The Peer Group Context of Sexual Behaviors among Ghanaian Youth

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ABSTRACT

Little is known about the influences of friends and peers on the sexual and condom use behaviors of youth in sub-Saharan Africa. Using longitudinal survey data from two towns in southeastern Ghana, we examine the associations of several peer group characteristics with self-reported sexual activity among youth. In cross-sectional and longitudinal analyses, we find that having opposite friends, perceiving that some or all of one's friends are sexually active, affiliating with prosocial peers, affiliating with antisocial peers, perceiving that one's friends disapprove of sexual activity, and perceiving that one can gain the respect of peers through sexual activity are all strongly associated with sexual initiation and multiple partnerships for both girls and boys. None of these variables predicts condom use with first or most recent partners. Multivariate analyses suggest that it is not possible to disentangle the effects of these peer group characteristics from one another.

BACKGROUND

Research on the social contexts of adolescent sexual behaviors in sub-Saharan Africa remains underdeveloped. Certain aspects of this topic, such as the "sugar daddy" phenomenon, have been the subjects of voluminous literature (e.g., Bajaj, 2009; Machel, 2001; see Luke 2003 for a review). Others, such as the influences of household composition and parental monitoring on teenagers' 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; 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.

The paucity of research on peer influences on adolescent sexual behaviors in sub-Saharan Africa is regrettable. Sexual and reproductive health problems attributable to behaviors such as early initiation of sex, lack of condom or other contraceptive use, multiple partners, and high risk partners are widespread among adolescents in youth adults in the region (Bearinger, Sieving, Gerguson, & Sharma, 2007; Blum, 2007; Hindin & Fatusi, 2009). In many sub-Saharan African countries, HIV prevalence increases sharply between the ages of 15 and 25 years, especially among females (Glynn, Caraël, Auvert, Kahindo, Chege, et al., 2001; Gouws, Stanecki, Lyerla, & Ghys, 2008). In Ghana, where our own research is based, HIV prevalence stands at 2.6% and 0.5% among women and men aged 20 through 29 years (Ghana Statistical Service, Noguchi Memorial Institute for Medical Research, & ORC Macro, 2004). Nor is HIV the only reproductive health problem that may result from early sexual activity, multiple partners, high risk partnerships, and lack of condom use. Among sexually active 15- to 19-year-olds in Ghana,

29% of girls and 7% of boys reported having had a sexually transmitted infection (STI) or STI symptoms (Ghana Statistical Service, Ghana Health Service, & ICF Macro, 2009). And the World Health Organization estimates that, in sub-Saharan Africa, complications of unsafe induced abortions – many of which are performed on adolescent girls – lead to the deaths of over 34,000 women per year, accounting for 14% of all maternal deaths (WHO, 2007). The need for effective interventions to reduce behavioral risks for HIV, other STIs, and unwanted pregnancy among youth in sub-Saharan Africa is therefore widely recognized (UNAIDS, 2003; UNFPA, 2008; Coates, Richter, & Caceres, 2008).

Unfortunately, available evidence suggests that existing HIV, STI, and pregnancy prevention programs for youth in sub-Saharan Africa have not been highly effective. One recent systematic review and meta-analysis of 28 interventions with youth in sub-Saharan Africa (Michielsen, Chersich, Luchters, De Koker, Van Rossem, and Temmerman, 2010) found little evidence that programs reduced sexual activity among participants. Moreover, the authors of this review found no direct evidence at all for program effects on HIV incidence, and inconsistent evidence for increases in condom use (Michielsen, Chersich, Luchters, De Koker, Van Rossem, and Temmerman, 2010; see Gallant & Maticka-Tyndale, 2004, for a more detailed review of school-based HIV risk reduction interventions in sub-Saharan Africa). The reasons for these disappointing results are not entirely clear. One plausible explanation, however, is that some programs did not adequately address the most salient psychosocial or socio-ecological determinants of sexual and contraceptive behaviors among youth.

In general, interventions meant to reduce sexual risk behaviors among youth may be most effective when their design is based upon a clearly articulated and appropriate theory or logic model (Kirby, Laris, & Rolleri, 2007). Such a theory or logic model could include peer

influences of various types. Many evidence-based pregnancy and STI prevention programs for youth in the United States, for example, teach participants skills for resisting peer pressure (e.g., Jemmott, Jemmott, & Fong, 1998). Such an approach may be appropriate in settings where pressure from peers to be sexually active is a key driver of sexual activity among youth, but would make little sense in settings where such pressures are minimal or nonexistent. Other interventions with youth in the United States have mobilized popular or socially influential youth to promote positive norms related to sexuality and condom use (Basen-Engquist et al., 2001; Sikkema et al., 2005). This strategy would be well-suited to contexts in which existing social norms among adolescents glorify sexual activity or denigrate condom use, and in which those norms demonstrably influence the sexual or contraceptive use behaviors of individual youth. In the absence of concrete information on the nature and magnitude of peer influences on the sexual and contraceptive use behaviors of young people in sub-Saharan Africa, however, there is little basis for judging the suitability of these or other peer-related intervention strategies in those settings.

Peer Influences and Adolescent Sexual Behaviors in the United States

In contrast to sub-Saharan Africa, there is a robust body of research from the United States suggesting that, for teenagers there, friend and peer influences are important determinants of sexual risk behaviors. 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; Harris, 1998; Smetana, Campione-Barr, & Metzger, 2006). This pattern appears to characterize societies throughout the world, but in some cases applies

more to adolescent boys than girls (Schlegel & Barry, 1991). Although much of this literature has focused on behaviors other than sexual activity and contraceptive use, there is considerable evidence that these behaviors, too, may be subject to considerable friend and peer influence.

