A Multi-level Model of Sexual Behavior among Young people in Nyanza, Kenya

Eric Y. Tenkorang

Eleanor Maticka-Tyndale

ABSTRACT

Although several studies have emphasized the relevance of school and community level variables to AIDS prevention among young people in sub-Saharan Africa, few have tested the empirical connections between such variables and sexual behaviors. Using data collected from 3645 sexually active grade 6 and 7 students from 160 schools and applying hierarchical linear models, this study estimates the impact of individual, school and community level variables on condom use among sexually experienced young people in Nyanza, Kenya. Four separate models were fit for both males and females. For all models, we observed significant differences across schools with respect to condom use. An attempt was made to capture this heterogeneity by introducing variables at individual, school and community levels. In multivariate models including all variables, the individual- level predictors of reported condom use for both males and females were ethnicity, being pressured to engage in sexual intercourse, and condom self-efficacy. . Age, religion, socio-economic status, rejecting myths related to the spread of HIV, perception of one's own risk of acquiring HIV, and talking to relatives about HIV/AIDS were also significant predictors of reported condom use for males. For females, factual knowledge and abstinence self efficacy were additional significant predictors. At the school and community levels only the socio-economic status of the school was significant for both sexes. Sponsorship of the school by a religious group and the availability of condoms at community clinics had significant effects on reported condom use for males, while for females, including HIV prevention messages in community festivals significantly contributed to reported condom use. Our results suggest that there are

marked differences in factors influencing reported condom use among males and females in Nyanza, Kenya. They also suggest that the social environment, in this case the school and community, impacts significantly on the sexual behaviors of youth.

Based on our findings, we recommend that AIDS prevention interventions take account not only of individual-level factors, but also school and community influences on the sexual behaviours of youth.

Keywords: Kenya, HIV/AIDS, condom use, youth, hierarchical linear models.

INTRODUCTION

Sub-Saharan Africa (SSA) had 67% of the globe's 33 million HIV infected people in 2007 and has maintained its position as the world region most heavily affected by the AIDS pandemic (UNAIDS, 2008). Kenya is among the countries in SSA that have experienced some success in reducing infection rates since the mid-1990s with HIV prevalence among 15-49 year old women estimated at 8.7% and men at 4.6% in 2007 compared to figures around 15% in the late 1990s (UNAIDS, 2007). This is credited to both improved accuracy in procedures for estimating rates of HIV infection as well as measurable reductions in behaviours that carry a risk of infection. For youth (15-24 years of age), the latter include reductions in the number who have engaged in sexual intercourse (decreasing from 56% to 41% for males and 32% to 21% for females between 1998 and 2003; UNAIDS, 2007: 14-15), reductions in multiple sexual partners, and decreases in reported condom-free sexual activity (UNAIDS, 2007: 15). Despite these gains, the 2008 UNAIDS *Report on the Global AIDS Epidemic*, estimated that among 15-24 year olds in Kenya, 4.6-8.4% of women and 0.8-2.5% of men were infected with HIV, suggesting that infection, for many, occurs during youth. With the majority of young people in most countries initiating sexual activity before reaching 18 years of age (Wellings et al., 2006), condom use becomes an important line of defense against HIV infection. This paper used data collected in 2002 and 2003 in 160 schools and communities in Nyanza Province, Kenya to examine the influence of individual, school and community-level variables on condom use among standard 6 and 7 primary school students.[1]

[1] Approximately equivalent to North American grades 6 and 7.

A number of studies have investigated the psycho-social determinants of sexual activity, including condom use, of young people in Kenya (Akwara et al., 2003; Maticka-Tyndale et al., 2005; Nzioka, 2000; Tenkorang & Maticka-Tyndale, 2008; Tenkorang et al., 2009; Zulu et al., 2002). While the majority of these studies, as well as similar studies across SSA, acknowledge the relevance of socio-cultural as well as psychological influences on the sexual behaviors of young people, the focus of analysis has been on psychological or intra-personal influences. When social influences are taken into account, they most often are measured at the individual-level with variables such as respondent's age, ethnicity, religion, and socio-economic status and are modeled as controls rather than variables of prime interest. A major reason for this is the reliance on AIDS prevention models and programmes that emphasize individual characteristics such as knowledge, attitudes, and skills rather than structural, cultural and environmental factors that contribute to vulnerabilities to HIV infection. Given the strong community orientation (Caldwell et al., 1997; Maticka-Tyndale et al., 2005), together with the socio-cultural and economic conditions prevailing in most SSA countries, it behooves us to pay closer attention to community-level influences and to adopt multi-level frameworks when investigating factors that influence adolescents' sexual behaviours. In this paper we use a combination of the Information-Motivation-Behavior Skills (IMB) Model developed by Fisher and Fisher (1992; 1993; 2000) and salient community-level factors identified by Campbell (2003) as influencing youths' ability to take a self-protective stance toward HIV.

Theoretical Frameworks

The IMB model belongs to the social-cognitive group of models designed to

explain the take-up of health-enhancing sexual behaviours. It has demonstrated effectiveness in predicting both sexual initiation and condom use (Fisher & Fisher, 1992; 1993; 2000; Tenkorang & Maticka-Tyndale, 2008). According to the IMB model, engaging in a self-protective behavior (such as condom use during sexual intercourse) is influenced by knowledge about the association of the behavior in question with risk reduction, being motivated, and having the requisite self efficacy and skills to engage in the self-protective behavior. In the area of knowledge, it is important to consider both factual knowledge and knowledge that debunks local myths about AIDS transmission and prevention. Local myths that portray HIV as transmitted through supernatural or mundane daily contacts and activities are widespread in SSA and encourage people to view HIV as nearly impossible to avoid, detracting from prevention, particularly if prevention requires individuals to behave contrary to local customs (Kiragu, 2001; Tenkorang & Maticka-Tyndale, 2008). In fact, our previous study examining factors that influenced the timing of first sexual intercourse among youth in Nyanza Province showed that endorsement of local myths about AIDS prevention led to earlier sexual intercourse, with implications for HIV transmission (Tenkorang & Maticka-Tyndale, 2008). Besides knowledge, a variety of factors have been identified as motivating youth to indulge in sexual behaviours that carry some risk of HIV infection. The socio-economic environment prevailing in most countries of SSA has been identified as encouraging risky sexual behaviours, especially among young girls (Luke, 2003; Maticka-Tyndale, et al., 2002; Maticka-Tyndale et al., 2005; Okonofua, 2000; Orubuloye et al., 1994). According to Zulu et al. (2002), the inexperience, likelihood of acquiescence to male authority, and the economic dependence on male partners puts women at a higher risk of contracting

HIV than men, especially when they are dealing with older partners. Pressure from peers and community members to engage in sex, together with the consequences of not doing so, have been shown to motivate Kenyan youth to engage in early sexual activity (Maticka-Tyndale et al., 2005; Nzioka, 2000; Tenkorang & Maticka-Tyndale, 2008). Factors that may motivate youth to take-up risk-reducing behaviours such as abstaining from sexual activity or using condoms include perception of AIDS as serious and that one is at risk of contracting HIV (Ajzen & Fishbein, 1980; Bandura, 1994; Catania et al., 2004; Rosenstock, 1974). Studies in South Africa, for instance, have shown that perceiving oneself as being at risk and knowing someone who has died of AIDS (evidencing its seriousness), delayed first sexual intercourse (Anderson et al., 2007; Tenkorang et al., 2009). Besides knowledge and motivation, behavioral self efficacy or the conviction that one is able to perform a particular behavior (e.g., to abstain from sex or to use a condom) is required. For example, abstinence self efficacy proved influential in our earlier study of the timing of sexual debut (Tenkorang & Maticka-Tyndale, 2008), but only for boys. Although girls were more convinced of their ability to abstain from sexual intercourse (i.e., had higher abstinence self efficacy) than were boys, we theorized, with support from qualitative data (Maticka-Tyndale et al., 2002; Nzioka, 2001; Zulu et al., 2002), that the cultural positioning of women in sexual encounters impeded their ability to act on these convictions. All components of the IMB model were useful in explaining the timing of first sexual intercourse in upper primary school students in Nyanza, Kenya (Tenkorang & Maticka-Tyndale, 2008). However, its focus on individual-level factors limited its predictive power. Several researchers have noted similar results, leading to the recommendation for examination of social, cultural and economic

environments that create the conditions that facilitate or inhibit individual action (Beeker et al., 1998; Campbell, 2003; Tawil et al., 1995; Waldo & Coates, 2000).

