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Transition into first sex among adolescents in slum and non-slum communities in Nairobi, Kenya

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Abstract

While early sexual experiences are a key marker of the transition from childhood to adulthood, it is widely acknowledged that precocious initiation of sexual activity predisposes adolescents to negative health and psychological outcomes. Extant studies investigating adolescent sexuality in sub-Saharan Africa often rely on cross-sectional data lacking information on the social-psychological underpinnings of adolescent behavior. Through the theoretical lens of the protection-risk conceptual framework, this paper draws on two waves of longitudinal data collected from 2,134 adolescents to examine sociodemographic, psychosocial and behavioral predictors of transition to first sex among adolescents living in slum and non-slum settlements in urban Kenya. We employ logistic regression models to examine the effect of antecedent sociodemographic and risk and protective factors measured during the first wave of data collection on transition to first sex by the second wave. We observe that transition to first sex is influenced by age, slum residence, perceived parental monitoring, and peer behavior. We also find evidence for coupling of risk behaviors. Study findings underscore the need to focus on very young adolescents and those growing up in resource poor settings as these young people may be highly vulnerable to negative health outcomes stemming from precocious sexual activity.

Keywords

Transition to first sex; adolescents; slums; informal settlements; Nairobi; Kenya

Introduction

Young people's early sexual encounters are primary markers of the transition to adulthood because "they occur at the time of marriage or because they bring with them opportunities for further emotional and relational development as well as the possibilities of marriage and/or parenthood" (National Research Council and Institute of Medicine 2005, p. 194). However, it is widely recognized that early initiation of sexual activity predisposes adolescents to negative sexual and reproductive health outcomes, such as unwanted pregnancies and sexually transmitted diseases. Indeed, desire to understand the determinants

of early sexual activity among young people, the HIV/AIDS pandemic, and the need for evidence-based interventions to delay coital activity have led to an extensive pool of literature on adolescent sexual behavior both in the developed and developing world.

Abstinence, one of the three facets of HIV prevention efforts relying on the ABC (Abstain, Be faithful, and use Condoms) approach, has been a point of controversy. Indeed, the efficacy and practicality of abstinence promotion efforts in the US have been called into question (Besharov and Gardiner 1997, Brown 1997, Rosenbaum 2009). Engaging in the debate surrounding the promotion of sexual abstinence among adolescents is not our aim as the issues are well-documented; rather, we examine early sexual initiation in a context where HIV infection, early pregnancies and associated impacts on schooling, and other negative sexual and reproductive health outcomes remain constant threats to the wellbeing of young people (Okonofua 2007). In addition, the youth upon which this paper is based are situated in a context where sexuality education continues to be highly contested, with parents and school systems reluctant to introduce such education, teachers inadequately prepared to deliver it, a large number of children out of school, and a political climate largely averse to the very notion of young people as sexual beings.

Theoretical Framework

We examine predictors of first sexual activity among adolescents living in slum and non-slum settlements in Nairobi, Kenya through the theoretical lens of the protection-risk conceptual framework (Jessor and Jessor 1975, Jessor 1991, Jessor *et al.* 1998, Jessor *et al.* 2003, Costa *et al.* 2005). The conceptual framework describes the relations of protective factors and risk factors to involvement in problem behaviors such as drug use, alcohol abuse, delinquency, and early sexual intercourse experience (Jessor *et al.* 2003). Briefly, the model posits that protective factors lower the probability of engaging in problem behaviors by providing: models for conventional behavior, controls against problem behaviors, and an environment that supports conventional behavior. Protective factors may also mitigate the effect of exposure to risk factors (Jessor and Jessor 1975, Jessor 1991, Jessor *et al.* 1998, Jessor *et al.* 2003, Costa *et al.* 2005). Risk factors, on the other hand, increase the probability of problem behaviors by providing models for and opportunities to engage in deviant behaviors, as well as increasing personal vulnerability.

We acknowledge that sexual behavior in itself is *not* a problem behavior; nonetheless, the primary focus of the study is *precocious* sexual initiation, which we view as potentially qualifying as a problem behavior. It is problematic in the slum context because it largely occurs much earlier than among other population sub-groups (Dadoo *et al.* 2007) and in a context where HIV prevalence is almost three times the national prevalence (APHRC 2008). The fact that younger adolescents are less likely to have adequate knowledge on how to protect themselves against unwanted pregnancy and STIs or about how to handle interpersonal relationships that include sex is evident from the very high HIV prevalence rates among adolescents in Africa: in a region that accounts for almost 70% of all cases of HIV/AIDS in the world, approximately half of all new infections occur among young people aged 15 to 24. Further, we would argue that the prevailing culturally-supported abstinence

message (Ahlberg 1994, Izugbara 2008) for young people creates a general perception of sexual activity in this age group as deviation from 'acceptable' behavior.

Although the conceptual framework adopted in this paper was developed in the United States, it has been successfully applied in several countries and within different cultures (Jessor 2008). Jessor and colleagues (2003), in a cross-national study employing this conceptual framework to examine adolescent involvement in problem behaviors (delinquent behavior, cigarette smoking, risky sexual behavior, and problem drinking), observed that while Chinese and American adolescents differed on descriptive and theoretical measures, the models of association were similar in both countries. In both samples, the model accounted for 45% of the variation in problem behavior involvement. Addition of marijuana use and sexual activity to the problem behavior measure in the US sample (for which data was available) increased the proportion of variance accounted for by the model to 51%.