Among the most consistent findings in research on adolescent sexual behaviors in the United States is the strong statistical association between adolescents' self-reported sexual initiation and their perceptions of the sexual activity of their close friends. This association has been documented in numerous cross-sectional investigations (Benda & DiBlasio, 1994; Bersamin, Walker, Fisher, and Grube, 2006; Little & Rankin, 2001, Maguen & Armistead, 2006; Miller, Norton, Curtis, Hill, Schvaneveldt, & Young, 1997; Rai et al., 2003; Romer et al., 2004; Stanton et al., 1994; Whitaker & Miller, 2000). Of course, statistical associations such as these are subject to multiple interpretations. One important theme in the research on adolescent sexual behaviors in the United States, therefore, has been the extent to which such associations are attributable to peer influences, as opposed to selection and deselection processes in which adolescents form and dissolve friendships as a result of similarities and differences in behaviors, attitudes, and values. To some extent, analyses of longitudinal data can help to disentangle these processes. And in general the association between the perceived sexual activity of friends and young people's own self-reported sexual activity has held up in longitudinal studies (Billy and Udry, 1985; Kinsman, Romer, Furstenburg, & Schwarz, 1998; Stanton, Li, Pack, Cottrell, Harris, & Burns, 2002; Whitbeck, Conger, & Kao, 1993). Some studies have gone further, relying not upon respondents' perceptions of their friends' behaviors, but on designs in which respondents provide the names of their friends, and investigators then use the self-reported sexual behavior data obtained from those friends to predict, longitudinally, respondents' self-reported sexual activity (Maxwell, 2000; Sieving, Eisenberg, Pettingell, & Skay, 2006). These findings provide

stronger, albeit not indisputable, evidence that peer influences play some role in shaping adolescents' sexual behaviors in the United States.

Another important theme in this body of research has been the desire to identify more clearly how peer influences operate. That is, assuming that friends and peers do influence one another's sexual behavior, how is it exactly that those influences operate? Brown and Theobald (1999) identify four possible mechanisms: peer pressure, modeling, structuring opportunities, and setting and enforcing group norms. These processes are not mutually exclusive. In fact, they may be easier to differentiate conceptually than they are to distinguish empirically. In recent years, the bulk of research on peer influences and adolescent sexual behaviors in the United States has focused on perceived norms.

Investigators have employed two different approaches to measuring perceived norms. In one approach, youth are asked to report on the views of their friends regarding sexual activity. Carvajal and colleagues (1999), for example, asked high school students whether most of their friends believed that people of their age should postpone sex until they are older, and whether most of their friends believed it acceptable for people of their age to have sex. Controlling for age, sex, race/ethnicity, socioeconomic status, and other psychosocial factors, they found that youth who reported more restrictive attitudes toward sex among their friends were less likely to become sexually active between the two waves of this longitudinal study. Investigators have obtained similar findings in several other cross-sectional and longitudinal studies in the United States (Bersamin et al., 2006; DiIorio, Dudley, Kelly, Soet, Mbwara, & Potter, 2001; Little & Rankin, 2001; Maguen & Armistead, 2006; Marín, Coyle, Gómez, Carvajal, & Kirby, 2000; Santelli, Kaiser, Hirsch, Radosh, Simkin, & Middlestadt, 2004).

A second approach to measuring peer norms has focused on the perceived consequences of sexual activity for respect from one's friends. Kinsman, Romer, Furstenburg, and Schwartz (1998), for example, asked sixth grade students in Philadelphia what would happen if a girl or boy their own age had sex. Net of other factors, those who said that a boy's friends would respect him more were more likely, and those who said that a boy's friends would respect him less were less likely, than those who indicated that it would not affect his friends' respect, to report initiation of sexual activity between baseline and follow-up surveys. Other studies (e.g., Seiving et al., 2006) have confirmed the association between adolescents' reports of perceived social gains and losses of sex with their self-reported sexual behavior.

It remains unclear whether the two approaches – social gains and losses versus friends restrictive or permissive attitudes – are simply two ways of measuring the same thing; or, alternatively, whether they tap two distinct (though presumably correlated) aspects of the normative environments in which adolescents in the United States operate. In any case, a recent systematic review (Buhi & Goodson, 2007), concluded that perceived norms are "stable predictors" (p. 18) of adolescents sexual behaviors in this body of research.

Other investigators have moved beyond perceived norms to situate adolescent sexual risk behaviors within the broader framework of Problem Behavior Theory (Donovan & Jessor, 1985). In this approach, early or high-risk sexual activity among teenagers is seen as part of a "syndrome" of interrelated problem behaviors (also referred to as antisocial or deviant behaviors). Other behaviors in the syndrome include tobacco use, alcohol and other drug use, petty crime, school failure, and rejection of adult authority. These may, furthermore, be negatively correlated with conventional or prosocial behaviors such as church attendance and school achievement (Donovan, Jessor, & Costa, 1988). Accordingly, investigators studying peer

influences on adolescent sexual activity from this perspective have examined the associations with sexual activity of affiliation with antisocial peers, affiliation with prosocial peers or both. Capaldi, Crosby, and Stoolmiller (1996), for example, constructed an index of deviant peer association for participants in the Oregon Youth Study based upon parent, teacher, and child reports. They found that, controlling for several covariates, this index was positively associated with self-reported sexual activity. Others have likewise found indices of antisocial peer affiliation to be positively associated with adolescent sexual activity (Browning, Leventhal, & Brooks-Gunn, 2004; Capaldi, Stoolmiller, Clark, & Owen, 2002; Cavanagh, 2004; Whitbeck, Yoder, Hoyt, & Conger, 1999) or pregnancy status (Scaramella, Conger, Simons, Whitbeck, 1998). Some have also found indices or indicators of prosocial peer affiliation to be negatively associated with sexual activity among adolescents (e.g., Cavanagh, 2004). It is uncertain, however, whether affiliation with prosocial and antisocial peers are better predictors of adolescent sexual activity than peer norms or perceptions of friends' sexual activity.