While the influence of community-level conditions is acknowledged, there are few studies that do more than merely enumerate the socio-demographic characteristics of individuals in their analyses. For example, several studies in SSA have demonstrated associations between socio-economic status at the individual level and sexual behaviour (e.g., Kaufman et al., 2004; Tenkorang et al., 2009; Uthman & Kongnyuy, 2008). Few, however, have empirically examined the processes through which socio-economic status exerts an influence. In her critical review of such studies, Janet Wojcicki (2005) elaborated the differential impacts of socio-economic conditions on women's risk of HIV infection in countries in Eastern, Southern and Central Africa. Inconsistencies in the influence of socio-economic status on sexual behavior were explained by general and comparative wealth in communities as well as the gender norms underpinning marital status and age. Wojcicki's (2005) results clearly illustrated that it is insufficient to consider socio-economic status at the individual level devoid of the economic, social and cultural context in communities where respondents live.

Rob Stephenson (2009) published one of the few studies that measured economic conditions at the community level. He applied the community opportunity model originally developed in the United States by Billy and his colleagues (1994), to analyze Demographic and Health Survey data from Burkina Faso, Ghana and Zambia. Stephenson demonstrated that community economic characteristics such as levels of unemployment for men and women, typical size of households, extent of household ownership, levels of education in the community, as well as general levels of knowledge

and attitudes in a community influenced whether youth between 15 and 24 years reported condom use over the previous 12 months. In addition, cultural norms and social patterns related to gender were reflected in different patterns of association among variables for men and women.

The influence of culture on sexuality in SSA has been extensively described and discussed (Akwara et al., 2003; Awusabo-Asare et al., 2004; Caldwell, 2000; Luke, 2002; Yamba, 2002) with numerous studies demonstrating differences in patterns of sexual behavior across both ethnic and religious groups (Lagarde et al., 2000; Miller & Gur, 2002; Tenkorang et al., 2009; Tenkorang & Maticka-Tyndale, 2008). Particularly relevant for youth is the difference in how cultures view youth sexuality. Some cultural groups encourage sexual activity among unmarried youth, including multiple partners, with girls more marriageable once they have demonstrated their fertility (Ajala, 2007; Amazigo, Silva, Kaufman, & Obikeze, 1997; Omorodion, 2006; Orubuloye, Caldwell, & Caldwell, 1993). Others hold strictly to a code of virginity prior to marriage, especially for girls (Khattab, 2007). Yet others allow for, and provide instruction in sexual contact so long as this does not include penile-vaginal penetration (Kiiru, 2007). Christianity and Islam, as imports to SSA, have joined with indigenous cultural beliefs and value systems to create distinct expressions of religion and culture in SSA (e.g., Ojo, 2007; Yusuf, 2007). Although expectations related to the timing and relationship status of sexual partners vary across indigenous cultures, both Christianity and Islam value and teach the restriction of sexual activity to marriage. Even though adherents do not necessarily follow the teachings of their religion (Maticka-Tyndale, 2007; Schmid, 2007), these teachings are acknowledged in how people talk about sexuality and there is clear

evidence that religion and culture together influence both sexual activity and thinking about sexuality (Amuyunzu-Nyamongo et al., 1999; Lagarde et al., 2000; Schmid, 2007; Willms, Arratia, & Makondesa, 2004; Yamba, 1997). As with economic influences, culture and religion are generally measured at the individual level and incorporated into analyses as the socio-demographic indicators 'ethnicity' and 'religious affiliation.'

While research has either demonstrated or suggested an association between social and cultural factors as experienced in community life and HIV transmission, few theoretical models have been developed to identify the specific community characteristics that facilitate or inhibit the take-up of behaviours such as condom use or the pathways and processes involved in such influence. Based on research in rural and peri-urban communities in South Africa, Catherine Campbell (2003) identified a series of community characteristics that she theorizes as inhibiting or facilitating the take-up of HIV preventive behaviours. These include the adequacy of knowledge related to HIV transmission in the community, community awareness of how social and cultural practices set conditions for HIV transmission, a community's commitment to and confidence in its ability to address the threat posed by HIV and AIDS, the presence of social networks that support change, and accessibility of services and resources related to HIV prevention. Campbell and her colleagues (2005), applied this set of characteristics in a case study of a peri-urban community in South Africa and illustrated how their absence undermined the effectiveness of HIV-prevention programming in the community. Neither Campbell, nor others, however, have operationalized or empirically tested the effects of these community characteristics. For the analyses presented in this paper, we operationalized these community characteristics based on observational and interview

research in participating communities that identified the most influential community members and most salient community activities and resources with respect to upper primary school-age youth (Maticka-Tyndale et al., 2002; 2003). The school, church, and extended family, together with teachers, religious leaders, and extended family members were the institutions and community members identified as having particular influence and control over youth. Peer and agemate groups had a secondary level of influence, primarily because of the time that youth spent together in these groups. Resources were available to youth primarily through their schools and community clinics. Community activities that were particularly salient to youth because of their participation in them were social events that drew large numbers of youth (movies, discos, informal social gatherings), festivals that drew the entire community to celebrate seasonal or political events, and traditional or cultural events such as funerals, weddings and rites of passage.

Background

In 2000, Nyanza Province, bordering Lake Victoria in southwestern Kenya had the highest HIV prevalence of any province in the country (22% compared to a national figure of 10%) (Ministry of Health, 2001). A 1997 WHO multi-city study found a rate of infection in Kisumu, the capital of Nyanza, of over 20% among 15-19 year old and nearly 40% among 20-24 year old women (compared to under 5% and just over 10% respectively for men: WHO, 1997). These findings led the Kenyan Ministry of Education (MoE) to identify Nyanza Province as a high priority region for delivery of HIV prevention programming in schools. The second author of this paper (EM-T) conducted the research and evaluation of an evidence-based HIV prevention programme for delivery in upper primary schools (standards 6 through 8). The programme was developed and delivered by C*f*BT, Kenya, an international non-government organization that works to improve the delivery of education in low income countries, in collaboration with the

Ministry of Education, Kenya. Research using surveys, interviews and focus groups was conducted in primary schools and their communities in 2001 and 2002 to inform the development of Primary School Action for Better Health (PSABH), a school-based HIV education and prevention programme. This was followed by successive waves of annual data collection with teachers, pupils and community members between 2003 and 2006 that were used to evaluate the programme. Based on the positive evaluation results (Maticka-Tyndale, 2010; Maticka-Tyndale et al., 2007; 2010), the Department for International Development, UK funded a national roll-out of the programme. By December, 2007 all primary schools in the country had access to teachers trained to deliver the PSABH programme. Data for this paper came from the research component of the PSABH initiative.