A more recent study by Vazsonyi and colleagues (2008) in Georgia and Switzerland also observed cross-national generality in the application of the model. Vazsonyi and colleagues tested the application of the model in explaining adolescent engagement in alcohol and drug use as well as other deviant behavior, such as theft and vandalism. Although the authors considered sexual behavior as a problem behavior, it was not included in the models because sexual behavior data were not collected in Georgia for religious reasons.

While the application of theoretical frameworks developed in one context to a different setting has been questioned, Jessor (2008), in a recent editorial, challenges scholarly overemphasis on the influence of cultural differences on theoretical explanations. In his words, sensitivity to cultural differences stems, in part, from "our awareness of entire disciplines, such as anthropology, that have long taught us about the uniqueness of different cultures and societies and that have brought their sometimes exotic practices to our attention" (p. 528). Indeed, Jessor contends that while we may observe differences in theoretical constructs across cultures or nationalities, the relations between these constructs should remain unchanged. Bearing in mind Jessor's argument and given the successful application of the model in various settings, we apply it in this Kenyan context, but remain cognizant of the importance of local realities.

Limitations of Previous Studies

A review of the existing literature highlights several shortcomings of many of the studies that investigate adolescent sexuality. First, most studies in sub-Saharan Africa utilize cross-sectional data which simply examine relationships between sexual debut and other variables. Longitudinal data would help us move towards addressing causal linkages since we can control for timing of various events and covariates that precede sexual debut. Second, data from the commonly used Demographic and Health Surveys (DHS) and other demographic surveys do not contain adequate information to allow examination of the effect of psychosocial protective and risk factors on sexual behavior. Third, analyses using DHS data to address differences between slum and non-slum areas require use of a proxy measure of slums since DHS data do not distinguish slums from non-slums. This paper uses data from the actual slum and non-slum geographic locations. Lastly, many sexual and reproductive health studies focus primarily on females and cover only those aged 15-19 and often do not

include very young adolescents (12-14 years). However, recent evidence (Bankole *et al.* 2007) shows that significant numbers of very young adolescents in sub-Saharan Africa are sexually active and yet they lack sufficient knowledge about sexual and reproductive health.

Objectives

The aims of this study are twofold. First, we seek to identify predictors of first sexual activity among adolescents in slum and non-slum neighborhoods in Nairobi. Second, we assess whether protective and risk factors at the individual and social levels have comparable levels of effectiveness for older versus younger adolescents, as well as for adolescents living in slum settlements and those living in poor, but non-slum neighborhoods. High-risk urban neighborhoods may form a unique context which poses challenges for the sexual and reproductive health of young people. Nairobi's slum settlements, for example, are characterized by poor sanitation and housing, congestion, a lack of basic infrastructure such as roads, inadequate public services such as water, education and health. Furthermore, widespread unemployment, violence, and insecurity are the norm within these settings (African Population and Health Research Center 2002, Zulu *et al.* 2002). Evidence from studies conducted in Nairobi's slums indicates that the median age at first intercourse is much lower in these slum settings (15 years) and that slum dwellers fare much worse in terms of risky sexual behavior when compared to their wealthier urban counterparts or those living in rural areas (Zulu *et al.* 2002, Ngom *et al.* 2003, Dodoo *et al.* 2007). Indeed, Zulu and colleagues (2002) observed a 5 year difference in age at first sex between those who grew up in the slums and those who grew up in other parts of the city. Further, even after controlling for religion, age, and schooling, women who grew up in slums were significantly more likely to have initiated sexual intercourse at a younger age and to report multiple sexual partners.

It is plausible that programs designed for more advantaged neighborhoods may flounder when confronted with the vast neighborhood disadvantage that slums represent. Roche and colleagues (2005) found, for instance, that in socio-economically disadvantaged U.S. neighborhoods, parental rules were associated with a lower likelihood of sex initiation. However, in more advantaged neighborhoods, parental rules were positively associated with sex initiation. There is a general need for information about factors that trigger or lead to first sexual activity in disadvantaged African settings. Knowledge of the effects of parental monitoring and peer models are an important initial step to developing recommendations for young people and parents in Africa's urban slum contexts.

This study draws on longitudinal data collected in 2005 (Wave 1) and a year later (Wave 2) under a larger study designed to explore various schooling-related issues, including the association between school participation and risky behaviors. The longitudinal nature of this study allows us to examine the relationship between transition to first sex during the two-wave interval and antecedent sociodemographic and risk and protective factors measured during the first wave of data collection among a sample of adolescents aged 12-19 years. We hypothesize that adolescents who transition into first sex between the two waves will be older, more likely to live in slum versus non-slum areas, and to be out of school. We also postulate that those who report fewer friends who engage in conventional behavior, lower

levels of parental monitoring, and a greater proportion of friends who engage in unconventional or risky behavior will be more likely to make the transition.