Still other investigators have examined the associations with sexual activity of several structural or compositional aspects of teenagers' peer groups. The literature on these topics remains thin, however, and the findings have been inconsistent. Using data from the National Longitudinal Study of Adolescent Health, for example, Cavanagh (2004) found that having more friends predicted transition to first sex among white girls but not among Latinas, but that having older male friends was associated with this transition for Latina but not among white girls. Miller and colleagues (1997) found no effect on transition to first sex of having opposite sex friends or of having older friends in another national sample in the United States.

Peer Influences in Sub-Saharan Africa

By comparison to the United States, the literature on peer influences on adolescent sexual and contraceptive use behaviors in sub-Saharan Africa remains sparse. Nevertheless, some research on these topics has been done. Surveys have documented cross-sectional associations between between perceived peer behavior and self-reported sexual activity among youth in at least four countries: Ghana (Magnani, Morgan, and Bond, 2003), Kenya (Kiragu & Zabin, 1993), Rwanda (Babalola, 2004), and Zambia (Magnani et al., 2002). To date, however, we are aware of no longitudinal data linking friends' sexual activity (perceived or self-reported) to the initiation of sexual activity among youth in sub-Saharan Africa.

Likewise, very little survey research has addressed these issues of peer norms and adolescent sexual behaviors in sub-Saharan Africa. One study in Cape Town, South Africa, used the perceived restrictive attitudes of friends approach, but found that such perceptions had no influence on self-reported sexual activity once other variables were controlled (Mathews, Aarø, Flisher, Mukoma, Wubs, & Schaalma, 2009). Another study, based in Bamako, Mali, measured perceived peer norms related not to sexual activity but to condom use, and found that perceived peer norms favoring condom use were positively associated with self-reported condom use at last sex, and negatively associated with number of partners in the past six months (Boileau, Rashed, Sylla, & Zunzunegui, 2008).

Other investigators have studied the social normative context of adolescent sexuality in sub-Saharan Africa using qualitative methods. One team conducted ethnographic research in northern Tanzania; they reported that clear norms prescribing abstinence among in-school youth and valuing female sexual respectability were in potential conflict with other prevailing norms, including one linking male status to sexual experience (Wight, Plummer, Mshana, Wamoyi,

Shigongo, & Ross, 2006). In a multi-method qualitative study in KwaZulu/Natal, South Africa, Harrison (2008) found that sexual activity among teenagers was strongly disapproved of, especially for young teenage girls. Another qualitative study in Cape Town, South Africa, suggested that adolescent boys in particular may be pressured by their peers into sexual activity, and may derive status within peer groups through having multiple sexual partners. (Selikow, Ahmed, Flisher, Mathews, & Mukoma, 2009). And a mixed-methods study of youth and young adults in Nigeria emphasized the growing centrality of "born again" Christianity in framing ideologies about sexuality among young people there (Smith, 2004). These findings suggest that peer norms in sub-Saharan Africa may often favor sexual abstinence among unmarried teenagers, especially for younger teens and girls, but may be in conflict with norms valuing sexual activity within some male peer groups.

Finally, no studies we are aware of have addressed the topic of peer influences on adolescent sexual and contraceptive use behaviors using the pro- and antisocial peer associations approach of Problem Behavior Theory. And only one study we are aware of has addressed the effects of structural or compositional aspects of teenagers' peer groups on sexual and contraceptive use behaviors among youth in sub-Saharan Africa: Magnani and colleagues (2002) found that, among unmarried youth in Lusaka, Zambia, having more friends was associated with reporting a larger number of lifetime sexual partners among boys but not girls. Having more friends was also associated with a small increase in the frequency of condom use among sexually experienced boys, but a small decrease in the frequency of condom use among sexually experienced girls.

The purpose of the current study, therefore, is to add to this small body of research on peer influences and adolescent sexual risk behaviors in sub-Saharan Africa. Drawing on two

waves of survey data from youth originally residing in two market towns in southeastern Ghana, we adopt all of the major approaches that have been used in the literature on the same topic in the United States: The size and composition of adolescents' friendship groups, perceived prevalence of sexual activity among adolescents' friends, perceived restrictive versus permissive peer attitudes, perceived status gains or losses among friends from sexual activity, affiliation with prosocial peers, and affiliation with antisocial peers. We examine cross-sectional and longitudinal associations between each of these variables and several important aspects of sexual risk behavior: transition to first sex, number of sexual partners, and lack of condom use. Because the limited evidence available for sub-Saharan Africa suggests that norms and peer influences may vary by gender, we conduct separate analyses for female and male youth. We then discuss the implications of our findings for the suitability of alternative peer-related intervention strategies in this setting.