METHODS

Ethical Considerations

The research protocol was reviewed by the office of the Provincial Director of Education for Nyanza Province and the Research Ethics Board of the University of Windsor, Canada. Community meetings preceded all research in selected schools and communities. These research procedures and methods were used to ensure that the ethical conduct of the research were presented to all in attendance, questions were answered and concerns discussed and resolved by consensus. Given the number of orphans and children not under the regular care of parents in the schools and the considerable stigmatization of families affected by HIV, the research team was advised by teachers and community members that the process of individually obtaining parental consent would potentially discriminate against participation of children affected by HIV and would also contribute to their identification and stigmatization. As a result, following a discussion at

community meetings it was decided that schools, in consultation with their local School Committees which included representation of parents, would exercise their authority to grant research team access to the pupils and to permit pupils to make their own decisions about research participation (Maticka-Tyndale, 2004). All standard 6 and 7 pupils (equivalent to grades 6 and 7 in North America) at school on the data collection day were given the opportunity to participate in the survey. An information sheet was provided for each pupil in both English and the local language and was read aloud to groups of pupils by trained, multi-lingual research assistants. Pupils were informed of their right to refuse participation in the research or to decline answering specific questions and that completing the questionnaire would be taken as their agreement to participate. For data collection on school and community characteristics, procedures for maintaining confidentiality were presented to all who contributed information and no personal identifying information was retained for any individuals.

Sample and Data Collection

The analyses for this paper used data collected from 160 public schools and the communities they served in July and August 2002, just prior to introduction of PSABH into the schools, and the standard 6 and 7 students in these schools in October 2003, a year after the introduction of PSABH. Schools were selected using stratified proportional random sampling, with 8 to 20 schools (proportional to district size) included from each of the 11 districts in Nyanza Province, Kenya.

School and community data were collected by Education Officers trained in observation, interviewing and survey completion. They completed survey data forms

based on community and school visits in July and August, 2002. School-level data included information about the school's level of resourcing, sponsorship, and use of an anonymous question box. In communities, data included identification of influential community informants (e.g. church leaders, traditional leaders, youth leaders, women leaders, traditional healers, school committee members, teachers), views of these informants on youth sexuality and sources of risk for HIV infection as well as what they communicated with youth about HIV, sexuality and condoms; identification of community events that attracted youth and where community informants said youth were likely to become involved in sexual activity as well as community events where HIV prevention activities and messages were delivered; reports of the presence of clinics; and locations where condoms could be obtained.

Student data were collected using self-report surveys completed by 8183 standard 6 and 7 pupils at the 160 participating schools in October, 2003. The analyses in this paper were restricted to the 3645 youth who reported having experienced sexual intercourse. All standard 6 and 7 students in attendance on data collection days were invited to complete surveys. A multi-lingual team of trained research assistants read survey questions aloud in English and the most commonly used local language (Luo, Kisii and/or Kiswahili) as pupils, separated into same-sex classrooms, followed along on their own copies of the surveys (text in English and the local language) and marked their answers.

All surveys were optically scanned into an SPSS database. Open-ended questions from school and community observations were coded and checked for reliability by 2-3 research assistants prior to inclusion in the databases.

Student Questionnaire Development

The student questionnaire was developed based on the WHO/UNESCO HIV Prevention Evaluation Kit (WHO, 1999) and elicitation research using focus groups with standard 6 and 7 pupils to develop measures appropriate to the local context. Pre-testing of the research process and questions was conducted in 24 schools with 1021 pupils completing questionnaires and 6 focus groups of pupils during the 2000 school year. Questions were tested for clarity, pupil comprehension, and internal validity. Scales were tested for internal and construct validity.

Measures

Dependent Variable

The dependent variable used in this paper is reported condom use at last sexual intercourse, coded 0 for those who reported no condom use at last intercourse and 1 for those who reported such use

Independent Variables

Independent variables were measured at two levels: individual-level and contextual or school and community-level. The individual-level variables came from the IMB plus indicators of individual experiences of community characteristics identified by Campbell as contributing to the ability of youth to take self-protective action and indicators of social and cultural factors. At the school- and community-level, variables reflected the local identification of Campbell's community characteristics.

IMB Indicators. Information, measured as knowledge about HIV prevention,

used two multi-dimensional scales created from responses to 12 questions about how infection with HIV may be avoided. Six were factual questions from the WHO/UNESCO kit (WHO, 1999) and 6 local myths identified in qualitative research. The factor analysis option in LISREL was used to create all scalar measures. For the knowledge items, factor analysis identified two latent constructs. The six factual statements (HIV/AIDS could be prevented by avoiding sex, having fewer sexual partners, not sharing razor blades, being faithful to an uninfected partner, using condoms, and making sure injections were done with clean needles) loaded heavily on the first latent construct which we called *prevention knowledge*. The six myths about prevention (HIV could be transmitted through wearing the clothes of someone sick with AIDS, sharing plates of food with an infected person, by mosquitoes and other insects, by having sex with thin people, or shaking hands with someone sick with AIDS and whether it could be avoided by eating a good diet) loaded heavily on the second latent construct which we called *transmission myths.* Correct responses were coded '1' and incorrect and missing responses were coded '0.' Scalar measures of each form of knowledge were created by summing responses weighted by their respective factor scores. Reliability coefficients (Cronbach's alpha) were 0.82 and 0.78 for *prevention knowledge* and *transmission myths* respectively. High positive values on prevention knowledge indicated correct knowledge about AIDS prevention while negative values indicated an absence of such knowledge. In contrast, high positive values on 'transmission myths' indicated endorsement of myths that conveyed false information about transmission and prevention while negative values indicated rejection of these myths.

The Provincial Director of Education would not agree to the inclusion of an

extensive examination of condom use, attitudes toward condoms and motivation to use condoms. Consequently, there were no questions that directly measured motivation to use condoms in the student questionnaire. Two indicators of motivations related to sexuality and reduction of risk from HIV were used in this analysis: pressures to engage in sexual activity and perception of one's own level of risk of acquiring AIDS. Pressure to engage in sex was operationalized with a scalar measure comprised of the weighted summation of responses to indicators developed from what young people reported in the elicitation focus groups (Maticka-Tyndale et al., 2002; Maticka-Tyndale et al., 2005). On the survey, students were asked whether they had ever felt pressured to engage in sexual intercourse because their own bodies pushed them to have sex, their friends encouraged them, an older person encouraged them, their boyfriend or girlfriend wanted to, they would receive money or gifts, someone had arranged for them to have sex, they did not know how to resist their partner, they had watched someone else have sex, or someone had tried to physically force them to have sex. The instructions accompanying these questions clarified that responding to items in the affirmative did not necessarily mean they had engaged in intercourse, but merely that they had experienced the pressure. Affirmative responses were coded '1' and negative '-1'. All indicators loaded on a single latent construct with factor loadings ranging from 0.49 to 0.69 and a Cronbach's alpha of 0.75. A scale called *pressure to have sex* was created by summing the items weighted by their factor scores. Higher positive values on the scale indicated experience of a larger number of pressures or motivators to engage in sexual intercourse, while larger negative values indicated experiencing fewer pressures.

Perception of one's own risk of acquiring AIDS was measured with an ordinal

scale with four dummy coded categories using ‘no chance at all’ as the reference category compared to responses of ‘small chance’, ‘moderate chance’ and ‘great chance’.

Behavioral self efficacy was measured as abstinence and condom use self efficacy operationalized as scale scores. The scales comprised the weighted summation of responses to questions that asked participants whether they believed they could say no to sex; believed that when a girl says no to sex, she really means it; were able to have a boyfriend/girlfriend for a long time without indulging in sexual intercourse; could tell their boyfriend/girlfriend that they (the couple) would abstain from sexual intercourse until marriage; could tell their boyfriend/girlfriend about condoms; and could insist on condom use during sexual intercourse. Responses ranged on a 5-point ordinal Likert scale from ‘definitely yes’ (5) to ‘definitely no’ (1). Using LISREL’s factor analysis option, the first four indicators loaded heavily on a latent construct which we called *abstinence self efficacy*; the last two on a construct which we called *condom use self efficacy*.