Methods

Study Design, Participants and Procedures

The data used in this study are drawn from two waves of the Education Research Program (ERP), a longitudinal population-based study in two slum and two non-slum settlements in Nairobi, Kenya. The study is nested in the Nairobi Urban Health and Demographic Surveillance System (NUHDSS), which collects routine health and demographic data from over 60,000 individuals living in more than 21,000 households in two slum areas in the city (Korogocho and Viwandani). The ERP has been following children aged 5-19 years in these two slum communities as well as in two other non-slum communities (Harambee and Jericho) since 2005. Jericho is a low income area while Harambee is a lower middle income area; however, most of the inhabitants in both communities are employed in the formal sector (African Population and Health Research Center 2006). Data are collected using five modular questionnaires that address specific issues: 1) the household module identifies individual households to which children belong, household members and household characteristics; 2) the primary school module collects information on school characteristics; 3) the parent or guardian module asks about parental involvement in school activities and in the child's life, as well as parental perceptions of the Kenyan free primary education initiative that was introduced in 2003; 4) the child module assesses each child's schooling status and experiences, informal training and apprenticeship, as well as general behavior (including sexual behavior and substance use); and lastly, 5) the child schooling module collects information on each child's enrollment in school and schooling history. Each of the sections is regularly updated with the child schooling module being updated every term (there are three terms in a year), while the other modules are updated annually (African Population and Health Research Center 2006). The behavior section of the child module is completed by respondents aged at least 12 years and the section must be completed with the child as the respondent. This paper primarily uses data collected using the child module, which includes measures of perceived levels of parental monitoring, perceived peer behaviors, and self-reported substance use and sexual behavior.

At the first wave, 284 females (26% of all females) and 303 males (29%) reported that they had ever had sex (Table 1). Nine percent (n=103) and 8.3% (n=86) of females and males, respectively, who were virgins at Wave 1, had transitioned into first sex by Wave 2. The mean age of respondents at Wave 1 was 15.0 years for males and 14.9 years for females. Over 70% of the respondents were living in one of the two slum settlements. Over 80% of males and females were enrolled in school during Wave 1.

Measures

Outcome variable—At both waves of data collection, respondents were asked whether they had ever had sex. Three groups of adolescents are defined: virgins – those that reported in both waves that they had never had sexual intercourse, transition – those that experienced first sex between the two waves, and non-virgins – those that reported that they had ever had

sex at Wave 1. Demographic and psychosocial characteristics of all three groups are summarized in Table 1. The primary outcome variable for the analyses is whether a respondent transitioned into first sex between Waves 1 and 2 (this variable is coded 0 for *no* or 1 for *yes*).

Explanatory variables

Social context protective factors—The measures of social context protective factors are parental monitoring (controls protection – family) and peer models for conventional or pro-social behavior (models protection). Perceived parental monitoring is measured using 9 items that assess the respondents' perception of how much their parents or guardians know about the following: where the child spends time on weekday evenings; with whom the child spends weekday evenings; where the child spends time on weekend evenings; with whom the child spends weekend evenings; what the child does during his/her free time; how the child spends his/her money; what TV programs, videos, or films the child watches; what books, novels, or magazines the child reads; and the child's best friend. Possible responses are *never know (coded 0)*, *sometimes know (1)*, *usually know (2)*, or *not applicable*. "Not applicable" responses were treated as missing values. About 1% of adolescents had missing values on three or more items. Scores on the scale were summed up to give an index score ranging from 0 to 18 with higher values reflecting greater perceived parental monitoring. Cronbach's alpha was used to assess internal consistency of scores, a measure of the extent to which related items on a scale are correlated and assesses whether these items produce similar scores (Crocker and Algina 1986). Cronbach's alpha values range from 0 to 1 with increasing values indicating greater consistency of item scores. The Cronbach's alpha for scores on the parental monitoring scale was 0.88.

Peer models for conventional or pro-social behavior was measured using four items: the proportion of friends who: get good marks in school, participate in sports or other school activities, attend church/mosque, and want to go to secondary school, university, or college (Cronbach's alpha = 0.55). Possible responses are *none of them (coded 0)*, *some of them (1)*, *most of them (2)*, *don't know*, or *not applicable*. "Don't know" and "Not applicable" responses were treated as missing values.

Social Context Risk Factors—A composite measure of peer models for unconventional behavior was used to assess risk factors at the perceived social context level. This measure of models risk was based on a 5-item measure of perceived peer involvement in unconventional behavior, that is, how many friends: drink alcohol, run away from home, have gotten into trouble with police, have had sex, and use drugs like marijuana (locally known as *bhang*), khat (locally known as *miraa*), or glue. Possible responses are *none of them*, *some of them*, or *most of them* (Cronbach's alpha = 0.77).

Individual Level Risk Factors—Risk factors at the individual level included general deviance, non-penetrative sexual contact (kissing, fondling, foreplay, and heavy petting), and substance use. General deviance (delinquent behavior) was measured through 7 items that assess the number of times the respondent had engaged in the following activities in the 4 months preceding the survey: stayed away from home without parental permission; started

a fight; stolen or tried to steal something; carried a weapon for protection; hit or threatened to hit an adult; delivered or sold drugs; and delivered or sold alcohol. Possible responses are *never* (coded 0), *once* (1), *2 or 3 times* (2), *4 or 5 times* (3), *6 or more times* (4), or *refused*. Refusals were treated as missing values. Less than two percent of adolescents refused to respond to these questions and were treated as missing values. Scores on the scale are summed up to give an index score ranging from 0 (has never engaged in any of above behaviors) to 28 (has engaged in all behaviors 6 or more times) (Cronbach's alpha = 0.66). Non-penetrative sexual contact and substance use were measured as dichotomous variables (*ever*-coded 1-versus *never*-coded 0).