METHODS

Sample and Participants

The data for this study come from the first and second waves of a longitudinal cohorts study dealing with the social contexts of adolescent sexual and reproductive health in two towns in southeastern Ghana. Both communities are market towns along a major road connecting Ghana's capital, Accra, with the capital of Volta region. Each has a population of just under 15,000 according to the 2000 census. The towns differ, however, in the prevalence of HIV. One is located within a district that has suffered a severe localized HIV epidemic, believed to be

driven at least in part by circular migration of young women from this community to Abidjan, the capital of neighboring Cote D'Ivoire, during the 1990s. The other town, just 40km away, is in a district that has seen virtually no cases of HIV in sentinel surveillance at prenatal clinics.

In the summer of 2010 a team of field workers from the Institute for Statistical, Social, and Economic Research at the University of Ghana visited all dwelling structures in both communities and compiled a list of eligible youth. Unmarried girls and boys age 13-14 years (the younger cohort) or 18-19 years (the older cohort) were eligible. A simple random sample of youth was drawn from this list, and interviewers then attempted to recruit the youth according to a protocol that was approved by Institutional Review Boards at the George Washington University and the Noguchi Memorial Institute for Medical Research at the University of Ghana. In total, 1,275 youth agreed to participate and were interviewed, for a response rate of 75%. Interviews were conducted in a mixture of English and Ghanaian languages at interviewing centers established by the field teams in the two study sites. In the winter of 2012 field teams attempted to contact all youth who had participated at Wave 1, and succeeded in conducted Wave 2 interviews with 1,206, for a follow-up rate of 95%. Select sociodemographic characteristics of the sample are shown, by sex, in Table 1.

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, perhaps reflecting a combination of out-migration by older girls and ineligibility of older girls due to marriage. 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.

Measures of Independent Variables

The independent variables for this study are aspects of peer group contexts assessed during Wave 1 interviews. After answering questions about their sociodemographic background and relations with family and other adults in their lives, participants were asked, "How many friends would you say you have?" Responses were recorded as zero (coded 0), one (coded 1), two (coded 2), three or four (coded 3.5), five to seven (coded 6), eight to ten (coded 9), and eleven or more (coded 12). The resulting variable we refer to as *Number of Friends*. Next, those reported having at least one friend were asked how many of their friends were girls and boys. On the basis of responses we derived a dichotomous indicator of *Opposite Sex Friends*.

In order to assess *Affiliation with Prosocial Peers* and *Affiliation with Antisocial Peers*, we used a battery of 14 questions adapted from an existing instrument (Huizinga, Esbensen, & Weihar, 1991). Each question began, "Over the past year, how many of your friends have…?" Six of the items assessed prosocial behaviors (regularly attendance of religious services, honesty, good relations with family adults, helping someone in need, school attendance, and good relations with non-family adults); eight assessed antisocial behaviors (being in trouble at home, being in trouble at school or work, disobeying adults, talking back to adults, theft from a family member, theft from a non-family member, getting drunk, and using drugs). In each case, response options were "none of them" (coded 1), "some of them (coded 2), "all of them" (coded 3), and "don't know" (coded missing and subsequently imputed). We took the average of the six prosocial items as our affiliation with prosocial peers scale, and the average of the eight

antisocial items as our affiliation with antisocial peers scale. These had Cronbach's alpha coefficients of internal consistency of 0.72 and 0.75, respectively.

Following these question, respondents were asked, "Over the past year, how many of your friends have had sex?" Again, the response options were "none of them" (coded 1), "some of them" (coded 2), "all of them" (coded 3), and "don't know" (coded missing and subsequently imputed). The resulting variable we term *Sexually Active Friends*.

Our measure of *Perceived Friend Disapproval of Sex* is based upon five questionnaire items modeled on those of Basen-Engquist and her colleagues (1999). A sample item read, "How many of your friends believe that boys/girls should wait until they get married to have sex?" The response options were "none of them" (coded 1), "some of them" (coded 2), "all of them" (coded 3), and "don't know" (coded missing and subsequently imputed). We took the mean of the five items (after reverse coding negatively worded items) to form the scale score. The Cronbach's alpha index of internal consistency for this scale was 0.77.

Finally, our measure of *Perceived Peer Respect from Sex* is based on responses to seven items modeled on those of Kinsman and colleagues (1998). A sample item read, "If a boy (girl) your age had sex with a girlfriend (boyfriend) of about the same age, what would happen?" Response options were, "his friends would respect him less" (coded 1), "it would not affect his friends' respect" (coded 2), and "his friends would respect him more" (coded 3). The scale was computed as the mean of these seven items, and had a Cronbach's coefficient alpha of 0.82.

Measures of Dependent Variables

We studied five dependent variables. The first, *Number of Sex Partners at Wave 1*, was derived by asking participants if they had ever had sex and, if they answered affirmatively, how many different sex partners they had had in their entire lives. Based upon responses to these two questions we assigned respondents to one of three categories: never had sex (coded 0), one partner (coded 1), and two or more partners (coded 2). Likewise, during the Wave 2 interviews respondents were asked whether they had ever had sex and, if so, how many partners they had had in their entire lives. On the basis of their answers to these Wave 1 and Wave 2 questions, we derived a variable called *Sexual Initiation between Waves*. It is coded 1 if they respondent had already had sex by Wave 1; coded 2 if the respondent had not had sex at Wave 1 and did not initiate sex between Waves 1 and 2; and coded 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 Wave 1 and Wave 2 questionnaire 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 on it.