Individually Experienced Community Characteristics. Communication with family members was used as an indicator that students were accessing social networks that might be supportive of health enhancing behaviours. Students were provided with a list of relatives and asked to indicate with whom they had talked about AIDS (coded 1 if they had spoken with the individual, 0 if they had not). Items loaded onto two factors which we named *talked to male relatives* (father, uncle, older brother, grandfather) and *talked to female relatives* (mother, aunt, older sister, grandmother). The scales were comprised of the summation of weighted scores for the indicators. Cronbach’s alphas for these measures were .722 and .725 respectively.

Students were asked 5 questions (coded 1 for yes and 0 for no) about whether they, themselves, had pursued information about HIV and AIDS by asking a question in the school question box, asking a question of a teacher, a parent, reading about HIV and AIDs in the information corner or asking a question at the School Health Club. All items loaded on a single factor. Their weighted scores were summed to create a *pursuing information* measure that had a Cronbach's alpha of .534.

Individually Measured Socio-Cultural Influences. The social and cultural differences among ethnic and religious groups, as well as the social organization of age groups and age-related cultural expectations with respect to sexuality were captured in indicators for ethnicity, religion and age. Religion and ethnicity were measured by personal identification as Catholic, Protestant or Other and as belonging to one of the two dominant ethnic groups in the region, the Luo and the Kisii, with smaller ethnic groups collapsed into 'other'. Both variables were dummy coded with Catholic and Luo the reference categories**.** Age was measured as self-reported in whole numbers by youth. Finally, potential economic influences were captured in a measure of socio-economic status based on a locally derived indicator that combined information about the structure of the home, and the methods for providing family needs for light, water, fuel and sanitation. Scores on the SES indicator ranged from 0 to 100.

School-level indicators. Since schools were identified in the qualitative, community-based research, as important institutions and the population being researched was students, 3 school-level indicators were included. These were measured based on observations and informal interviews with teachers and students. A measure of school socio-economic status was created based on the physical characteristics of the school

facilities and basic resources within the school. Scores were assigned to each school for the presence and quality of the roof, windows, doors, desks, and proportion of children with books. *School SES* was comprised of the summation of scores on these indicators. It had a theoretical range of 0-100 and actual ranges of 43-90, with 50% of schools clustering between scores of 51 and 56.

Historically, schools in Kenya were built and run by religious organizations. Today, with the exception of private schools, the Ministry of Education is responsible for accrediting and running schools; however, many schools maintain links to religious organizations which act as sponsors, some providing land and resources for schools and, in exchange may maintain an influence on school staffing and programming. Thus, sponsorship can provide extra resources together with an influence on how elements of an HIV prevention curriculum are handled. The presence (or absence) of a school sponsor was identified for each school and dummy coded, with no sponsor the reference group. Dummy coded variables were also created for sponsorship by Catholic (reference group), Mainline Protestant (affiliated with international Protestant churches such as Methodist, Anglican, Presbyterian, Baptist), or Breakaway churches (independent religious groups that included Christian and traditional elements of belief and worship but were not affiliated with any international church). Both the school SES and sponsorship were used as indicators of the level of services and resources related to HIV prevention that might be available to youth since schools that are poorly resourced, in general, are likely to have poorly resourced HIV programming. School SES may also be an indirect measure of community wealth since communities are responsible for providing the physical and material resources in their schools.

Schools were encouraged, as part of HIV prevention programming, to post question boxes where students could anonymously deposit questions that would be answered in their classrooms and/or school assemblies on a regular basis. The presence of a question box, with questions answered at least once in the past school term, was dummy coded against a reference category indicating 'no.' Since all schools were required to provide 1 class/week in HIV/AIDS education, the presence of the question box was an indicator of the school providing an additional, pupil-responsive level of instruction.

Community-level indicators. Religious leaders were identified in the qualitative component of the research as an important source of information about condoms. This was referred to by community members, including youth, as telling "the truth about condoms." Consequently, Campbell's adequacy of community knowledge was measured with a variable that identified the most common messages about condoms conveyed by religious leaders in the community. The messages were organized to create 2 dummy coded variables with 'anti-condom information' or messages designed to demonstrate that condoms would not protect and/or that they would contribute to infection, the reference category. Conveying information that supported condom use (but not for youth) and information that supported or approved of condom use for sexually active youth were the 2 variables. Community awareness of social and cultural practices that contributed to HIV transmission was measured with two dummy coded variables based on community leaders volunteering the names of community events that they considered to contribute to HIV transmission. These were traditional cultural practices and social events that attracted young people. Commitment to addressing the AIDS risk in the community was

measured by whether HIV prevention information and/or motivational messages were incorporated in community festivals. Finally, availability and accessibility of services and resources in the community was measured with an indicator of whether condoms were available in the community. Each of these was dummy coded with 0 indicating an event was not mentioned or resource not available and 1 indicating that it was.

Of note is that the school and community-level indicators reflect the circumstances in July-August 2002 while data on the individual-level indicators, including the dependent variable, reflect student responses to surveys administered in October 2003.

Data Analysis

The individual-level data used for this analysis are nested within schools. To avoid bias in the parameter estimates and to help estimate the impact of school/community level variables on reported condom use, a multilevel modeling procedure was employed. The multi-level strategy deals with the problem of clustering which arises as a result of the hierarchical nature of the data, and estimates a random effect term which in this research represents the extent to which reported condom use varied across schools (see Raudenbush and Bryk, 2003; Stephenson, 2009; Guo and Xhao, 2000).

The HLM 6.0 software was used to fit eight multivariate binary logistic regression models (four each for males and females). The multivariate binary logistic regression model is specified as follows:

$$\log\left[P_{ij} \Big/ 1 - P_{ij} \right] = \beta_0 + \beta_1 x_{ij} + \mu_j \quad \text{.....(1)}$$

where the outcome variable $\log\left[P_{ij} \big/ 1-P_{ij} \right]$ in equation (1) is the log odds of a respondent reporting condom use at last sexual intercourse versus not reporting condom use at last sexual intercourse. The β_o term is the random intercept or constant and β_1 is a vector of parameters that corresponds to a host of potential explanatory factors defined as x_{ij}. μ_j is a residual term defined as $\mu_j \sim N(0,\sigma_\mu{}^2)$ implying that μ_j is normally distributed with a mean value of 0 and variance $\sigma_\mu{}^2$ (see Guo and Xhao, 2000; Stephenson, 2009). The regression coefficient β_1 can be exponentiated and interpreted as odds ratios. If the odds ratio of a particular covariate is greater than one it will mean that respondents with such characteristics have higher odds of reporting condom use at last sexual intercourse compared to those in the reference category. Odds ratios lower than one on the contrary indicate a lower likelihood of reporting condom use at last sexual intercourse.

RESULTS

Sample Profile

Of the 8,183 students who completed the survey, 61.5% of the males and 29.9% of the females. The analyses were based on the sample of youth who reported having engaged in sexual intercourse (N=3645) representing 41.1% percent of the total sample. Of these youth, 68.1% were males and 31.9% females. Distribution on age, ethnicity and religion reflected the general population of standard 6 and 7 youth in this region (Tenkorang & Maticka-Tyndale, 2008) with a mean age of near 15 years and the majority of youth belonging to the Luo (57.4% males, 63% females) followed by Kisii (34.0%

males, 33.4% females) ethnic groups, and the sample was nearly evenly split between Roman Catholics and Protestants with only 6.4% of males and 2.8% of females reporting other religions. The mean SES was almost identical for males and females (55.57 and 55.43 respectively).

