML, Mshana G, Wamoyi J, Shigongo ZS, Ross DA. Contradictory sexual norms and expectations for young people in rural Northern Tanzania. *Social Science and Medicine*. 2006; 62:987–997. [PubMed: 16139937]
- World Health Organization (WHO). *Global Prevalence and Incidence of Selected Curable Sexually Transmitted Infections: Overview and Estimates*. Geneva: WHO; 2001.
- World Health Organization (WHO). *Unsafe Abortion: Global and Regional Estimates of the Incidence of Unsafe Abortion and Associated Mortality in 2008*. Geneva: WHO; 2011.
- Zwang J, Garenne M. Social context of premarital fertility in rural South Africa. *African Journal of Reproductive Health*. 2008; 12(2):98–110. [PubMed: 20695045]

Table 1

Description of Sample

	Girls (n=700)	Boys (n=575)	Total (n=1275)
Community of Residence (%)			
Low HIV prevalence	49.1	47.8	48.6
High HIV prevalence	50.9	52.2	51.5
Cohort (%)**			
Younger (13–14)	60.1	51.8	56.4
Older (18–19)	39.9	48.2	43.6
School Status (%)*			
Not in school	23.3	19.1	21.4
In school	76.7	80.9	78.6
Highest Schooling (%)			
None or Primary	57.0	55.7	56.4
JSS	31.4	31.7	31.5
SSS	11.6	12.7	12.1
Living Situation (%)***			
Both Biological Parents	25.3	32.2	28.4
Mother only	26.1	23.3	24.9
Father only	3.7	8.9	6.0
No Family Adult	15.0	13.7	14.4
Extended Family Adult(s)	28.9	20.9	25.3
Other	1.0	1.0	1.0
Household Wealth (Mean [SD])	0.46 [0.21]	0.45 [0.21]	0.46 [0.21]
Completed Wave 2 Interview (%)	93.7	95.7	94.6

*
p<0.05**
p<0.01***
p<0.001.

Table 2
Gender, Cohort and Community Comparisons of Peer Context and Sexual Behavior Variables

	Marginal Means and Percentages							
	Overall	Gender and Cohort				Town		
		Younger Female	Younger Male	Older Female	Older Male	Low HIV	High HIV	
Number of Friends (Mean [SD]) ^a	4.01 [3.19]	3.21	4.71	3.61	4.89	3.97	4.05	
At Least One Opposite Sex Friend (%) ^{a,b}	31.3	19.6	26.6	43.1	42.4	32.1	30.7	
Perceived Sexually Active Friends (%) ^{b,c,d}								
None	59.4	81.6	80.2	25.7	35.7	62.6	55.7	
Some	27.2	15.1	16.1	43.4	42.4	25.9	28.9	
All	13.4	3.3	3.7	30.9	21.9	11.5	15.4	
Affiliation with Antisocial Peers (Mean [SD]) ^{a,b,d}	1.33 [0.30]	1.28	1.35	1.33	1.37	1.35	1.30	
Perceived Peer Norms Favoring Sex (Mean [SD]) ^{a,b}	1.33 [0.35]	1.15	1.23	1.49	1.54	1.32	1.34	
Sexual Initiation Between Waves (%)								
(A) Already Initiated at Wave 1	21.8	4.7	3.1	52.6	36.1	17.3	25.7	
(B) Not Initiated at Wave 2	65.2	85.0	92.9	26.4	44.8	70.3	60.6	
(C) Initiated Between Wave 1 and Wave 2	13.0	10.3	4.1	20.9	19.1	12.4	13.7	
100*(C/(B+C)) ^{a,b,d}	16.6	4.8	4.2	44.2	29.9	15.0	18.4	
Multiple New Partners Between Waves (%) ^{b,d}	7.3	3.4	1.9	13.0	12.7	5.3	9.0	

^a Statistically significant sex difference at the 0.05 level.

^b Statistically significant cohort difference at the 0.05 level.

^c Statistically significant sex-by-cohort difference at the 0.05 level.

^d Statistically significant community difference at the 0.05 level.

Table 3

Relative Risk Ratios and Adjusted Relative Risk Ratios from Multinomial Logistic Regression Models of Sexual Initiation between Waves 1 and 2

	Bivariate	With Controls	Full Multivariate
Number of Friends	1.02	1.06	0.98
Any Opposite Sex Friends (vs. None)	1.61*	1.24	1.01
Affiliation with Antisocial Peers	1.20*	1.44**	1.24
Perceived Peer Norms Favoring Sex	2.20***	1.81***	1.67***
Male (vs. Female)			0.42***
Age			1.36***
High (vs. Low) Prevalence Town			1.69**
In (vs. Out of) School			0.57*
Educational Attainment (vs. None or Primary)			
Junior Secondary School			1.19
Senior Secondary School or More			1.88
Household Composition (vs. Both Parents)			
Mother Only			1.45
Father Only			0.88
No Family Adult			2.59**
Extended Family Adult			1.98*
Other			1.90
Household Wealth			0.55

Note: “With Controls” refers to four models containing one peer context variable each, plus sociodemographic controls, and Full Multivariate refers to a single model including all four peer context variables and sociodemographic controls. Risk ratios presented here contrast respondents who initiated sexual activity between Waves 1 and 2 with those who reported being sexually inexperienced at both Waves; we omit risk ratios from the equation comparing respondents who were already sexually experienced at Wave 1 with those who reported being sexually inexperienced at both Waves.

* p<0.05

** p<0.01

*** p<0.001.

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Table 4

Odds Ratios and Adjusted Odds Ratios from Logistic Regression Models Predicting Multiple New Sexual Partners Between Waves

	Bivariate	With Controls	Full Multivariate
Number of Friends			
For Younger Cohort	1.19**	1.20**	1.18*
For Older Cohort	1.03	1.03	1.03
Any Opposite Sex Friends (vs. None)	1.81*	1.29	0.98
Affiliation with Antisocial Peers			
For Younger Cohort	1.56	1.58*	1.13
For Older Cohort	0.99	0.96	0.78
Perceived Peer Norms Favoring Sex			
For Females	1.76***	1.20	1.21
For Males	2.23***	1.79***	1.85***
Male (vs. Female)			0.54*
Age			1.93***
High (vs. Low) Prevalence Town			1.76*
In (vs. Out of) School			0.85
Educational Attainment (vs. None or Primary)			
Junior Secondary School			0.72
Senior Secondary School or More			0.56
Household Composition (vs. Both Parents)			
Mother Only			1.09
Father Only			1.02
No Family Adult			0.81
Extended Family Adult			1.28
Other			0.83
Household Wealth			0.77

Note: "With Controls" refers to four models containing one peer context variable each, plus sociodemographic controls, and Full Multivariate refers to a single model including all four peer context variables and sociodemographic controls. All models included interactions between Number of Friends and Cohort, Affiliation with Antisocial Peers and Cohort, and Perceived Peer Norms Favoring Sex and Gender.

* p<0.05

** p<0.01

*** p<0.001.