Two additional dependent variables dealt with condom use. The first focused on condom use with a given respondent's first sexual partner, and was assessed at Wave 1. Respondents who reported having had sex were asked, with respect to their first sexual partner, "Over all the times you had sex with this partner, how often would you say a condom was used?" Response options were "all of the time," "most of the time," "some of the time," and "none of the time." Based upon responses to this question and the items about sexual activity and number of partners, we assigned respondents to three categories: never had sex (coded 1), consistent condom use with first partner (coded 2), and no or inconsistent condom use with first partner

(coded 3). We refer to this variable as *Condom Use with First Partner at Wave 1*. The last dependent variable was Condom Use with Most Recent Partner at Wave 2. During Wave 2 interviews, respondents were asked detailed questions about up to three sexual partners: their first partner, their second partner, and either their third or, if they had had more than three, their most recent partner. For each partner, they were asked, "Did you and this partner ever use a male condom?" If they were answered this question affirmatively, they were then asked, "Would you say that you and this partner used a male condom every time you had sex, most of the time you had sex, some of the time you had sex, or rarely?" Based upon answers to these questions, we assigned respondents to one of three categories: never had sex (coded 1), consistent condom use with most recent partner (coded 2), or no or inconsistent condom use with most recent partner (coded 3).

Other Variables

Beyond the key independent and dependent variables described above, our analyses also made use of several additional variables. These included each respondent's sex, age (and membership in either the younger or older cohort), school status (in school versus not in school), highest level of school attended (none or primary, junior secondary, and senior secondary or higher), and household composition (living with biological mother and father, biological mother only, biological father only, or neither biological parent). They also included an index of household wealth that is similar to that used in the Demogrpahic and Health Surveys (Rutstein & Johnson, 2004). This index had a Cronbach's alpha of 0.73.

Data Analysis

Our data analysis consisted of X stages. First, we used the multiple imputation technique of iteratively chained equations (Royston, 2004; White, Royston, & Wood, 2011) to create ten completed datasets. Our imputations drew upon information from all independent and dependent variables discussed above, plus numerous other variables measured at Wave 1 including sex, age, town of residence, religion, ethnic group, parental monitoring, emotional support from adults, conflict with adults, financial support from adults, communication with adults about sexual and reproductive health, aggression, delinquency, anxiety/depression, social withdrawal, gender role attitudes about marital division of labor, gender role attitudes about childrearing, pubertal development, and knowledge of HIV/AIDS. These imputations were carried out using the *mi impute chained* command in Stata 12.1. For all subsequent analyses we fit models using Stata's *mi estimate* commands.

Second, using the ten completed datasets and mi estimate commands, we conducted a descriptive analysis of all seven independent variables and all five dependent variables. In each case, we examined the distribution of the corresponding variable overall and in relation to sex, cohort (older versus younger), and the interaction of sex and cohort. We did this by running linear regression, logistic regression, ordered logit regression, and multinomial logit regression for each independent and dependent variable using dummy indicators for male sex, older cohort membership, and the interaction of the two as predictor variables.

Third, we examined binary associations between each dependent variable and each independent variable using logistic (for *Multiple New Partners between Waves*) and multinomial logit (for all other dependent variables) models fit using Stata's *mi estimate* command. Fourth,

we fit models in which the bivariate association between each independent variable and each dependent variable is adjusted for several covariates measured at Wave 1: age, community of residence, school status, highest level of schooling, household composition, and household wealth. Finally, we fit for each dependent variable a single model that includes all seven independent variables plus all of the covariates mentioned above. We estimated each model separately for females and males.

The dependent variable *Multiple New Partners between Waves* is binary. We therefore used ordinary logistic regression models (under Stata's *mi estimate* command) for it. The other four dependent variables consisted of three categories each. We therefore used multinomial logit models (again, under Stata's *mi estimate* command) for them.

For models of *Number of Partners at Wave 1*, none served as the reference category, so that the multinomial logit model included two equations: one comparing youth with just one partner to those with none, and another comparing youth with two or more partners to those with none. For models of *Sexual Initiation between Waves*, youth 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 those who had not had sex at either Wave 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. Similarly, both condom use variables (*Condom Use with First Partner at Wave 1* and *Condom Use with Most Recent Partner at Wave 2*) consist of three categories: no partner, consistent condom use with focal partner, and no or inconsistent condom use with the focal partner. In our models of these variables, the consistent condom use group is treated as the reference category. One equation compares youth with no partner to those who

reported consistent condom use, but this equation is not of substantive interest and is not reported. We focus on the equation that compares youth who either did not use condoms or used them inconsistently to those who used them consistently.

RESULTS

Descriptive Results: Peer Group Characteristics

The age- and sex-specific distributions of the seven peer group characteristic independent variables and five sexual behavior dependent variables are displayed in the upper half Table 2. Two key patterns in these rows should be noted. First, perceptions of social norms related to youth sexuality are highly restrictive among all four subgroups according to both scales. The range of plausible values for the Perceived Friend Disapproval of Sex is 1 ("none of them") to 3 ("all of them"), with higher values representing more restrictive perceived norms. All subgroup means on this scale were well above the midway point, ranging from 2.46 for older males to 2.82 for younger females. In fact, many youth in all four groups scored a 3.0, meaning that they chose the most restrictive response option for all items in this scale. Similarly, the range of plausible values for the Perceived Peer Respect from Sex scale was 1 ("her/his friends would respect him less") to 3 ("her/his friends would respect him more"). All subgroup means on this scale were well below the midway point, ranging from 1.12 for younger females to 1.51 for older males. As with the other scale, a substantial proportion of adolescents chose the most restrictive response option for all items in this scale. In spite of these ceiling and floor effects, we found significant differences according to age and sex for both scales.