Sociodemographic Characteristics—We also examined the association between transition into first sex between Wave 1 and Wave 2 and several sociodemographic characteristics – age at Wave 1, schooling status at Wave 1 (in versus out of school), slum versus non-slum residence, and number of adolescents in the household (HH). Separate analyses for slum and non-slum residence did not show any significant differences between study sites (Korogocho versus Viwandani in slum areas and Jericho versus Harambee in non-slum areas). Thus, the models shown here do not include study site as a predictor variable. Information on ethnicity was lacking for non-slum residents, who are not part of the NUHDSS. Preliminary analysis using data from respondents in the slum areas showed that ethnicity was not significantly associated with transition into first sex. Thus, we do not control for ethnicity in the models reported here.

Statistical Analyses—Data were analyzed using *Stata version 9.2* (Stata 2007). Univariate statistics were computed to describe the respondents' psychosocial, behavioral and sociodemographic characteristics, as well as sexual experience. Two thousand, three hundred and twenty four adolescents (2,324) completed the behavior section of the education child module in both waves. One hundred ninety (190) respondents (8%) retracted their initial report of ever having had sex and were excluded from analyses. The final sample size is therefore limited to the 2,134 adolescents (51% female) with consistent sexual behavior data in both waves. Of these respondents, 1,358 were categorized as virgins (52% female), 189 made the transition to first sex (54% female) while 587 were non-virgins at Wave 1 (48% female). Two hundred seventy nine (279) respondents who reported first sex at Wave 2 but gave an age at sexual debut that was younger than age at Wave 1 were recoded as non-virgins.

Logistic regression models were employed to identify correlates of transition to first sex among the subset of adolescents who reported that they had never had sexual intercourse at the time the baseline survey was conducted (Wave 1). Baseline measures were used to predict transition into first sex. At the multivariate level, data were analyzed separately for males and females. We run three sets of logistic models: separate models for younger (Phipps and Sowers 2002) (12-15 years) versus older (16-19 years) adolescents; separate models for slum versus non-slum residence; and models including interactions terms for age group and slum residence.

Ensuing findings should be interpreted in light of several limitations. First, the duration between the two waves of data collection is about a year and since the actual month of first

intercourse is unknown, it is not possible to investigate the effect of these predictors on the actual timing of first sexual intercourse within that interval. Second, there are only two waves of data. Having information on the actual timing of first intercourse over multiple waves of data collection would enable us to better understand and explain the process of making the transition to first sex. Lastly, the available data has relatively few measures of risk and protective factors that could influence initiation of sexual activity.

Results

Descriptive Analyses

Among females who made the transition to first sex, the median age at first intercourse was 18 years for those living in non-slum areas and 15 years for those living in slum areas. On the other hand, among males the median age at first intercourse was 17 years for those living in non-slum areas and 15 years for their counterparts residing in the slums. Table 1 summarizes the demographic, psychosocial, and behavioral characteristics of the adolescents at Wave 1 according to their sexual behavior status. Non-virgins were significantly older than both the virgins and those who transitioned into first sex. Adolescents who transitioned into first sex between the two waves were on average older than those who remained virgins. The three groups did not differ on the proportion living in slum versus non-slum areas. Non-virgins at Wave 1 were more likely to be out of school. Among females, a significantly lower proportion of those making the transition to first sex were enrolled in school at Wave 1 compared to virgins.

Virgin and transition females did not differ in terms of peer models for conventional behavior and reported levels of parental monitoring; however, non-virgin females reported significantly lower levels of peer models for conventional behavior and perceived parental monitoring than either group. Males who transitioned into first sex reported lower levels of peer models for conventional behavior and lower levels of parental monitoring than their virgin counterparts. Females who transitioned into first sexual activity reported more peer models for unconventional or risk behavior than their virgin counterparts. While males who made the transition to first sex reported more peer models for unconventional behavior than their virgin counterparts, the difference in means was only marginally significant. Virgins and those who transitioned into first sex did not differ on deviant behavior; however, non-virgin respondents were significantly more likely than either group to report other delinquent behavior.

Slum and non-slum dwellers differed on several protective and risk factors (Table 2). Both males and females living in non-slum areas reported significantly more peer models for conventional behavior than their peers in the slums. Females in the slums reported higher levels of parental monitoring but lower levels of peer models for unconventional behavior than their non-slum peers. A greater proportion of females living outside the slums reported non-penetrative sexual contact and substance use than their counterparts in the slums. Both males and females living outside of slums reported lower levels of delinquent behavior than slum residents.

Multivariate analysis

Results from the logistic models are presented in Tables 3-5. Table 3 shows the results of the models by age group and sex. The results of the models by area of residence and sex are presented in Table 4; and models including interactions terms for age group and slum residence are showed in Table 5. Six categorical variables (age group, residence, schooling status, number of adolescents in household, non-penetrative sexual contact, and substance use in Wave 1) and four continuous variables (peer models for conventional behavior, perceived parental monitoring, peer models for unconventional behavior and delinquent behavior) were used in the models. For the categorical variables, the odds ratio represents the chances of making transition to first sex for the specified category in comparison with the reference category. For the continuous variables, the odds ratio indicates the odds of transitioning into first sex for each unit increase in the corresponding variable. Odds ratios greater than 1 indicate a greater likelihood of making the transition to first sex while odds ratios lower than 1 indicate lower chances of making the transition to first sex. Two-tailed p-values are presented in the tables.

For females aged 12-15 years, only perceived parental monitoring and delinquent behavior had a significant effect on the chances of becoming sexually active (Table 3). Among girls in this age group, for each additional unit increase of parental monitoring and delinquent behavior, the chances of transitioning to first sex increases by 10% and 40% respectively. For girls aged 16-19 only peer models for unconventional behavior was found to significantly influence the chances of having first sex. Specifically, for each additional unit increase in the index assessing peer models for unconventional behavior, the chances of becoming sexually active increases by 80%.