Reports of condom use at last sexual intercourse were not common and, interestingly, slightly lower among males (26.9%) than females (29.2%). For this sample of sexually experienced students, females scored higher on knowledge and rejected more myths about HIV transmission than did males and also had higher scores for pursuing information about AIDS and slightly higher scores on the sexual pressure scale, indicating they reported more sources of pressure to engage in sex. Males were more likely to report communicating with male than with female relatives about AIDS (means of .415 and -.458 respectively) with females the reverse (means of -.327 for male relatives and .486 for female relatives). The majority (67% of males and 57% of females) considered themselves to be at risk of contracting HIV. Males scored higher on condom self-efficacy (.148 and -.012 for males and females respectively); whereas, females scored higher on abstinence (.098 and -.130 for females and males respectively).

Of the 160 schools in the sample (see Table 1b), the mean school SES was 54.82 (sd=6.61). Nearly ¼ of schools had no sponsor, with approximately 1/3 sponsored by Roman Catholic, 1/3 by mainline Protestant and 10% by Breakaway religious groups. The majority of schools had a functioning question box (69.3%). Awareness of local social and cultural practices that contributed to HIV risk and community programming about HIV was common in these communities with nearly 80% of community leaders identifying local social events and traditional practices as posing HIV risks to youth and

reporting that programming related to HIV was incorporated into community festivals. Condoms were available in 78% of the communities. However, few communities (21.2%) had church leaders who spoke positively about condom use for youth, with 45.9% speaking against condom use.

Bivariate Results

Results from the bivariate regression analyses are reported in Table 2. . With the exception of abstinence self efficacy and pursuing information, all individual-level variables were significantly related to the dependent variable, reported condom use at last intercourse, for at least one of the genders. Males who were more likely to report condom use on average were older, Roman Catholic rather than Protestant, of higher SES, endorsed fewer myths about HIV transmission, reported more sources of pressure to engage in sex, communicated with more male and female relatives, and had higher condom self efficacy. Females who were more likely to report condom use on average were Luo rather than Kisii, had higher factual knowledge about AIDS, reported more sources of pressure to engage in sex, were more likely to communicate with male and female relatives about AIDS, considered themselves to be at small rather than no risk of contracting HIV, and had higher condom self efficacy.

In 2003, condom use was reported more often by males who attended schools that were not sponsored by either Catholic or Protestant organizations in 2002 and when condoms were not available in the school communities. Females were more likely to report condom use at last intercourse in 2003 if their schools were more poorly resourced (lower school SES) in 2002 and they were in communities where HIV programming was

incorporated into community festivals.

Multivariate Results

Four multivariate models are reported each for males and females (see Tables 3 and 4 respectively). In the first model we considered the effect of the indicators of the IMB model plus communication and pursuing information about HIV/AIDS (the latter two indirect measures of social networks supportive of HIV/AIDS awareness and change). In the second we added the socio-cultural variables measured at an individual level. In the third we considered only the school- and community-level indicators while in the fourth we included all variables – individual-, school-, and community-level.

As in the bivariate results, more of the individual level variables-, school- and community-level indicators had a significant influence on reports of condom use among males than females. The significance and strength of influence of independent variables from the bivariate models remained constant across models for males and, with only one exception, also for females, indicating independence of effects. Four indicators that were not significant in the bivariate models gained significance in the multivariate (3 for males, 1 for females), indicating suppressor effects.

For males (Table 3), when all individual-level indicators of the IMB model and Campbell's community factors measured at the individual-level were entered simultaneously in model 1, the significance evidenced in the bivariate analyses was retained with the strength of effects remaining approximately the same. Even when individual-level socio-cultural indicators were added in model 2, the effects of the IMB indicators from the bivariate analyses maintained their effects and ethnicity gained in

strength and significance with Kisii males more likely to use condoms. Turning to the school- and community-level indicators in model 3, we see that the bivariate results were maintained for school sponsorship, but availability of condoms no longer had a significant effect, suggesting that the original bivariate effect was the result of other community-level factors that influenced condom use. When all indicators were entered simultaneously in model 4, the significance of most of the indicators in models 1-3 was retained. Communication with female relatives lost its significance suggesting its effect was explained by school- and community-level factors. Risk perception and school SES became significant, suggesting suppressor effects, i.e. their effects only become evident when school- and community-level factors are considered. For risk perception, those who considered themselves to have a small chance of becoming infected were significantly less likely to report condom use than those who felt they had no chance. The direction of this relationship was the same for all other levels of risk perception (moderate and great), but not significant, suggesting that it was boys who saw themselves as having no chance of infection who were the most likely to report condom use. Thus, when all indicators were considered, boys were more likely to report condom use if they were older, Kisii, Roman Catholic rather than Protestant, of higher SES, rejected more myths about transmission, experienced pressure to engage in sex from a greater number of sources, felt they had no chance of becoming infected with HIV, had communicated with more male relatives, had higher condom self efficacy, and attended schools which, in 2002 were more poorly resourced (lower SES) and were not sponsored by a religious organization.

For females (Table 4), only two of the IMB and individual-level indicators of

Campbell's community factors that were significant in bivariate analyses maintained significance when entered simultaneously in model 1.Experiencing pressure to engage in sex and condom self efficacy retained significance, but knowledge, risk perception, and communication with relatives lost significance. These results suggest that pressure and condom self efficacy carry the influence of risk perception and communication. When socio-cultural influences were added in model 2, the influence of ethnicity remained significant and no additional socio-cultural indicators gained significance. Abstinence self efficacy, however, did gain significance in this model with lower self efficacy associated with greater likelihood of reporting condom use, suggesting that this effect was suppressed until socio-cultural indicators were added. Both of the school- and community-level indicators that were significant in bivariate analyses remained when all were entered simultaneously in model 3; however, school SES lost significance when all variables were entered in model 4, leaving only the inclusion of HIV programming in community festivals as a significant influence on reported condom use. Thus, females were more likely to report condom use if they were Luo rather than Kisii, had greater factual knowledge about HIV prevention, experienced pressure to engage in sex from a greater number of sources, were less likely to consider themselves able to be abstinent but had higher condom self efficacy and their schools were in communities which, in 2002, had incorporated HIV programming into community festivals. The variance components in Tables 3 and 4 suggest that there is still some heterogeneity to be captured in the models for males and females. The magnitude of unobserved heterogeneity is however not very different for the two genders.

DISCUSSION

The well-researched IMB Model, proved useful in explaining reported condom use at the individual-level. Indicators of information, motivation and behavioral self efficacy related to condom use were significantly associated with reported condom use for both males and females. Based on the extant research literature, especially in SSA, we applied Campbell's framework to model community-level influences on youth's ability to protect themselves against HIV through condom use (Campbell, 2003). We faced two challenges here: the absence of prior research that operationalized Campbell's concepts or their relationships and the difficulty of collecting community-level data. We operationalized Campbell's concepts based on community observations and conversations with community members. Data were collected directly in the schools and communities by trained Education Officers who were known in these schools and communities and indirectly through responses to surveys completed by our sample of students. Reduction in the variance of the null model (not shown here) when school/community level variables are included suggests the importance of community influences on condom use among youth in Nyanza, Kenya. However, the small number of school- and community-level variables with statistically significant influences and the size of the variance yet to be explained, indicates that we did not fully capture the influence of environmental factors on reported condom use.

