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Individual- and Family-Level Psychosocial Correlates of HIV Risk Behavior Among Youth in Rural Kenya

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Abstract

Associations between individual- and family-level psychosocial factors and sexual behavior were examined among 325 adolescents ages 10–18 in rural Kenya. History of sexual activity was reported by 51% of males and 30% of females. Among those reporting sex within the past year, 64% of males and 32% of females had multiple partners; 85% of males and 54% of females reported not using a condom at last sex. Multivariate logistic regression modeling demonstrated sexually active adolescents were significantly more likely to be older, male, more accepting of risky behavior, and have greater perceived HIV risk, caregiver social support, social support related to HIV, and emotional problems. Youths reporting high-risk behavior (unprotected sex or multiple partners) were significantly more likely to be younger, male, and have lower sex-related self-efficacy, lower caregiver monitoring, and more externalizing problems. Future studies should evaluate HIV prevention interventions targeting improvements in mental health and family relationships.

Keywords

HIV; Sexual risk behavior; Psychosocial; Adolescents; Kenya

Introduction

Home to 68% of the world's HIV-infected population [1], Sub-Saharan Africa (SSA) bears the largest HIV/AIDS burden in the world. Given the magnitude of the epidemic and that only a small fraction of those infected with HIV have access to treatment, prevention continues to be a top priority. Since over a third of the 22 million people infected with HIV in SSA are ages 15–24 [1], prevention efforts must target youth to curtail the spread of HIV. Researchers and policy-makers have called for increasingly sophisticated prevention science to reduce high-risk behavior using interventions informed by epidemiological data from target populations [2]. As Piot and colleagues [3] described, prevention will succeed only if “grounded in a strategic analysis of the epidemic's dynamics in local contexts (p. 2).” Within this framework, context-specific data on antecedents and correlates of HIV-related behavior are critical.

In Kenya, where 7.4% of adults are infected with HIV, the National AIDS Control Council established prevention as its first priority in 2007 [4]. Key goals of the Council include the elucidation of cultural and family dynamics in relation to HIV/AIDS, the understanding of behaviors specific to age and gender, and the creation of preventive interventions targeting especially vulnerable populations. The importance of context-specific data has become clear in Kenya. While country-wide data show decreases in high-risk sexual behavior among adults ages 15–49 [1], it remains unclear whether sexual behavior has changed in all regions and whether these shifts have occurred among youth. These gaps in knowledge of risk behavior patterns in Kenya are especially important for rural areas, where the majority of the population lives, and for areas with high HIV prevalence. Nyanza Province has the highest prevalence of HIV in the country at 15.3%, with data suggesting that adolescents and young women are disproportionately affected [5]. Evidence suggests that over 20% of youth in Kenya initiate sexual activity before age 15 and that almost half of youths ages 15–19 are sexually active [1]. Data further suggest that youth in Kenya, especially females, are likely to become infected within a short time after sexual debut, perhaps because the majority report not using condoms [6]. In one study, almost half of females ages 15–19 who reported sexual debut within the past 5 years were already infected [5].

In the Muhuru division of Nyanza, this study's location, risk of HIV is even higher than in Nyanza as a whole, as it is located directly on Lake Victoria. According to the KAIS, lakeshore communities account for 15% of the entire HIV disease burden in Kenya [7]. The well-documented concerns regarding transactional sex in fishing communities, referred to as “fish-for-sex,” likely contribute to the increased prevalence among both adults and youth in these areas, in part by affecting social norms regarding sexual activity [8]. Youth in Muhuru face additional unique challenges to avoiding behaviors and lifestyles that place them at risk for exposure to HIV, as they are faced with limited access to education, entrenched traditions of gender inequality and early marriage, and high poverty rates [9, 10]. Thus, the success of prevention programs in Muhuru and other similar areas of Kenya will depend on achieving a better understanding of the context in which youth initiate and continue high-risk sexual activity.

Several recent literature reviews have identified common themes to inform future HIV prevention efforts. While many interventions in the United States (U.S.) and SSA have improved youths' HIV-related knowledge and decreased risk behavior in the short-term, few have documented sustained behavior change [11–13]. Thus, researchers have suggested the need for multi-level interventions that address factors beyond HIV-related knowledge and beliefs [14]. Further, leaders in the field have emphasized that interventions should be culturally tailored [15] and should address context-specific risk and protective factors [16].