For 12-15 year old males, only residence was significantly associated with transition to first sex. Slum residents were 10 times more likely to become sexually active than their counterparts living in non-slum areas. Similarly for males aged 16-19 only residence had a significant effect on the odds of losing virginity with those living in non-slums being 3.3 times (1/0.3) more likely than their counterparts in slum areas to have transitioned to first sex.

In the second set of logistic models for separate analyses by area of residence (Table 4), age group is significantly associated with transition to first sex among males and females living in non-slum areas and females in slum areas. As expected, older adolescents were significantly more likely to have made the transition to first sex. Among females living in non-slum areas, parental monitoring, and peer models for unconventional behavior also predicted transition into first sex. Among their male counterparts, no other variables besides age group were significantly associated with transition to first sex. For females and males living in slums, peer models for conventional behavior and delinquent behavior were associated with transition to first sex.

For both females and males, there was a significant interaction between age group and slum residence (Table 5). Among females, young girls (12-15 years) living in non-slum areas were significantly less likely to make the transition to first sex than females aged 16-19 years living in slums. Wald tests to examine differences between coefficients for the interaction terms (not shown) showed that 12-15 year old females living in non-slum areas

were also less likely to make the transition to first sex than 16-19 year olds living in non-slum areas. Among males, 12-15 year olds living in non-slum areas were significantly less likely to make the transition to sexual activity than males aged 16-19 years living in slums. However, compared to males aged 16-19 years living in slums, males in the same age group living in non-slum areas were significantly more likely to make the transition to first sex. There was no statistically significant difference between younger and older males living in slums. Wald tests to examine differences between coefficients for the interaction terms (not shown) showed that 12-15 year old males living in non-slum areas were less likely to make the transition to first sex than 12-15 year olds living in slum areas and 16-19 year olds living in non-slum areas.

In summary, age and slum residence were found to significantly predict transition to first sex. In general, older age and slum residence were associated with greater odds of making the transition to first sex. Among females living outside slums, school attendance was associated with lower odds of making the transition to first sex than being out of school. A high level of parental monitoring was associated with greater odds of making the transition among females living in non-slum areas and among younger females. Having peer models for conventional behavior was negatively associated with the likelihood of transitioning to first sex for males and females living in slum areas. On the other hand, peer models for unconventional behavior were a risk factor for girls aged 16-19 and females living in non-slum areas.

Discussion

This paper uses longitudinal data to examine predictors of transition to first sex among adolescents aged 12-19 years in slum and non-slum areas of Nairobi, Kenya. It focuses on the association between transition to first sex and sociodemographic characteristics, as well as risk and protective factors measured during the first wave of data collection. The study provides a unique perspective of transitions to first sex by comparing the experiences of adolescents living in both slum and non-slum areas. Unlike previous studies on sexual behavior in slum settings (Zulu *et al.* 2002, Ngom *et al.* 2003, Dodoo *et al.* 2007), this paper examines the association between transition into first sex and psychosocial variables such as perceived levels of parental monitoring, peer models for conventional or pro-social behaviors, and peer models for unconventional or antisocial behaviors.

Consistent with previous research showing that slum dwellers fare much worse in terms of risky sexual behavior than their peers living outside slums, we observe that adolescents living in the slum areas initiate sexual activity about three years earlier than their non-slum counterparts. Between the two waves of data collection, younger adolescents aged 12-15 years living in slum areas were significantly more likely than their non-slum counterparts to make the transition into first sex. Yet, slum dwellers do not necessarily fare worse in terms of the presence or absence of protective and risk factors as defined herein. Understanding attributes of the social context of urban slums that facilitate precocious sexual initiation may be essential for effective programs aimed at mitigating early sexual initiation in slum communities. Dodoo and colleagues (2007), for instance, have noted that cramped living conditions in urban slums limit privacy as parents are often forced to share sleeping space

with children, thus exposing children to sexual activity early on in life. Further, exposure to parental sexual activity may weaken adult control over their children's sexual behavior. Space constraints may also force young people to move out of parental homes to their own dwellings prematurely, providing them with opportunities to engage in risk behavior away from parental watch.

Interestingly, we observe that for males aged 16-19 years, those living in slums were less likely to make the transition to first sex than their counterparts living in non-slum areas. How do the circumstances differ for this group? This study found that the median age at first sex was 15 among males living in slum areas compared to 17 years among their counterparts living in non-slum areas. We posit that males living in slums who, despite all odds, remain virgins beyond the typical age of first intercourse in the slums may be more likely to be resilient to pressures to engage in sexual intercourse. Indeed, for adolescent males living in slum communities, peer models for conventional behavior significantly reduce their likelihood on making the transition to first sex.