The gendered nature of condom use, consistent with the literature for SSA on the gendered nature of sexual behaviours overall (Maticka-Tyndale et al., 2005; Mensch et al., 1998; Nzioka, 1996; 2001; Tenkorang & Maticka-Tyndale, 2008; Varga, 2003; Zulu et al., 2002) was clearly evident in our results. Despite no appreciable differences between sexually experienced male and female students in SES, age, religion, and

ethnicity, significant differences were evident in indicators related to sexuality and HIV, including those that influenced reported condom use. Fewer females had engaged in sexual intercourse even though they experienced pressure to engage in sex from more sources than did males. More females reported condom use, they had higher knowledge about HIV transmission and rejected more myths, and pursued information about HIV and AIDS more than males did. Self efficacy and communication with relatives were gender specific with females having higher abstinence than condom self efficacy and higher communication with female than male relatives and the reverse for males on both variables. Consistent with the literature (Maticka-Tyndale et al., 2005; Mensch et al., 1998; Nzioka, 1996; 2001; Tenkorang & Maticka-Tyndale, 2008; Varga, 2003; Zulu et al., 2002), the gendered-profile suggests that females may be more purposeful and conscientious about matters related to sexuality and sexual health but have less control over whether and when sex occurs.

In the bivariate and multivariate analyses, more indicators had significant influence on reported condom use for males than females. This was especially the case for socio-cultural measures where only ethnicity influenced reported condom use for females compared to age, religion and socio-economic status for males. For males, the influence of religion on their condom use was evident not only based on their own religious affiliation, but also from the influence of attending a religiously sponsored school. Males attending schools sponsored by Catholic or mainline Protestant churches and males who themselves were Protestant rather than Catholic were less likely to report condom use at last intercourse. The result on school sponsorship suggests that religious organizations may inhibit teaching about condoms and the development of condom self efficacy among

males. The latter finding on religious affiliation may be considered puzzling since the official stance of the Catholic Church is against condom use while there is greater variation across Protestant churches in their stance. For females, neither religious affiliation nor school sponsorship influenced reported condom use, suggesting that the position of religious denominations has little influence on females. For the IMB variables, two gender differences stood out. First, information, measured as factual knowledge and myth rejection, was consistently associated with reported condom use for males in bivariate and multivariate models, but only in the form of myth rejection. Second, while condom self efficacy had a significant influence on both males and females, abstinence self efficacy was also significantly associated with reported condom use for females with those less convinced of their ability to abstain from sex more likely to report condom use at last intercourse. Taken together with results from our earlier research on the timing of sexual debut (Tenkorang & Maticka-Tyndale, 2008), where abstinence self efficacy demonstrated a strong association with timing for males but none for females, and with the results demonstrating an association between pressure to engage in sex and both timing of sexual debut and condom use, these results suggest that while the timing of first intercourse may be less volitional and more circumstantial or environmental for young women (i.e., the result of pressures rather than one's own self efficacy), those who have engaged in sex have more volition over condom use (i.e. one's own self efficacy having a significant effect). In contrast, for young men, both timing of first intercourse and condom use are more volitional with each influenced by self efficacy that is specific to the act.

Another noteworthy gender difference in our results is the evidence of independence

of effects of independent variables for males as compared to their interdependence for females. To wit, among males, the majority of indicators that demonstrated a significant influence on reported condom use remained the same across all multivariate models as they were in the bivariate, with little change in the strength of effect. Among females, however, the significance of the effect of a considerable number of indicators at the bivariate level was lost in multivariate analyses and from more simple to more complex multivariate models. Thus, for example, among females knowledge, communication with family members and pursuing information appear to work together with or through the experiences of pressure to engage in sex and condom self efficacy in influencing reported condom use. At the community-level the influence of the school's characteristics also appears to work through these individual level variables. This suggests more indirect or interdependent pathways and processes of influence on condom use for females as compared to more direct influences for males.

Our results for the influence of communication with family members on reported condom use are consistent with other studies that have demonstrated the positive effect of family closeness and communication on age of sexual debut (Bozick 2006; Miller, Forehand & Kotchick, 1999; Tenkorang et al, 2009), but little attention has been paid to family influence on condom use. In fact, concerns have been raised that families may not approve of teaching about or promoting condom use (Maticka-Tyndale, 2002). Our results serve to allay this concern. The more family members that males and females report talking to about AIDS, the more likely they are to report condom use at last sex, suggesting family communication supports condom use.

The results of this study also add to our understanding of the continuum of HIV

prevention behaviours that may be followed by upper primary school youth in Nyanza Province. Our earlier paper, using the full sample of standard 6 and 7 students (those who are and are not yet sexually experienced) and the IMB model to examine factors associated with the timing of first sexual intercourse addressed the first step along the continuum, abstinence from or delaying of sexual intercourse (Tenkorang & Maticka-Tyndale, 2008). This paper uses only those who are sexually experienced together with the IMB and a community-level model to examine factors associated with and influencing reported condom use, addressing the second step along the continuum, protection from HIV transmission and acquisition during sexual intercourse by using a condom. Both sexual debut and condom use increase with age and pressure from others to engage in sexual intercourse[2]. Religion and ethnicity, used as indicators of socially endorsed values, beliefs and cultural practices related to sexuality, produced gender-specific results. Religion had a statistically significant effect on males, but not females with Protestants compared to Roman Catholics male initiating sexual activity at an earlier age and less likely to report using a condom at last intercourse, which together suggest that Protestant males are at greater risk of acquiring HIV. Ethnicity influenced both debut and reported condom use for both sexes, but in contradictory ways. Kisii as compared to Luo males initiated sex earlier while females initiated later, suggesting a possible stronger social endorsement of virginity for Kisii females than males consistent with the practice of female circumcision among Kisii as a method of curbing female sexual promiscuity (Hayward, 2005). Results for condom use were also gender specific with Kisii males more and females less likely than Luos to report condom use. These results may also reflect cultural differences in gender power in sexual encounters, an area

[2] All comments about sexual debut come from results reported in Tenkorang and Maticka-Tyndale, 2008.

consistently supported in the research (Maticka-Tyndale et al., 2005; Mensch et al., 1998; Nzioka, 1996; 2001; Varga, 2003). The association of levels of factual knowledge and myth rejection with both sexual debut and condom use suggest neither of these can be ignored in prevention programming, but that factual knowledge may be more important for females. This is not surprising since the literature consistently reports that girls and women have less access to knowledge than men and boys; with the latter likely to already have sufficient knowledge to take preventive action. From these analyses it appears that self efficacy has a complex, gendered relationship with sexual debut and condom use. Abstinence self efficacy was associated with later debut for males; while condom self efficacy was associated with reports of condom use by both sexes. When socio-cultural characteristics were included in the multivariate analysis, abstinence self efficacy gained strength and statistical significance in its association with condom use. We suggested that this might indicate less volitional control of sexual debut but more for condom use for females as compared to volitional control of both for males. Turning to the effect of risk perception, when we combine the two analyses it appears that the perceptions reported by our sample may reflect perceptions resulting from rather than preceding sexual behavior since higher perceived risk was associated with earlier debut and less condom use.

The results presented here lead to a number of program and policy recommendations.

First, condom use among school-attending youth is influenced not only by individual, but also socio-cultural and community influences. While the former may be addressed through programming targeting individuals, the latter require interventions aimed at entire communities and not just youth.

Second, results of individual-level influences on condom use provide guidance for areas to stress in youth programming. These include condom self efficacy, pressure to engage in sex, communication with family members, and rejection of myths about HIV transmission. From this it is clear that merely providing factual information is insufficient. Myths must be addressed, confidence must be built in one's ability to use condoms, and family members must be involved in communicating with youth about AIDS. Communication about HIV at community festivals is also a beneficial approach to increasing condom use.