For youth in rural Nyanza, further research is needed to identify these context-specific risk and protective factors at the individual, family, and community levels. An emerging literature from the U.S. and SSA points to several factors associated with HIV-related risk behavior in some populations, though family and community-level variables remain largely unexamined. At the individual level, research has focused on the co-occurrence of risk behaviors, finding that early sexual debut, decreased condom use, and having older partners tend to cluster together [17, 18]. Other studies have found mixed results on associations between risk behavior and HIV-related knowledge, beliefs, and sex-related self-efficacy. Most have not found a protective effect of HIV-related knowledge [19, 20], and some have documented protective effects of higher self-efficacy and perceived HIV risk [11, 21], while others have not [19].

Individual factors beyond constructs specifically related to HIV also may be important. In some U.S. studies, poor mental health, including internalizing (e.g. depression; anxiety), and externalizing symptoms (e.g. substance use; truancy), has been associated with early sexual debut, increased sexual activity, less condom use, and multiple partners [22–25]. Unfortunately, despite some attention to mental health of those infected/affected by HIV/AIDS [26, 27], to our knowledge, no studies have examined mental health correlates of HIV-related risk behavior in SSA. At the interpersonal level, several studies have found that parenting and peer relationships are related to risk behavior. Among inner-city youth in the U.S., quality of parent–child communication about sex has been associated with lower risk behavior [28, 29]. Further, a review by Dilorio et al. [2003] documented that the relationship between parent and child communication about sex and risk behavior may be moderated by youth gender, parenting style, parents' values about sex, timing of discussions, and quality of communication [30]. Youth perceptions of parental disapproval of adolescent sexual behavior [31, 32], high parental supervision [33], and perception of peer norms also have been associated with adolescents' risky sexual behavior [34, 35]. Studies in SSA have focused more on the dynamics of sexual partnerships and suggest that sex among youth often occurs within transactional and coercive relationships, which are associated with a higher risk of HIV transmission [36–39]. To our knowledge, the only community-level factor that has been examined empirically in SSA is girls' education. One study documented that girls who completed secondary school were less likely to be infected with HIV [40] and another found that providing school uniforms led to reduced childbearing among school-aged girls [41].

The aim of this study was to identify individual- and family-level psychosocial correlates of HIV-related risk behavior, including HIV knowledge and beliefs, mental health, and relationship factors among youth in Muhuru Bay, Kenya. Our design and hypotheses were guided by ecological systems theory, which highlights multiple individual, family and community system influences on youths' behavior and developmental outcomes [42]. In accordance with NIMH's definition of the family as a network of mutual commitment [43], we hypothesized that mental health and facets of youth-caregiver relationships, such as social support youth receive, would be significantly related to risk behavior [42]. Further, we expected that the strength of these associations would meet or exceed associations between risk behaviors and HIV-related factors that have traditionally been evaluated (e.g., transmission knowledge and beliefs). We controlled for age and gender in all models, as we hypothesized that these might affect the magnitude, though not the direction, of the correlates under examination. Our overarching goal was to inform the development of an ecologically valid prevention intervention [44] by identifying factors that can be targeted to reduce sexual risk behavior among youth in this context.

Methods

Participants and Procedures

Adolescents were randomly selected from pupils enrolled in Standards 5–8 in the 14 schools (9 public; 5 private) in the Muhuru Division of Nyanza, Kenya. Each had between 21 and 339 pupils in the target age range. Schools varied in standardized test scores, though all had below average scores compared to country-wide data. All schools reported some knowledge of the national HIV curriculum but use varied widely. Of the 1,847 pupils on school rosters, 353 were selected. Of these, 326 adolescents (92.4%) participated; 25 could not be located, and one caregiver declined participation. The final N was 325 because one participant was found to be out of the age range. Participants completed a 90-min structured interview administered by trained research assistants using electronic devices to enter responses. Surveys were administered in private areas near participants' schools or homes, and a bar of soap was given as a token of appreciation. Institutional Review Boards at Duke University and Kenya Medical Research Institute approved procedures. All study documents and measures were translated into Dholuo, the local language, and back translated by native Dholuo speakers also fluent in English.