Among girls living outside slum areas, being in school was associated with a lower likelihood of making the transition to first sex compared to being out-of school. Previous studies among 12-19 year old Kenyan adolescents (Ajayi *et al.* 1991), 14-22 year old South African youth (Kaufman *et al.* 2004), and among 15-24 year old Ivorian youth (Babalola *et al.* 2005) have also found school enrolment to be associated with a lower likelihood of sexual activity. As in other studies, the impact of schooling on sexual behavior appears stronger for girls than for boys. We are unable to ascertain whether sexual and reproductive health education is provided in the schools represented in our sample. Knowledge of whether a school has sex education would have provided insight into whether being in a school that offers sex education delays initiation of sexual activity. As noted by Kaufman and colleagues (2004), the impact of education on sexual behavior may differ significantly for boys and girls. The stronger effect of schooling on sexual behavior among girls in non-slum areas compared to boys may also reflect the possibility of greater dropout among girls due to pregnancy meaning that sexually experienced girls are under-represented in school samples. However, Mensch and colleagues (2001) argue that pregnancy is unlikely to be the primary reason for disruption of schooling for young girls because the same factors that lead to dropouts also lead to early childbearing. Given the potential success of schools in protecting girls, there is clearly a need for more school-based research and gender analysis in order to understand the dynamics therein and to determine how the possible benefits derived by girls from the school setting can be extended to boys as well.

Having peer models for conventional behaviors, such as friends who perform well in school, who desire to advance their education, and who participate in pro-social activities such as sports or religious activities, was associated with a lower likelihood of transitioning into first sex for males and females living in slums. In addition, for females aged 16-19 and females living in non-slum areas, increasing numbers of friends engaging in delinquent behaviors was associated with increased chances of making the transition to first sex by Wave 2. As boys and girls make the transition from childhood to adolescence, identification with peer groups becomes critical. Peers, therefore, serve as important models of appropriate behavior and also influence the extent to which young people engage in risk activities, including risky

sexual behavior (Haffner 1995, Ben-Zur 2003, Giles *et al.* 2005). Our findings are consistent with previous studies showing peers' behaviors and attitudes to be associated with adolescent sexual behavior (MacPhail and Campbell 2001, Brook *et al.* 2006). However, we are cautious to assert that peers necessarily influence adolescent sexual behavior and acknowledge that adolescents may choose friends who share similar qualities and values as themselves.

High parental monitoring at Wave 1 was associated with greater odds of transitioning into first sex by Wave 2 for females aged 12-15 years and females living in non-slum areas. This is contrary to expectations that high parental monitoring would deter young people from engaging in risk behaviors, such as precocious sexual activity. However, it is consistent with some of the literature. High parental monitoring could derive from parents' perception that a child is more likely to engage in risk behavior. Furthermore, high parental monitoring may be perceived by young women as unwarranted or overzealous strictness, which could in turn lead to actions that symbolize their own (quest for) autonomy. Rodgers (1999) for example, in a study among school going adolescents in the United States, found that sexually active females who perceived their parents as being psychologically controlling (i.e. allowing less autonomy) were more likely to engage in high risk sexual behavior than those who perceived their parents as being less controlling.

Given that first sexual intercourse is not always desired and rates of coerced sexual activity are reportedly higher in urban slums due to widespread violence and insecurity in these settings, the results of this analysis are insightful. A population-based survey conducted in Kibera slum in Nairobi, for instance, found that 43% of girls and 15% of boys aged 10-19 years reported that they were coerced into their first sex (Erulkar and Matheka 2007). Within this context, understanding factors that may predispose young boys and girls to early sexual activity is important for efforts to reduce high STD and HIV prevalence among adolescents in sub-Saharan Africa.

Our findings underscore the importance of considering the social and environmental contexts when examining pathways to first sexual intercourse among adolescents. We argue that there is need to focus on very young adolescents, particularly those growing up in resource poor settings, or those who are out of school, as these young people may be more likely to make the transition to first sex and hence, be more vulnerable to negative health outcomes stemming from precocious sexual activity. The paper also highlights the need to strengthen parents' capacity to adapt their parenting strategies to the needs of their changing/evolving adolescents.

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Table 1
Background and behavioral characteristics of adolescents by gender and sexual status
(Wave 1, 2005)

	Female			Male		
	Virgins	Transition	Non-virgins	Virgins	Transition	Non-virgins
n	705	103	284	653	86	303
	64.6%	9.4%	26.0%	62.7%	8.3%	29.1%
Socio-demographics						
Mean age (standard deviation) ^{a,b}	13.8 (1.81)	15.1 (1.62)	17.0 (1.76)	13.9 (1.88)	15.2 (1.80)	17.0 (1.67)
% Slum residence	75.7	79.6	79.6	72.3	65.1	76.9
% In school ^{a,b}	94.1	82.4	49.5	94.8	91.8	56.8
Number of adolescents in HH						
One	25.4	20.7	22.4	25.2	15.6	27.0
Two	32.5	38.0	35.4	34.9	33.8	34.3
Three	42.1	41.3	42.2	39.9	50.7	38.7
Social Context Protective Factors						
<i>Models</i>						
Mean peer models for conventional behavior (SD) ^{ab,c}	10.2 (1.42)	10.1 (1.37)	9.6 (1.73)	10.2 (1.45)	9.8 (1.71)	9.7 (1.50)
<i>Social controls</i>						
Mean perceived parental monitoring (SD) ^{a,b,d}	22.6 (4.13)	22.7 (4.09)	20.1 (4.95)	21.6 (4.50)	20.5 (4.87)	17.4 (4.80)
Social Context Risk Factors						
<i>Models</i>						
Mean peer models for unconventional behavior (SD) ^{a,b,e}	5.8 (1.30)	6.2 (1.60)	7.1 (2.02)	6.1 (1.60)	6.7 (1.93)	7.9 (2.14)
Individual Risk Factors						
% Non-penetrative sexual contact ^{a,b}	10.2	12.6	61.3	12.4	20.9	58.1
Mean delinquent behavior (SD) ^{a,b,f}	0.5 (1.23)	0.8 (1.71)	1.5 (2.80)	0.9 (1.66)	1.2 (1.92)	2.4 (3.34)
% Substance use ^{a,b}	4.7	6.8	15.5	10.0	14.0	46.2
Behavioral characteristics						
Median age at first sex						
Slum		15	15		15	15
Non slum		18	15		17	16