Limitations

Several limitations to the generalizability of the results of this study must be considered. Recognizing the concerns that have been raised about the reliability of self-report data, especially when they deal with sensitive issues like sexual behaviour and condom use (Cleland, et al., 2004: Hewett et al., 2004; Plummer et al., 2008), we used several procedures in preparation for and in conducting data collection to achieve the highest possible validity. First, questions and survey format came from previously tested instruments (WHO, 1999) combined with locally appropriate terminology and context obtained as part of elicitation research. Second, questionnaires were piloted with statistical testing of reliability and internal and construct validity of questions and qualitative feedback from youth on how they interpreted questions used to further refine the data collection instruments and procedures. Third, combined self report (each student completed his or her own instrument) and structured interviewing (research assistants read questions aloud in English and the dominant local language to groups of pupils) were used to minimize interviewer effect (Hewett et al., 2004; Mensch et al., 2003) while also compensating for limited literacy skills. The only method that has been discussed in the literature as potentially (although not consistently) producing more valid survey results is the use of computer assisted survey

administration (CASI or ACASI) (Hewett et al., 2004; Mensch et al., 2003). This method was infeasible for this study because of cost and the incompatibility of the technology with the local conditions (e.g., absence of electricity, unfamiliarity with and suspicion of computer technology). Given these conditions, the method of administration we chose produced the most valid question responses possible (Cleland et al., 2004; Hewett et al., 2004; Mensch et al., 2003). Cleland et al. (2004) note, in their introduction to a special issue of *Sexually Transmitted Infections* that considered issues of research design that carefully collected self report data continue to provide essential insights in research on sexuality, despite their shortcomings. We must, however, continue to acknowledge the difficulties in using self-report data when conducting analyses related to sexual activity.

A second limitation is the interpretation of the dependent variable, reported condom use at last sexual intercourse. Guidelines for HIV prevention stress consistent and regular condom use across all sexual encounters. We must be cautious not to assume that use at most recent intercourse is equivalent to consistent, regular use.

The use of cross-sectional, individual-level data also limited the interpretation of our results. While we can make inferences about associations between independent and dependent variables measured at the individual-level, we cannot draw causal inferences. This has been taken into consideration in the interpretation of many of the results reported here. Community and school-level preceded by a year the collection of individual data, assuring the causal order of community influences on the dependent variable. However, we cannot be absolutely certain whether these school and community effects were direct or indirect – directly on the students or indirectly through motivating other changes in the school and community that then influenced students.

An additional limitation is that the operationalization of community- and school-level

concepts. Although these were based on observations and conversations within the communities, it was not possible to test their construct validity and reliability within the context of this research programme and results must be considered preliminary. Campbell's model also does not provide information about the optimal timing or spacing of community influences. In this research community and school indicators were measured a year before the dependent variable. Several of these indicators (e.g. school SES and sponsorship) were likely constant over that time period. Others, however, may not have been. The absence of a significant effect for the majority of school and community indicators may, therefore, be a result of the large amount of time between measurements and the potential changes that may have occurred in the community and school indicators.

A final limitation is that the research reported here uses data from only one province in Kenya. While Nyanza shares many characteristics with other provinces in the western part of the country (e.g. Western Province) and the dominant ethnic group, the Luo, extend across the borders into Tanzania and Uganda, it also has some distinctive characteristics. By December 2007, PSABH was running in all elementary schools in Kenya and monitoring results indicated that the implications for all the variables included in the analyses presented in this paper were similar. However, the specific analyses conducted here would need to be replicated before confidence could be placed in generalizing them beyond Nyanza Province.

CONCLUSION

Globally, the majority of youth become sexually active in their teenage years (Wellings et al., 2006). Considering the threats of early pregnancy, unsafe abortions, sexually transmitted infections, and HIV, condom use is an important behavior for maintaining the sexual health of the world's youth (Glaser et al., 2006). Despite considerable programming targeting increase in condom use, levels remain low

throughout SSA (UNAIDS, 2007; 2008). While acknowledging that community and socio-cultural factors influence condom use, the focus of research and theorizing about factors influencing condom use has been at the level of individual influences, This paper has taken a step toward a more holistic approach, combining theories that use individual-level and community-level explanations of condom use.

Our results support the expansion of research on how communities influence the ability of youth to take-up risk reduction so that programming and policy targeting communities may proceed from a base of evidence.

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Table 1a: A Univariate analysis of selected dependent and independent variables

Dependent variable	**Boys N=2380**	**Girls N=1025**
Condom use at last sex	**%**	**%**
No (Ref)	73.2	70.8
Yes	26.8	29.2
Independent variables (Level 1)		
Mean Age (range, 11 to 17)	14.81	14.68
Ethnicity		
Luo (ref)	57.4	63.0
Kissi	34.9	33.4
Others	7.7	3.6
Religion		
Catholic (ref)	48.2	47.2
Protestant	45.4	50.0
Other	6.4	2.8
Socio-economic status of respondent (range, 31.82 to 100)	55.57	55.43
Sexual pressure (range, -.87 to 2.56)	.44	.491
Factual knowledge about AIDS (range, -2.04 to 2.58)	.061	.198
Transmission myths (range, -1.20 to 2.529)	.025	.032
Talked to male relative about AIDS (range, -1.89 to 2.46)	.415	-.327
Talked to female relative about AIDS (range, -2.0 to 1.842)	-.458	.486
Level of pursuing information about AIDS (range, -2.08 to 1.33)	-.066	.046
Self-efficacy for condom use (range, -2.50 to 1.61)	.148	-.012
Pro-abstinence (youth can say no) (range, -2.79 to 1.93)	-.130	.098
Risk perception		
No chances at all (ref)	32.9	42.8
Small chance	29.8	25.4
Moderate chance	14.2	15.7
Great chance	23.1	16.1
Sexual pressure (range, -.87 to 2.56)	.44	.491

Table 1b. A univariate analysis of school/community level variables

School/Community level	% N=160
Mean Socio-economic status of school (range, 43.2 to 90.1)	54.82
Sponsorship group	
No sponsor (ref)	24.4
Catholic	31.3
Mainline	34.4
Protestant/Breakaway	10.0
School has question box	
No (ref)	30.7
Yes	69.3
AIDS risks from traditional practices	
No (ref)	20.1
Yes	79.9
AIDS risks from social events	
No (ref)	20.8
HIV programs incorporated into festivals?	
No (ref)	22.0
Yes	78.0
Availability of condoms in clinics	
No (ref)	22.0
Yes	78.0

Table 2: A bivariate analysis of risky sex and selected independent variables

Variables	Boys	Girls
Individual level	Exp^{β}	Exp^{β}
Age	1.16(.075)***	1.10(.059)
Ethnicity		
Luo (ref)	1.00	1.00
Kissi	1.30(.152)	.607(.201)***
Others	.858(.307)	.799('.582)
Religion		
Catholic (ref)	1.00	1.00
Protestant	.705(.130)***	1.19(.151)
Other	1.08(.252)	.894(.542)
Socio-economic status of respondent	1.01(.005)***	1.01(.007)
Sexual pressure	1.35(.069)***	1.75(.106)***
Factual knowledge about AIDS	1.09(.053)	1.23(.070)***
Transmission myths	.858(.058)***	.959(.081)
Talked to male relative about AIDS	1.26(.059)***	1.09(.083)
Talked to female relative about AIDS	1.28(.068)***	1.20(.080)***
Level of pursuing information about AIDS	1.07(.058)	1.16(.088)
Self-efficacy for condom use	1.31(.059)***	1.40(.097)***
Pro-abstinence (youth can say no)	.977(.063)	.897(.084)
Risk perception		
No chances at all (ref)	1.00	1.00
Small chance	.833(.121)	1.38(.191)**
Moderate chance	.912(.175)	.823(.236)
Great chance	.944(.162)	.801(.253)
School/Community level		
Socio-economic status of school	.979(.012)	.958(.023)**
Sponsorship group		
No sponsor (ref)	1.00	1.00
Catholic	.608(.239)**	1.17(.308)
Mainline	.581(.223)***	1.52(.300)
Protestant/Breakaway	.607(.294)	1.58(.348)
School has question box		
No (ref)	1.00	1.00
Yes	1.09(.185)	.999(.199)
AIDS risks from traditional practices		
No (ref)	1.00	1.00
Yes	1.24(.185)	1.02(.248)
AIDS risks from social events		
No (ref)	1.00	1.00
Yes	.851(.173)	.922(.284)
What church leaders say about condoms		