Measures

Sexual Risk Behaviors—The following behaviors were assessed: history of sexual activity, including vaginal, anal, or oral sex (yes/no); sexual activity in the past year (yes/no); number of sex partners in the past year; and condom use at last sexual encounter (yes/no). Youth who were sexually active in the past year were categorized into two “sex risk” levels. High risk was defined as having more than one partner in the past year *or* not using a condom at last sexual encounter; low risk was defined as having only one partner *and* using a condom at last sexual encounter.

HIV-Related Psychosocial Factors—HIV knowledge was assessed with an 18-item scale of yes/no questions adapted from the HIV Knowledge Questionnaire [45] (e.g. “Is there a vaccine or medicine that can stop adolescents and adults from getting HIV?”). Twelve of these items were used previously in a study in South Africa [46]. Items were chosen based on myths commonly reported in this community, and some questions were simplified for youths. Percentage correct was computed. Sex-related self-efficacy was measured with a 5-item scale; four items assessing condom use and sex refusal self-efficacy were adapted from a longer scale [47], and one item was added to assess self-efficacy for refusing sex with an older person. Similar items have been used in studies in SSA [47, 48]. A sum score was computed ($\alpha = .64$). Sex beliefs were assessed with 16 items about the acceptability of risk behaviors, condom use and effectiveness, and acceptability of forced and transactional sex (e.g. “It is ok for men to have many sexual partners; it is okay to have sex with a person so they will buy you things”). Participants used a 4-point Likert scale to indicate their level of agreement with each statement ($\alpha = .68$). A sum score was calculated with higher scores representing beliefs that were more “risky.” Perceived HIV risk was measured with one item asking participants to rate their likelihood of contracting HIV on a 3-point scale based on their behavior over the past 3 months.

Caregiver Relationship and Social Support Factors—For questions related to caregivers, participants were asked to identify the one or two adult(s) in their household most involved in their daily care and supervision and to answer based on their relationships with these individuals. Caregiver monitoring was assessed with seven items asking about caregiver supervision and knowledge of youths' whereabouts [49]. Participants used a 4-point Likert scale ($\alpha = .53$). Youths also reported how frequently they left home at night on a 4-point scale. Caregiver social support was assessed with eight items adapted from the

Parental Social Support for Adolescents (PSSA) Scale [50]. Items assessed youths' perceptions of the levels of caring and understanding in their relationship with their primary caregiver using a 4-point Likert scale (e.g., "Your caregiver cares about your feelings"; $\alpha = .87$). Sum scores were calculated for both measures.

Two measures assessed caregiver-youth communication. Frequency of communication about sex and HIV (e.g., "How often have you and your parent(s)/guardian talked about how to use a condom?") was assessed using five items from the Parent Adolescent Communication Scale [51] plus two additional items about puberty and circumcision. Participants used a 4-point Likert scale ($\alpha = .81$). Potential barriers to caregiver-youth communication about sex and HIV were assessed with 16 items adapted from the Parent/Adolescent Communication—Jaccard measure [28] (e.g., "You would only make your parent suspicious of you if you tried to talk to her about sex, family planning, and HIV"). Participants used a 5-point Likert scale ($\alpha = .85$).

The Social Support for Adolescents Scale [52] was used to assess emotional support, material support, and relationship satisfaction. Participants used a 4-point scale to rate the helpfulness of 14 types of people (e.g., parent, church members) in each of the three areas (e.g., "How helpful are your close friends when you talk to them about a personal problem?"; "How helpful is your father when you need money and other things?"). Responses were summed across types of support ($\alpha = .95$). Social support related specifically to receiving information about sex and HIV was assessed with the same measure; responses were summed and entered as a separate variable.

Mental Health Factors—The Strengths and Difficulties Questionnaire (SDQ) was used to assess emotional and conduct problems [53, 54]. Participants rated statements about their own emotions and behaviors. Emotional and conduct problems were assessed with five items each ($\alpha = .59$, entire scale). Example items included: "You worry a lot." (emotional symptom), "You take things that are not yours from home, school or else-where" (conduct problem). The SDQ has been used in studies in several countries of SSA [55–57]. Depression symptoms were assessed using the 27-item Children's Depression Inventory [58] (CDI; $\alpha = .66$). For each item, participants chose one of three statements that best described their mood or behavior over the past 2 weeks (e.g., "Which statement describes how you have been feeling over the past 2 weeks? Nobody really loves me, I am not sure if anybody loves me, or I am sure that somebody loves me?"). The CDI has been used previously in SSA [59].