^aDifferences across groups are significant at p<0.05 for females;

^bDifferences across groups are significant at p<0.05 for males;

^cIncreasing values indicate higher levels of peer models for conventional behavior;

^dincreasing values indicate higher levels of parental monitoring;

^eIncreasing values indicate higher levels of peer models for unconventional behavior;

^fIncreasing values indicate higher levels of delinquent behavior

Table 2
Background and behavioral characteristics of adolescents by gender and slum residence
(Wave 1, 2005)

	Female			Male		
	Non-slum n=250	Slum n=842	Sig. ^a	Non-slum n=281	Slum n=761	Sig. ^a
Sociodemographics						
Age	15.6 (2.42)	14.6 (2.15)	***	15.5 (2.39)	14.7 (2.19)	***
% Currently in school	79.2	82.2		88.6	81.7	**
Number of adolescents in household						
One	24.6	23.9		22.6	26.0	*
Two	35.3	33.3		30.5	36.5	
Three or more	40.2	42.7		47.0	37.5	
Social Context Protective Factors						
<i>Models</i>						
Mean peer models for conventional behaviors (SD)	10.6 (1.24)	9.9 (1.55)	***	10.4 (1.38)	9.9 (1.53)	***
<i>Social controls</i>						
Mean perceived parental monitoring (SD)	21.1 (4.86)	22.2 (4.34)	***	20.4 (4.71)	20.3 (5.08)	
Social Context Risk Factors						
<i>Models</i>						
Mean peer models for unconventional behavior (SD)	6.5 (1.54)	6.1 (1.67)	***	7.0 (2.04)	6.6 (1.93)	***
Individual Risk Factors						
% Non-penetrative sexual contact	33.6	20.78	***	34.52	23.39	***
Mean delinquent behavior (SD)	0.4 (0.99)	0.9 (2.04)	***	1.1 (2.19)	1.4 (2.46)	*
% Substance use	14.8	5.6	***	22.8	20.1	

^a Significance levels for differences across groups:

p<0.001,

**
p<0.01,

*
p<0.05

Table 3
Odds ratios of explanatory variables to predict transition into first sex by Wave 2, by age group

Variables in the equation	Female	Male
	OR (95% Confidence Interval)	OR (95% Confidence Interval)
12-15 years		
Slum residence (ref. non slum)	2.0 (0.7 - 5.3)	10.0** (1.5 - 65.2)
Currently in school (ref. not in school)	0.5 (0.1 - 3.2)	0.5 (0.0 - 4.4)
Number of adolescents in HH (ref. one)		
Two	1.4 (0.6 - 3.4)	1.9 (0.5 - 7.5)
Three or more	1.0 (0.4 - 2.4)	2.1 (0.6 - 7.2)
Peer models for conventional behavior ^a	0.8 (0.6 - 1.1)	0.8 (0.6 - 1.1)
Perceived parental monitoring ^b	1.1* (1.0 - 1.2)	1.0 (0.9 - 1.1)
Peer models for unconventional behavior ^c	0.9 (0.7 - 1.1)	0.8 (0.5 - 1.2)
Non-penetrative sexual contact (ref. never)	0.6 (0.1 - 2.8)	3.1 (0.6 - 17.6)
Delinquent behavior ^d	1.4** (1.1 - 1.8)	1.0 (0.7 - 1.4)
Substance use (ref. never use)	3.3 (0.6 - 17.2)	1.3 (0.3 - 6.3)
Observations	357	336
Wald χ^2 (10)	19.08	21.19
Pseudo R^2	0.0665	0.1077
16-19 years		
Slum residence (ref. non slum)	1.0 (0.3 - 3.2)	0.3** (0.1 - 1.0)
Currently in school (ref. not in school)	0.5 (0.1 - 1.8)	1.6 (0.1 - 26.5)
Number of adolescents in HH (ref. one)		
Two	1.8 (0.5 - 7.1)	1.1 (0.2 - 8.4)
Three or more	1.0 (0.3 - 3.4)	1.7 (0.3 - 12.0)
Peer models for conventional behavior ^a	0.8 (0.5 - 1.1)	0.8 (0.6 - 1.1)
Perceived parental monitoring ^b	1.1 (0.9 - 1.2)	1.0 (0.9 - 1.1)
Peer models for unconventional behavior ^c	1.8** (1.1 - 2.8)	1.2 (0.8 - 1.6)
Non-penetrative sexual contact (ref. never)	0.3 (0.1 - 1.3)	1.0 (0.3 - 3.3)
Delinquent behavior ^d	1.2 (0.8 - 1.9)	1.3 (0.9 - 1.9)
Substance use (ref. never use)	0.4 (0.0 - 5.0)	0.5 (0.1 - 2.2)
Observations	93	94
Wald χ^2 (10)	12.54	16.04
Pseudo R^2	0.1162	0.1251

Note: 95% confidence intervals in parentheses;

^aIncreasing values indicate higher levels of peer models for conventional behavior;

^bIncreasing values indicate higher levels of parental monitoring;

^c Increasing values indicate higher levels of peer models for unconventional behavior;