The second key pattern in Table 2 is this. Although statistically significant age and sex differences were found for most of the peer group characteristic variables, the sex differences are almost all small in comparison to the age differences. Mean differences according to sex on the Perceived Peer Disapproval of Sex scale, for example, were 0.08 and 0.02 in the younger and older cohorts, respectively; while mean differences on the same scale according to cohort (older versus younger) were 0.34 for girls and 0.28 for boys. In fact, on one key aspect of peer influences, Perceived Sexually Active Friends, sex differences did not achieve statistical significance while the age differences were statistically significant and quite large in magnitude: whereas around 80% of younger cohort members reported that none of their friends were sexually active, only about 30% of older cohort members did so.

Models Predicting Sexual Activity in Cross-Sectional Data

Biviate and two types of multivariate associations between peer group characteristics and number of sexual partners at Wave 1 appear for females and males, respectively, in Tables 3A and 3B. The pattern of these cross-sectional findings is very similar for girls and boys. Almost all of the peer group characteristic variables have large and statistically significant bivariate associations with number of sexual partners at Wave 1, as shown in the first two columns of odds ratios. For both females and males, having opposite sex friends, having more sexually active friends, being affiliated with antisocial peers, and perceiving that one can gain the respect of friends by having sex are all strongly and positively associated with sexual activity; being affiliated with prosocial peers and perceiving that one's friends disapprove of sexual activity are

both strongly and negatively associated with sexual activity. The only peer group variable that is not associated with sexual activity is number of friends.

The first set of multivariate findings – models that include controls for age, household wealth, school status, highest level of schooling, and community of residence – echo those from the bivariate analysis. Although most of the effects are at least slightly attenuated, they are still large, statistically significant, and in the expected direction. Net of sociodemographic background, having opposite sex friends, having more sexually active friends, being affiliated with antisocial peers, and perceiving that one can gain the respect of friends by having sex are all strongly and positively associated with sexual activity; and being affiliated with prosocial peers and perceiving that one's friends disapprove of sexual activity are both strongly and negatively associated with sexual activity. This pattern applies equally to females and males.

Results from entering all peer group characteristic variables, along with sociodemographic controls, simultaneously into a single model predicting, cross-sectionally, sexual activity appear in the last columns of Tables 3A and 3B. Again, the pattern is very similar to the two sexes: The effects of having sexually active friends remain large and statistically significant, whereas the effects of other peer group characteristics are further attenuated and mostly lose their statistical significance.

Models Predicting Sexual Activity Longitudinally

Results of analyses linking peer group characteristics at Wave 1 to reported sexual activities occurring between Waves 1 and 2 are shown in Tables 4A and 4B for females and males, respectively. Overall, the pattern of bivariate findings is very similar to those we obtained

cross-sectionally. For both females and males, there are substantial and statistically significant bivariate effects of virtually all peer group characteristics on transition to first sexual activity between Waves 1 and 2, and on having multiple new partners between Waves 1 and 2. Having opposite sex friends, believing that one's friends are sexually active, and affiliating with antisocial peers are positively associated with transition to first sex and multiple new partners. Affiliating with prosocial peers and believing that one's friend disapprove of sexual activity are negatively associated with transition to first sex and multiple new partners.

Many but not all of these associations survive control for sociodemographic confounding variables, as shown in the first columns of multivariate results. For both girls and boys, having sexually active friends is associated with an increased risk, and perceiving that one's friends disapprove of sex is associated with a decreased risk, of transition to first sex. Affiliating with pro- and antisocial peers remain statistically significant determinants of transition to first sex for girls but not for boys, whereas believing that one can increase one's respect from friends by having sex remains statistically significant for boys but not for girls. The pattern is similar for multiple new partners, but for that outcome fewer of the estimated coefficients achieved statistical significance. In the final multivariate models – those including all peer group characteristics and sociodemographic controls simulataneously – only having sexually active friends remains a statistically significant predictor (and only for transition to first sex, not for multiple new partners) for both females and males. For males, perceiving that one can gain the respect of friends through sexual activity also remains significant in models of both transition to first sex and multiple new partners.

Models Predicting Condom Use

Results from models predicting condom use with respondents' first sexual partners at Wave 1, and most recent sexual partners at Wave 2, are shown in Tables 5A and 5B for females and males, respectively. The results are easy to summarize: None of the peer group characteristic variables is consistently associated with self-reported condom use. One exception to this pattern, arguably, is that affiliation with antisocial peers has a strong effect on condom use with first sexual partner among males.

DISCUSSION

Forthcoming. Will feature the following theses: (1) There is pretty good evidence here for the relevance of peer influences to adolescent sexual activity. Associations with of peer group characteristic variables with sexual activity are present in longitudinal as well as cross-sectional analyses and, in both cases, survive control for several sociodemographic variables. These findings suggest that at least part of the association is attributable to peer influence rather than selection/deselection. (2) The results from the full multivariate models suggest that it is difficult to isolate the effects of one peer group characteristic from the effects of others. This is not surprising since the various peer group characteristics tend to be strongly intercorrelated. (3) There is basically no evidence here that peer group characteristics influence condom use. This is not surprising since condom use may be more of a private matter than sexual activity itself (which frequently takes place within relationships that are publicly acknowledged). (4) Perceived norms are not vastly different for girls versus boys, and appear to have similar influences in the two sexes. They tend to be very restrictive for both sexes, but become

somewhat less restrictive with age. (5) Implications for intervention the suitability of alternative peer-based intervention strategies are complex.