Exposure to trauma was assessed with 10 items selected from the Things I Have Seen and Heard Child Self-Report [60]. Participants reported whether they had experienced certain traumatic events, including serious physical illness, injury, physical or sexual abuse, or death. Traumatic stress symptoms were assessed with the Abbreviated UCLA PTSD Reaction Index for DSM IV [61]. This index has been used and validated for youth in multiple countries, including Mozambique in SSA [61]. Participants used a 5-point scale to rate their symptoms related to the one event that continued to cause them the most distress (e.g., "How much do you try not to talk about, think about, or have feelings about what happened?"; $\alpha = .74$).

Self-esteem was assessed with the 10-item Rosenberg Self-Esteem Scale [62]. Participants used a 4-point scale to rate their perception of their abilities and self-worth (e.g., "You believe you are able to do things as well as most other people"; $\alpha = .69$). This measure has been validated in numerous regions, including East Africa [63]. Hope and optimism were assessed with six items from the Children's Hope Scale [64]. Participants used a 3-point scale to rate how capable and likely they are to do well in life across domains ($\alpha = .70$).

Data Analysis

Participant characteristics and descriptive statistics for risk behaviors were computed using means and proportions. Two sets of logistic regression models were run to identify correlates of sexual activity and sex risk level. Predictor variables included demographics, HIV-related psychosocial factors, caregiver relationship and social support variables, and mental health factors. In the first model, we identified correlates of history of sexual activity (yes/no) in the full sample. In the second, we identified correlates of sex risk (high/low) among youth reporting sexual activity in the past 12 months. In both, variables associated with the outcomes at $p < .10$ in bivariate analyses were included in the multivariate models. Age and gender were entered in the first block, and other predictors were entered in the second block to determine if they accounted for significant variability above and beyond age and gender. To determine whether correlates of HIV risk behavior differed between males and females, interaction terms were added one at a time to the multivariate models [65]. Analyses were conducted in SPSS 17.0.

Results

Participants included 158 males and 167 females ages 10–18 years ($M = 14.0$; $SD = 1.7$). Over half were part of the Luo tribe (54.8%), and all others were Suba (43.1%) or Luo/Suba (1.2%). Reported weekly income varied widely with many families reporting no income, though the median was \$5.38 USD. Most participants (69.1%) listed a biological parent as primary caregiver (20.9% fathers; 46.8% mothers). The next largest group (22.7%) reported being cared for by another extended family member, such as an aunt or uncle, but not a grandparent (17.2% female relatives, 5.2% male). A smaller percentage (8.6%) listed a grandparent as primary caregiver, with 7.7% of youth cared for by a grandmother and only approximately 1% by a grandfather. A very small percentage (.6%, $n = 2$) listed a non-relative adult and both of these caregivers were male. All youth reported having primary caregivers; no participants were married, had full-time employment, were caring for their own children, or were engaged in any other full-time activities that would indicate they had made a lifestyle transition to adulthood.

Males were more likely than females to have a history of sexual activity (51.3%; $n = 81$ vs. 29.9%, $n = 50$, $\chi^2(1) = 15.4$, $p < .001$), and age at first intercourse was younger for males ($M = 12.2$ years; $SD = 2.2$, Median = 12) than females ($M = 13.1$ years; $SD = 2.0$, Median = 13; $t(128) = -2.4$, $p < .05$). As shown in Table 1, among sexually active youths, the majority of males (82.6%) and almost half of females (45.2%) did not use a condom the most recent time they had sex ($\chi^2(1) = 16.9$, $p < .001$); 42.0% of males and 20.0% of females had multiple partners within the past year ($\chi^2(1) = 6.7$, $p < .05$). Taken together, most sexually active males (91.3%) and over half of sexually active females (57.1%) were classified as “high risk” either for having multiple partners in the past year or not using a condom at last sex ($\chi^2(1) = 18.0$, $p < .001$).