^d Increasing values indicate higher levels of delinquent behavior

p<0.01,

**
p<0.05,

*
p<0.1

Table 4
Odds ratios of Wave 1 explanatory variable to predict transition into first sex by Wave 2, by area of residence

Variables in the equation	Female	Male
	OR (95% Confidence Interval)	OR (95% Confidence Interval)
Non-slum		
16-19 years (ref. 12-15 years)	4.6** (1.2 - 17.9)	57.8*** (6.2 - 541.9)
Currently in school (ref. not in school)	0.0*** (0.0 - 0.3)	1.9 (0.0 - 117.7)
Number of adolescents in HH (ref. one)		
Two	3.0 (0.5 - 18.4)	1.4 (0.2 - 10.2)
Three or more	2.4 (0.4 - 14.6)	2.8 (0.5 - 15.7)
Peer models for conventional behavior ^a	0.8 (0.4 - 1.4)	0.8 (0.5 - 1.2)
Perceived parental monitoring ^b	1.4** (1.0 - 1.8)	1.0 (0.8 - 1.1)
Peer models for unconventional behavior ^c	1.9** (1.1 - 3.2)	1.1 (0.8 - 1.5)
Non-penetrative sexual contact (ref. never)	0.3 (0.0 - 1.4)	0.9 (0.2 - 4.2)
Delinquent behavior ^d	0.7 (0.2 - 3.0)	0.9 (0.6 - 1.4)
Substance use (ref. never use)	5.8 (0.6 - 60.5)	0.7 (0.2 - 3.3)
Observations	132	154
Wald χ^2 (10)	15.93	29.37
Pseudo R ²	0.3021	0.3718
Slum		
16-19 years (ref. 12-15 years)	2.3** (1.0 - 5.1)	1.7 (0.6 - 4.8)
Currently in school (ref. not in school)	1.2 (0.3 - 4.3)	1.1 (0.1 - 12.6)
Number of adolescents in HH (ref. one)		
Two	1.3 (0.6 - 3.1)	1.5 (0.4 - 5.3)
Three or more	0.8 (0.4 - 1.9)	1.5 (0.4 - 5.0)
Peer models for conventional behavior ^a	0.8* (0.6 - 1.0)	0.8* (0.6 - 1.0)
Perceived parental monitoring ^b	1.1 (1.0 - 1.1)	1.0 (0.9 - 1.2)
Peer models for unconventional behavior ^c	0.9 (0.7 - 1.2)	0.8 (0.6 - 1.2)
Non-penetrative sexual contact (ref. never)	0.6 (0.1 - 2.5)	2.5 (0.7 - 8.8)
Delinquent behavior ^d	1.4*** (1.1 - 1.7)	1.3* (1.0 - 1.6)
Substance use (ref. never use)	0.5 (0.0 - 9.4)	0.9 (0.2 - 4.7)
Observations	318	276
Wald χ^2 (10)	16.49	11.96
Pseudo R ²	0.0576	0.0670

Note: 95% confidence intervals in parentheses;

^aIncreasing values indicate higher levels of peer models for conventional behavior;

^bIncreasing values indicate higher levels of parental monitoring;

^c Increasing values indicate higher levels of peer models for unconventional behavior;

^d Increasing values indicate higher levels of delinquent behavior

p<0.01,

**
p<0.05,

*
p<0.1

Table 5
Odds ratios of baseline explanatory variables to predict transition into first sex by Wave 2, with age-slum interaction

Variables in the equation	Female	Male
	OR (95% Confidence Interval)	OR (95% Confidence Interval)
Age slum (ref.16-19 years, slum)		
12-15 years, non-slum	0.3** (0.1 - 0.8)	0.1** (0.0 - 0.5)
12-15 years, slum	0.5 (0.2 - 1.2)	0.6 (0.2 - 1.5)
16-19 years, non-slum	1.5 (0.5 - 4.3)	3.1** (1.1 - 8.9)
Currently in school (ref. not in school)	0.5 (0.2 - 1.5)	1.3 (0.2 - 8.6)
Number of adolescents in HH (ref. one)		
Two	1.4 (0.7 - 2.9)	1.5 (0.5 - 4.2)
Three or more	1.0 (0.5 - 2.0)	1.8 (0.7 - 4.7)
Peer models for conventional behavior ^a	0.8 (0.7 - 1.0)	0.8** (0.6 - 1.0)
Perceived parental monitoring ^b	1.1* (1.0 - 1.2)	1.0 (0.9 - 1.1)
Peer models for unconventional behavior ^c	1.1 (0.9 - 1.3)	1.0 (0.8 - 1.2)
Non-penetrative sexual contact (ref. never)	0.5 (0.2 - 1.3)	1.5 (0.6 - 4.0)
Delinquent behavior ^d	1.2** (1.0 - 1.5)	1.1 (0.9 - 1.4)
Substance use (ref. never use)	1.6 (0.4 - 7.0)	0.8 (0.3 - 2.4)
Observations	450	430
Wald χ^2 (12)	32.92	45.81
Pseudo R ²	0.0817	0.1755

Note: 95% confidence intervals in parentheses;

^aIncreasing values indicate higher levels of peer models for conventional behavior;

^bIncreasing values indicate higher levels of parental monitoring;

^cIncreasing values indicate higher levels of peer models for unconventional behavior;

^dIncreasing values indicate higher levels of delinquent behavior

p<0.01,

**
p<0.05,

*
p<0.1