Anti-condom/misinformation (ref)	1.00	1.00
Impersonal/not supportive/abstinence	.957(.175)	.732(.209)
Approval	.942(.192)	.844('.268)
HIV programs incorporated into festivals?		
No (ref)	1.00	1.00
Yes	.902(.145)	1.43(.219)***
Availability of condoms in clinics		
No (ref)	1.00	1.00
Yes	.638(.179)***	1.10(.197)

Note; **p<.05; ***p<.01. Robust standard errors are reported in brackets

Table 3: Multi-level logit models of risky sexual behaviors among young boys in Nyanza, Kenya

Variables	Model 1	Model 2	Model 3	Model 4
Individual level	Exp^{β}	Exp^{β}	Exp^{β}	Exp^{β}
Age		1.16(.039)***		1.16(.039)***
Ethnicity				
Luo (ref)		1.00		1.00
Kissi		1.49(.162)***		1.58(.180)***
Others		.812(.330)		.757(.350)
Religion				
Catholic (ref)		1.00		1.00
Protestant		.723(.133)**		.698(.136)***
Other		1.21(.271)		1.16(.272)
Socio-economic status of respondent		1.02(.001)***		1.02(.006)
Sexual pressure	1.31(.072)***	1.31(.075)***		1.31(.073)***
Factual knowledge about AIDS	1.01(.057)	1.02(.059)		1.01(.059)
Transmission myths	.899(.051)***	.876(.061)**		.880(.050)***
Talked to male relative about AIDS	1.20(.072)***	1.18(.061)***		1.18(.067)***
Talked to female relative about AIDS	1.19(.076)**	1.16(.071)**		1.15(.078)
Level of pursuing information about AIDS	.968(.061)	.959(.062)		.952(.065)
Self-efficacy for condom use	1.32(.062)***	1.35(.067)***		1.37(.068)***
Pro-abstinence (youth can say no)	.984(.063)	1.01(.061)		1.03(.065)
Risk perception				
No chances at all (ref)	1.00	1.00		1.00
Small chance	.813(.118)	.816(.139)		.796(.120)**
Moderate chance	.896(.180)	.862(.176)		.825(.185)
Great chance	.899(.167)	.898(.154)		.877(.172)
School/Community level				
Socio-economic status of school			.973(.015)	.959(.016)***
Sponsorship group				
No sponsor (ref)			1.00	1.00
Catholic			.532(.253)***	.481(.253)***
Mainline			.543(.228)***	.559(.236)***
Protestant/Breakaway			.599(.205)	.633(.268)
School has question box				
No (ref)			1.00	1.00
Yes			1.18(.175)	1.31(.192)
AIDS risks from traditional practices				
No (ref)			1.00	1.00
Yes			1.33(.197)	1.45(.205)
AIDS risks from social events				
No (ref)			1.00	1.00
Yes			.834(.186)	.829(.145)
What church leaders say about condoms				

Anti-condom/misinformation (ref)			1.00	1.00
Impersonal/not supportive/abstinence			1.04(.175)	.979(.158)
Approval			.907(.213)	.827(.148)
HIV programs incorporated into festivals?				
No (ref)			1.00	1.00
Yes			.916(.161)	.885(.157)
Availability of condoms in clinics				
No (ref)			1.00	1.00
Yes			.770(.202)	.744(.173)
Random intercepts	-.993(.103)***	-1.01(.137)***	-.461(.631)	-.421(.390)
Variance components	.338***	.345***	.345***	.297
Intra-class correlation	.009	.009	.009	.008

Note: **p<.05; ***p<.01. odds ratios are reported with robust standard errors in brackets with the exception of the intercepts where we report the coefficients

Table 4: Multi-level logit models of risky sexual behaviors among young girls in Nyanza, Kenya

Variables	Model 1	Model 2	Model 3	Model 4
Individual level	Exp^{β}	Exp^{β}	Exp^{β}	Exp^{β}
Age		1.09(.063)		1.08(.063)
Ethnicity				
Luo (ref)		1.00		1.00
Kissi		.560(.226)***		.561(.252)**
Others		.591(.631)		.633(.689)
Religion				
Catholic (ref)		1.00		1.00
Protestant		1.08(.164)		1.02(.163)
Other		1.04(.581)		1.12(.595)
Socio-economic status of respondent		1.01(.007)		1.01(.008)
Sexual pressure	1.71(.110)***	1.75(.112)***		1.76(.115)***
Factual knowledge about AIDS	1.14(.074)	1.13(.083)		1.13(.077)
Transmission myths	.981(.085)	.978(.091)		.952(.084)
Talked to male relative about AIDS	1.06(.093)	1.07(.097)		1.06(.098)
Talked to female relative about AIDS	1.12(.091)	1.14(.092)		1.15(.095)
Level of pursuing information about AIDS	1.06(.099)	1.10(.100)		1.11(.109)
Self-efficacy for condom use	1.34(.097)***	1.29(.101)***		1.27(.101)**
Pro-abstinence (youth can say no)	.847(.087)	.821(.094)**		.813(.095)**
Risk perception				
No chances at all (ref)	1.00	1.00		1.00
Small chance	1.28(.190)	1.24(.195)		1.28(.177)
Moderate chance	.763(.240)	.762(.234)		.790(.235)
Great chance	.822(.258)	.858(.267)		.899(.230)
School/Community level				
Socio-economic status of school			.938(.027)**	.960(.029)
Sponsorship group				
No sponsor (ref)			1.00	1.00
Catholic			1.018(.313)	.806(.361)
Mainline			1.48(.267)	1.17(.305)
Protestant/Breakaway			1.87(.356)	1.13(.433)
School has question box				
No (ref)			1.00	1.00
Yes			1.07(.214)	1.01(.224)
AIDS risks from traditional practices				
No (ref)			1.00	1.00
Yes			1.12(.197)	.952(.224)
AIDS risks from social events				
No (ref)			1.00	1.00
Yes			.926(.262)	1.17(.297)
What church leaders say about condoms				

Anti-condom/misinformation (ref)			1.00	1.00
Impersonal/not supportive/abstinence			.665(.225)	.732(.233)
Approval			.739(.288)	.673(.296)
HIV programs incorporated into festivals?				
No (ref)			1.00	1.00
Yes			1.57(.151)***	1.44(.167)**
Availability of condoms in clinics				
No (ref)			1.00	1.00
Yes			1.22(.230)	1.13(.257)
	-	-	-	
Random intercepts	.953(.137)***	.837(.179)***	1.60(.388)***	-1.20(.519)**
Variance components	.301***	.307***	.315***	.368***
Intra class correlation	.008	.009	.009	.101

Note: **p<.05; ***p<.01. odds ratios are reported with robust standard errors in brackets with the exception of the intercepts where we report the coefficients