Table 2 presents each psychosocial variable by gender. On HIV-related psychosocial factors, the only significant gender difference was that females reported lower levels of beliefs associated with risky behavior. For caregiver relationship and social support factors, females reported significantly higher monitoring and frequency of communication with caregivers about sex and HIV, and lower levels of barriers to communication with caregivers about issues of sex and HIV; however, they reported lower overall social support than males. On mental health variables, males reported higher levels of hope.

Correlates of Sexual Activity

Table 3 summarizes bivariate and multivariate logistic regression analyses examining correlates of sexual activity. Age and gender were included as covariates in all models. Variables associated with sexual activity at $p < .10$ in bivariate analyses included age and gender, all HIV-related factors except for HIV knowledge, several caregiver relationship and social support factors, and three mental health variables. In the multivariate model, significant correlates ($p < .05$) of sexual activity were older age, male gender, more “risky” sex beliefs, higher perceived HIV risk, higher levels of caregiver social support, high levels of social support related to sex/HIV, and more emotional problems. See Table 3 for adjusted odds ratios. This model significantly improved prediction over a constant only model (Model $\chi^2(13) = 142.89$; Nagelkerke $R^2 = .49$). One significant gender interaction effect was found for caregiver social support (AOR = .76, $p < .001$, CI 95% = .63–.88). To explore this interaction, simple effects for logistic regression were calculated; sexual activity was associated with higher caregiver social support for males (AOR = 1.13, 95% CI = 1.03–1.25), but not for females (AOR = .99, 95% CI = .92–1.08).

Correlates of High-Risk Sexual Behavior

Table 4 presents bivariate and multivariate logistic regression analyses examining level of sex risk among sexually active youths. Variables significantly associated with high-risk sex at $p < .10$ in bivariate analyses were age, gender, sex-related self efficacy, caregiver monitoring, frequency of going out at night, frequency of caregiver-youth communication, general social support, and conduct problems. In the multivariate model, correlates of high-risk sex significant at $p < .05$ were younger age, male gender, lower sex-related self efficacy, lower caregiver monitoring, and more symptoms of conduct problems. Adjusted odds ratios are reported in Table 4. This model significantly improved prediction over a constant only model (Model $\chi^2(9) = 43.80$; Nagelkerke $R^2 = .51$). No significant gender interaction effects were found.

Discussion

This study is among the first in SSA to examine relationships between sexual risk behavior and both individual- and family-level psychosocial factors. Our focus on mental health and youth-caregiver relationships is unique among studies in Africa, as most have focused on HIV-related knowledge, attitudes, and beliefs. The inclusion of younger youths also begins to fill a gap, as less is understood about their risk factors despite evidence that many are sexually active by early adolescence [1]. Results documented that many youths are engaged in sexual activity, having unprotected sex, and having sex with more than one partner within a year. Data supported the overall hypothesis that risk behavior would be associated with a combination of HIV-related psychosocial factors, caregiver relationship and social support characteristics, and individual mental health factors.

Sexually active youths endorsed beliefs more accepting of risk behavior and perceived themselves to be at higher risk for HIV than their non-sexually active peers. This contrasts with evidence that *lower* perceived risk is related to *riskier* behavior [11]. Our results suggest that sexually active youth may understand the connection between their behavior and elevated risk, though their understanding of risk is not associated with desirable changes in beliefs; those who perceived themselves to be at high risk also reported higher acceptance of risk behaviors (e.g., unprotected sex). One possible explanation is that youth develop beliefs based on their behavior, rather than the other way around. Though cognitions can influence health-related behaviors [66, 67], engaging in behaviors also can change one's cognitions [68, 69]. This is one potential reason that changing beliefs may not be sufficient; it may be necessary to target risk behaviors directly.

Sexually active youth also reported *more* social support for obtaining information about sex and HIV. Further, for males, *more* social support from caregivers was related to *higher* likelihood of sexual activity. This was surprising, as social support is typically regarded as protective. It is possible that sexually active youth may seek out this support because they have more questions about sex and HIV, but the *type* of messages provided in this context also must be considered [70]. For instance, in many ways, it is socially normative in this community for males to have early sexual debut as a sign of maturity and strength [71]. Further, in coastal communities, males often begin fishing during adolescence with their caregivers. Because transactional sex is common in fishing areas [37], male youths and caregivers may spend some earnings to initiate sexual relationships. Therefore, males receiving more “support” in these ways may actually be receiving messages—explicitly and via modeling—that they *should* be sexually active.