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WHO, 2007

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	11.0	7.5	19.5
In school	89.0	92.5	80.6
Highest Schooling (%)			
None or Primary	57.3	55.7	56.5
JSS	31.4	31.7	31.5
SSS	11.3	12.7	11.9
Living Situation (%)***			
Neither biological parent	44.7	34.4	40.0
Mother only	26.3	24.5	25.5
Father only	4.2	10.0	6.8
Mother and Father	24.9	31.3	27.7
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. Age and Sex Comparisons of Peer Context and Sexual Behavior Variables

	Younger (13-14)		Older (18-19)	
	Female	Male	Female	Male
Number of Friends (%)[a]				
No Friends	3.1	1.3	3.9	1.4
One Friend	20.3	10.7	20.1	11.6
Two Friends	29.5	19.5	25.8	17.3
Three or Four Friends	28.6	32.4	26.5	29.6
Five, Six, or Seven Friends	12.4	18.0	13.3	20.9
Eight, Nine, or Ten Friends	2.1	5.8	2.5	5.4
Eleven or More Friends	4.0	12.2	7.9	13.7
At Least One Opposite Sex Friend (%)[a,b]	19.5	26.5	42.9	42.3
Perceived Sexually Active Friends (%)[b]				
None	81.8	80.2	29.4	33.1
Some	15.3	17.7	36.0	46.0
All	3.0	2.1	34.7	20.9
Affiliation with Prosocial Peers (Mean [SD])[a,b]	2.71	2.61	2.62	2.57
	[0.33]	[0.33]	[0.37]	[0.36]
Affiliation with Antisocial Peers (Mean [SD])	1.23	1.30	1.25	1.28
	[0.27]	[0.28]	[0.29]	[0.29]
Perceived Friend Disapproval of Sex (Mean [SD])[a,b]	2.82	2.74	2.48	2.46
	[0.31]	[0.35]	[0.45]	[0.42]
Perceived Peer Respect from Sex (Mean [SD])[a,b]	1.12	1.20	1.38	1.51
	[0.27]	[0.38]	[0.39]	[0.50]
Number of Partners at Wave 1 (%)				
None (REF)	96.2	96.9	48.8	63.7
One [b]	2.9	3.2	35.0	23.5
Two or More [b]	1.0	0.0	16.2	12.7
Sexual Initiation Between Waves (%)				
Already Initiated at Wave 1[b]	3.9	3.2	51.2	36.3
Not Initiated at Wave 2 (REF)	86.9	92.6	27.3	44.1
Initiated Between Wave 1 and Wave 2[a,b]	9.3	4.2	21.5	19.6
Multiple New Partners Between Waves (%)[b]	3.1	1.8	13.6	12.7
Condom Use with First Partner at Wave 1				
No Partner[b]	96.2	96.9	48.8	63.7
Consistent Condom Use with First Partner (REF)	0.7	0.3	16.7	12.6
No / Inconsistent Condom Use with First Partner	3.1	2.8	34.4	23.7
Condom Use with Most Recent Partner at Wave 2				
No Partner[b]	91.7	96.4	38.9	61.9
Consistent Use with Most Recent Partner (REF)	2.3	1.7	15.4	12.5
No / Inconsistent Use with Most Recent Partner	6.1	1.9	45.7	25.6

[a]Statistically significant sex difference at the 0.05 level. [b]Statistically significant age difference at the 0.05 level. No sex-by-age interaction effects were statistically significant at the 0.05 level.

Table 3A. Odds Ratios and Adjusted Odds Ratios Between Peer Group Characteristics and Number of Sexual Partners at Wave 1, Females

	Bivariate		Multivariate 1		Multivariate 2	
	1 vs. 0	2 vs. 0	1 vs. 0	2 vs. 0	1 vs. 0	2 vs. 0
Number of Friends (Linear)	1.03	1.21*	1.09	1.33**	1.00	1.13
Number of Friends (Squared)	1.01	0.98	1.00	0.96*	1.00	0.97
Any Opposite Sex Friends (vs. None)	2.33***	4.49***	1.34	2.76**	0.84	1.14
Some (vs. No) Friends Sexually Active	15.86***	26.71***	9.12***	16.58***	7.30**	9.25**
All (vs. No) Friends Sexually Active	133.43***	325.22***	50.03***	118.05***	34.85***	49.58***
Affiliation with Prosocial Peers	0.23***	0.13***	0.27***	0.16***	0.84	1.45
Affiliation with Antisocial Peers	3.69**	7.80***	6.71***	19.70***	1.13	2.83
Perceived Friend Disapproval of Sex	0.07***	0.03***	0.15***	0.05***	0.61	0.30*
Perceived Peer Respect from Sex	10.23***	16.37***	3.88***	5.56***	1.77	2.21

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

Table 3B. Odds Ratios and Adjusted Odds Ratios Between Peer Group Characteristics and Number of Sexual Partners at Wave 1, Males

	Bivariate		Multivariate 1		Multivariate 2	
	1 vs. 0	2+ vs. 0	1 vs. 0	2+ vs. 0	1 vs. 0	2+ vs. 0
Number of Friends (Linear)	1.14	1.23	1.17*	1.34*	1.00	1.19
Number of Friends (Squared)	0.98	1.00	0.98	0.99	0.98	0.99
Any Opposite Sex Friends (vs. None)	2.04**	4.07**	1.94*	4.21**	2.21*	2.64
Some (vs. No) Friends Sexually Active	17.00***	37.81***	10.77***	18.82**	7.17**	5.04
All (vs. No) Friends Sexually Active	85.82***	380.26***	49.84***	137.13***	34.30***	47.74***
Affiliation with Prosocial Peers	0.36**	0.17**	0.35*	0.19**	0.82	1.73
Affiliation with Antisocial Peers	2.04	9.53***	4.27**	18.71***	0.70	1.76
Perceived Friend Disapproval of Sex	0.09***	0.02***	0.11***	0.03***	0.45	0.24
Perceived Peer Respect from Sex	5.39***	7.61***	3.70***	5.05***	2.32*	2.05