Youth who reported more symptoms of emotional problems also were more likely to be sexually active. This is important for prevention, as unaddressed mental health problems may be a barrier to adolescent behavior change not addressed in most interventions [72]. Youth may have sex to seek support to cope with emotional difficulties or as a distraction from emotional stress [24]. Additionally, emotional distress can compromise decision-making abilities and decrease self-efficacy and motivation for making behavioral changes [73]. In Nyanza, it is also probable that some youths’ emotional difficulties are closely tied to poverty, disease, and lack of access to future education; they may feel that engaging in sex is one way to access resources and security (e.g., by receiving gifts for sex; getting married) and thereby alleviate distress.

Among sexually active youth, high risk behaviors were associated with being younger and male. While older males were the most likely to be sexually active, the younger sexually active males were most likely to have high-risk sex (i.e., without condoms; multiple partners). This is consistent with other data from Kenya and Nyanza [1, 37,71]. Younger youths may have less access to HIV information, less access to condoms, and perhaps less mature decision-making abilities. This certainly underscores the importance of including them in interventions.

Caregiver monitoring was associated with lower risk behavior and conduct problems were associated with higher risk behavior. These are likely related, as monitoring has been associated consistently with behavior problems, including sexual risk behavior [74–76]. Therefore, teaching caregiver monitoring and behavior management skills within HIV prevention interventions could decrease both sex risk and other unwanted behaviors. It may seem contradictory that caregiver monitoring was related to lower risk sex, while caregiver social support was associated with higher likelihood of sexual activity for males. However, these may be independent constructs (Pearson $r = .16$). Caregiver social support reflects youths’ perceived connection with caregivers, whereas monitoring reflects specific interactions to track where/how youth spend time. Therefore, influences of social support may depend on the *types* of messages from caregivers while effects of monitoring may be more straightforward, restricting opportunities for sexual activity and increasing motivation to avoid consequences of unprotected sex.

Across caregiver monitoring, communication, and social support, gender differences also emerged that warrant further examination. For example, females reported more monitoring from caregivers and more communication with them about sex and HIV, but lower overall levels of social support. This may suggest that caregiving efforts towards female youths may be more focused on preventing negative behaviors (e.g., restricting behaviors, warning about HIV) and less focused on providing material social support and building the positive aspects of youth-caregiver relationships. In contrast, for males, caregivers may emphasize fostering

camaraderie and de-emphasize managing behavior and communication about risks of sexual activity.

This study has potentially important implications for HIV prevention in SSA. Results suggest that targeting psychosocial needs of youth and families could increase intervention efficacy by addressing potential antecedents of risk behaviors beyond HIV-related knowledge and attitudes. Future studies should test the efficacy of treating mental health symptoms and teaching caregivers to monitor youths' behavior and to provide social support that does not encourage risky sexual behavior. These targets should not replace others (e.g., self-efficacy) targeted in existing interventions that also were related to risk behavior in this study. Rather, there is potential value of combining approaches for sustainable behavior change. For Muhuru and similar communities, results elucidate specific individual and family factors that need to be addressed in ways that take into account the challenges of this context, such as limited access to mental health care, limited economic opportunities, and cultural norms and beliefs that can be barriers to HIV prevention. Results also support the need to recognize gender differences. While most risk factors were shared across genders, males had higher rates of risk behavior. This, coupled with males' higher power in sexual decision-making [77], highlights the importance of building male youths' risk reduction skills, as their behavior change may have a larger impact than improvements in females' knowledge and skills. The influence of caregiver relationships also may differ across gender, perhaps due to differences in cultural expectations for men and women. Therefore, interventions should incorporate gender and context-specific instruction for families and communities on ways to support youths' HIV prevention behaviors.

Though results show that constructs in this study explained a practically significant amount of the variance in risk behavior, one limitation is that we undoubtedly did not include all variables that may influence risk. Another limitation is the smaller sample size of sexually active youth for analyses on unprotected sex and multiple partners; these were not powered to detect the significance of effect sizes that may be meaningful. The cross-sectional design also precludes conclusions about the directions of observed relationships. This is particularly evident in analyses of measures (e.g., the CDI) that assess recent symptoms, making it more difficult to assess whether factors preceded risk behavior. Prospective, longitudinal studies are needed to understand if correlates of behavior are truly antecedents of risk behavior and to conduct a more developmentally-focused analysis of risk behavior across ages and levels of sexual maturity.

Our measures also were limited in that self-report data can be subject to bias. Additionally, we did not include potentially important constructs, such as socioeconomic status, and frequency of sexual activity because our measures did not seem reliable. Further, some measures were developed and normed on Western populations and had only moderate reliability in our sample; therefore, we may not have captured some nuances of psychosocial functioning. Psychometric studies are needed to determine the validity of measures to assess these constructs in SSA and Kenya specifically. The use of random selection of study participants and the high participation rate are significant strengths of this study. However, future studies should extend data collection to include out-of-school youth, whose risk profiles may be different, and to assess community-level factors, such as access to education and structural effects of poverty.

This study makes an important contribution to the literature on factors related to youth sexual risk behavior by examining multiple mental health and family-level psychosocial factors in a rural community in SSA. Identifying factors associated with HIV risk behavior in this region is important given the challenges of developing effective HIV prevention strategies for youth in low-resource areas with generalized epidemics. Results point to the

potential benefits of expanding HIV prevention interventions to address youths' emotional problems and to improve the quality of social support and behavior monitoring within families. Though further research clearly is needed before making any policy recommendations, HIV prevention may be more effective if these broader psychosocial factors are addressed in addition to targets of existing HIV prevention interventions that focus on knowledge, beliefs, and skills for risk reduction.

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Table 1

Descriptive statistics for sexual risk behavior of youth sexually active in past 12 months

	All sexually active (N = 111)	Males (n = 69)	Females (n = 42)
No condom at most recent sex, % (n)	68.5% (76)	82.6% (57)	45.2% (19)
Multiple partners, % yes (n)	39.6% (44)	49.3% (34)	23.8% (10)
Sexual risk classification, % high risk (n)	78.4% (87)	91.3% (63)	57.1% (24)

Table 2

Descriptive statistics for predictive variables by gender

	Males (N = 158)		Females (N = 167)		t	df
	M	SD	M	SD		
Age	13.95	1.67	13.98	1.52	-.15	323
HIV-related psychosocial factors						
HIV knowledge	82.35	9.33	82.13	9.96	.20	323
Sex-related self efficacy	19.23	5.03	18.87	5.13	.63	322
"Risky" sex beliefs	29.09	5.01	27.90	4.16	2.32*	320
Perceived HIV risk	.35	.586	.24	.57	1.69	323
Caregiver relationship and social support factors						
Caregiver monitoring	24.28	3.14	24.93	2.27	-2.15*	323
Going out at night: frequency	.86	1.06	.56	.91	2.79**	323
Caregiver social support	27.46	3.43	27.13	4.09	.80	322
Communication: frequency	5.54	5.08	7.13	6.13	-2.56*	322
Communication: barriers	39.75	10.95	36.31	9.69	3.00**	322
Social support: general	39.24	13.73	35.65	11.33	2.56*	322
Social support: related to sex/HIV	1.52	.78	1.64	.75	-1.38	323
Mental health factors						
Emotional problems	4.04	2.48	4.34	2.25	-1.13	323
Conduct problems	.91	1.06	.78	1.14	1.04	323
Depression symptoms	7.39	4.54	7.70	4.15	-.63	322
Traumatic events	4.06	3.14	3.89	2.71	.54	323
Traumatic stress	13.24	6.02	13.83	5.58	-.86	287 ^a
Self esteem	21.30	3.52	20.63	3.80	1.64	323
Children's hope scale	8.22	1.91	7.96	2.35	1.11**	323

^aFewer children have scores for traumatic stress because they did not endorse any current distress related to a past event* $p < .05$,** $p < .01$,

100 > *p* < .001

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Table 3
Bivariate and multivariate logistic regression models predicting sexual activity ($n = 325$)