*p<0.05, **p<0.01, ***p<0.001

Table 4A. Odds Ratios and Adjusted Odds Ratios Between Peer Group Characteristics and Transition to First Sex Between Waves 1 and 2, Multiple Partners between Waves 1 and 2, Females

	Bivariate		Multivariate 1		Multivariate 2	
	Transition	Multiple	Transition	Multiple	Transition	Multiple
Number of Friends (Linear)	1.06	1.16*	1.10	1.20*	1.02	1.17
Number of Friends (Squared)	1.00	0.99	0.99	0.98	0.99	0.98
Any Opposite Sex Friends (vs. None)	1.83*	2.23**	1.16	1.56	0.87	1.06
Some (vs. No) Friends Sexually Active	4.17***	4.48***	2.80**	2.72*	2.20	2.46
All (vs. No) Friends Sexually Active	13.28**	6.19***	7.13*	2.27	5.24*	2.22
Affiliation with Prosocial Peers	0.38**	0.37*	0.31**	0.58	0.61	0.76
Affiliation with Antisocial Peers	2.25*	1.44	4.58**	1.20	1.32	0.45
Perceived Friend Disapproval of Sex	0.21***	0.32***	0.33**	0.72	0.71	1.08
Perceived Peer Respect from Sex	3.39**	3.23**	1.36	1.47	0.94	1.21

*p<0.05, **p<0.01, ***p<0.001

Table 4B. Odds Ratios and Adjusted Odds Ratios Between Peer Group Characteristics and Transition to First Sex Between Waves 1 and 2, Multiple Partners between Waves 1 and 2, Males

	Bivariate		Multivariate 1		Multivariate 2	
	Transition	Multiple	Transition	Multiple	Transition	Multiple
Number of Friends (Linear)	1.06	1.13	1.09	1.13	1.02	1.13
Number of Friends (Squared)	1.00	0.99	0.99	0.99	0.99	0.99
Any Opposite Sex Friends (vs. None)	1.57**	1.46	1.34	1.08	1.27	0.76
Some (vs. No) Friends Sexually Active	4.26***	4.91**	2.60*	2.24	1.96	1.39
All (vs. No) Friends Sexually Active	16.62***	8.93***	8.92**	2.72	6.81*	1.87
Affiliation with Prosocial Peers	0.61**	0.76	0.51	0.94	0.92	2.49
Affiliation with Antisocial Peers	1.22***	1.68	2.65	2.24	0.91	1.77
Perceived Friend Disapproval of Sex	0.21***	0.24***	0.30**	0.43	0.72	0.93
Perceived Peer Respect from Sex	4.36***	4.69***	2.78**	3.17**	2.09*	2.79*

*p<0.05, **p<0.01, ***p<0.001

Table 5A. Odds Ratios and Adjusted Odds Ratios Between Peer Group Characteristics and No or Inconsistent Condom Use with First Partner (Wave 1) and Most Recent Partner (Wave 2), Females

	Bivariate		Multivariate 1		Multivariate 2	
	First (W1)	Recent (W2)	First (W1)	Recent (W2)	First (W1)	Recent (W2)
Number of Friends (Linear)	0.96	1.03	0.99	1.06	0.92	1.17
Number of Friends (Squared)	1.00	1.01	1.00	1.01	1.01	1.00
Any Opposite Sex Friends (vs. None)	1.31	0.91	1.64	0.98	1.91	0.63
Some (vs. No) Friends Sexually Active	0.72	1.49	0.83	1.79	0.81	1.87
All (vs. No) Friends Sexually Active	0.62	2.28	0.58	2.41	0.50	2.86
Affiliation with Prosocial Peers	0.86	1.09	1.07	1.34	0.96	1.18
Affiliation with Antisocial Peers	0.95	0.45	0.79	0.43	0.57	0.18*
Perceived Friend Disapproval of Sex	0.76	0.70	0.72	0.73	0.53	0.57
Perceived Peer Respect from Sex	0.78	1.22	0.72	1.10	0.69	0.80

*p<0.05, **p<0.01, ***p<0.001

Table 5B. Odds Ratios and Adjusted Odds Ratios Between Peer Group Characteristics and No or Inconsistent Condom Use with First Partner (Wave 1) and Most Recent Partner (Wave 2), Males

	Bivariate		Multivariate 1		Multivariate 2	
	First (W1)	Recent (W2)	First (W1)	Recent (W2)	First (W1)	Recent (W2)
Number of Friends (Linear)	1.06	1.08	1.08	1.08	1.08	1.07
Number of Friends (Squared)	1.00	0.99	1.00	0.99	1.00	0.99
Any Opposite Sex Friends (vs. None)	0.69	0.94	0.82	1.30	0.44	1.21
Some (vs. No) Friends Sexually Active	0.51	2.02	0.71	1.87	0.34	1.52
All (vs. No) Friends Sexually Active	0.82	1.61	1.03	1.16	0.46	1.10
Affiliation with Prosocial Peers	0.43	0.83	0.41	1.03	1.12	1.09
Affiliation with Antisocial Peers	4.36*	0.72	5.20*	0.77	4.54	0.47
Perceived Friend Disapproval of Sex	0.50	0.90	0.36	0.84	0.57	1.03
Perceived Peer Respect from Sex	1.45	1.47	1.87	1.79	1.51	1.97

*p<0.05, **p<0.01, ***p<0.001