Predictor	Bivariate analyses		Multivariate analyses	
	OR	95% CI	Adjusted OR	95% CI
Demographics: control variables ^a				
Age	1.64***	1.39, 1.93	1.80***	1.44, 2.25
Gender	.406***	.26, .64	.35***	.19, .67
HIV-related psychosocial factors				
HIV knowledge	1.01	.99, 1.03		
Sex-related self efficacy	.94***	.89, .98	.95	.89, 1.02
"Risky" sex beliefs	1.07**	1.02, 1.13	1.09*	1.01, 1.19
Perceived HIV risk	5.73***	3.33, 9.87	3.99***	2.11, 7.56
Caregiver relationship and social support factors				
Caregiver monitoring	.99	.92, 1.08		
Going out at night: frequency	1.57***	1.25, 1.98	1.18	.88, 1.60
Caregiver social support	1.05 ⁺	.99, 1.12	1.15**	1.04, 1.26
Communication: frequency	1.02	.98, 1.06		
Communication: barriers	1.04***	1.02, 1.06	1.02	.99, 1.06
Social support: general	1.02**	1.01, 1.04	.99	.97, 1.03
Social support: related to sex/HIV	1.30 ⁺	.97, 1.74	1.61*	1.01, 2.57
Mental health factors				
Emotional problems	1.18***	1.07, 1.29	1.28**	1.11, 1.48
Conduct problems	1.22*	1.00, 1.50	.99	.75, 1.31
Depression symptoms	1.04	.98, 1.09		
Traumatic events	1.13***	1.04, 1.22	1.08	.97, 1.20
Traumatic stress	1.03	.98, 1.07		
Self esteem	1.03	.97, 1.09		
Hope	.94	.85, 1.04		

Note: Only variables related to sexual activity at $p < .10$ were included in the multivariate analysis

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^aAge and gender were entered in a first step as covariates. All other variables were entered simultaneously. For the final multivariate model, Nagelkerke $R^2 = .49$

⁺ $p < .10$,
* $p < .05$,
** $p < .01$,
*** $p < .001$

Table 4

Bivariate and multivariate logistic regression models predicting high-risk sex^a among sexually active youth ($n = 111$)

Predictor	Bivariate analyses		Multivariate analyses	
	OR	95% CI	Adjusted OR	95% CI
Demographics: control variables ^b				
Age	.67**	.50, .89	.50**	.31, .80
Gender	.127***	.05, .36	.07***	.02, .30
HIV-related psychosocial factors				
HIV knowledge	1.01	.97, 1.06		
Sex-related self efficacy	.92 ^a	.83, 1.01	.86 [*]	.74, .99
“Risky” sex beliefs	1.05	.96, 1.16		
Perceived HIV risk	1.17	.61, 2.26		
Caregiver relationship and social support factors				
Caregiver monitoring	.78 [*]	.65, .97	.69 [*]	.51, .93
Going out at night: frequency	1.55 ^a	.96, 2.45	1.12	.61, 1.03
Caregiver social support	1.01	.88, 1.15		
Communication: frequency	.90**	.83, .98	1.03	.91, 1.16
Communication: barriers	1.01	.96, 1.05		
Social support: general	1.04 [*]	1.00, 1.08	.99	.94, 1.04
Social support: related to sex/HIV	.69	.38, 1.27		
Mental health factors				
Emotional problems	1.05	.87, 1.26		
Conduct problems	1.70 [*]	1.01, 2.84	2.04 [*]	1.03, 4.03
Depression symptoms	1.06	.95, 1.18		
Traumatic events	.10	.87, 1.15		
Traumatic stress	.97	.89, 1.05		
Self esteem	1.04	.92, 1.18		
Hope	1.17	.94, 1.45		

Note: Only variables related to sex risk level at $p < .10$ were included in the multivariate analysis

^aSex Risk was coded as 0 = condom at last sex and only one partner (past 12 months) and 1 = no condom at last sex or more than one partner (past 12 months)

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^b Age and gender were entered in a first step as covariates. All other variables were entered simultaneously. For the final multivariate model, Nagelkerke $R^2 = .51$

^a $p < .10$,
* $p < .05$,
** $p < .01$,
*** $p < .001$