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Research Article

Talking about AIDS: The influence of communication networks on individual risk perceptions of HIV/AIDS infection and favored protective behaviors in South Nyanza District, Kenya

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Research Article

Talking about AIDS: The influence of communication networks on individual risk perceptions of HIV/AIDS infection and favored protective behaviors in South Nyanza District, Kenya

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Abstract

This paper explores the significance of social relationships to two important stages in the process of sexual behavioral change in response to increased HIV/AIDS risk in rural Africa: the perceived risk of becoming HIV-infected through unprotected sexual intercourse and the preferred methods of protection either through sexual fidelity, or through condom use. The empirical analyses are based on cross-sectional data from the Kenya Diffusion and Ideational Change Project (KDICP) which provides information about AIDS-related, ego-centered communication networks of Kenyan men and women. The results show that perceived risks, as well as preferred methods of protection against HIV-infection, depend in general on the prevailing perceptions and favored protective methods within personal communication networks. However, different influential network properties can be found. The risk-perceptions of women are shaped by strong relationships and cohesive network structures. Male's risk perception depends more on the number of risk-perceivers in their communication networks. Heterogeneous relationships of various kinds are influential on women's and men's probability of favoring sexual faithfulness as a method of protection against HIV-infection.

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1. Introduction

Change in sexual behavior occupies a key-position in the fight against AIDS in sub-Saharan Africa. HIV/AIDS prevention programs promote postponement of first sexual intercourse, sexual fidelity, and the use of male, or female, condoms as appropriate ways to avoid HIV infection. One remarkable feature of many of these programs is that they have a strong theoretical background in models of behavioral change, like the "Health Believe Model", the "Aids Risk Reduction Model", the theory about "Stages of Change", or the "Theory of Reasoned Action" (see UNAIDS 1999 for an overview). However, during the past years a discussion has emerged about how much the individualistic perspective of these theories fits the cultures and societies in sub-Saharan Africa (Denison 1999, Aihihenbuwa et al. 1999, Aihihenbuwa and Obregon 2000). It has become increasingly evident that these theories do not entirely explain why some populations have a higher prevalence of HIV infection than others because they do not consider the influence of contextual factors like governmental policy, socioeconomic development, or culture.

Despite the increasing attention to such factors, there is considerable uncertainty about how contextual factors influence individual behavior in sub-Saharan Africa. Due to the significance of the community in every day life, one can hypothesize that contextual factors influence the individual through two pathways: (a) via a direct effect on the individual, and (b) via an indirect effect by shaping and changing the structures and contents of social institutions and systems of interaction such as the family, the clan, kinship, or the local village community (Esser 1996: 112-118). In order to understand the relevance of contextual factors for individual behavior or for behavioral change in the context of HIV/AIDS, researchers need to consider both the direct as well as the indirect pathways of influence.

In this paper, we examine this proposition empirically. We focus on social networks and hypothesize that their potential to influence attitudes and behavior relevant to AIDS prevention depends significantly on their internal composition and structure. We investigate these hypotheses using an unusual longitudinal survey in rural Kenya that includes questions about the characteristics of network partners with whom the respondent talked about AIDS.

The most important advantage of our network-based approach is that the literature on social networks offers guidance for understanding the influence of interpersonal relationships on attitudes and behavior relevant to HIV/AIDS prevention. In particular, theories of social networks rest on the insight that actors do not make decisions in isolation, but rather with other individuals who are connected to one another (Wellman 1988, Emirbayer and Goodwin 1994, Rogers 1995). These interactions offer opportunities for individuals to exchange information, to evaluate information, to learn

about the rigidity or flexibility of social norms, and to influence each others' attitudes and behaviors (Mitchell 1969, Boissevain 1979, Montgomery and Casterline 1996, Emirbayer 1997, Kohler, Behrman, and Watkins 2002). Such interactions are likely to be particularly important when an individual is uncertain about the best response to an innovation, environmental change, or to new social and economic circumstances.

There is no doubt that the emergence of AIDS presents a challenge along these lines. AIDS is not only a new disease, but has also provoked a great deal of uncertainty in areas of the world where levels of infection have risen rapidly in recent years and reached a relatively high prevalence. This uncertainty is partly due to the advice offered by global and national HIV/AIDS prevention programs to change sexual behavior and to adopt innovative practices. The most common advice is abstinence, or condom use before marriage and fidelity after marriage, but pilot programs have also promoted HIV testing, female condoms, alteration of initiation customs, and ways of decreasing the mother-to-child transmission of HIV.

While the spread of information about potential responses to HIV/AIDS risks and the improvement of access to respective means (e.g. condoms) are an important step, this approach is still limited. In particular, the literature on communication networks argues that the dissemination of information about preventative measures is not sufficient to induce behavioral change. The literature proposes that social networks play an important role in translating the prevention messages disseminated by the media, clinics and churches into local terms and in interpreting them in the local context (Awusabo-Asare 1995, Schenk 1995).

We will present our arguments and empirical results in the following way. After this short introduction, we offer in Section 2 information on the content of conversations about HIV/AIDS in local networks in rural Kenya and rural Malawi. We draw on qualitative data as well as on literature about other places in sub-Saharan Africa. In Section 3, we discuss the context in which our respondents live. Furthermore, we describe the household survey data from Kenya used in the subsequent empirical analyses and the network characteristics central to these analyses. Section 4 presents a description of personal and network characteristics by gender. In Section 5, we consider network-related determinants of two essential aspects of the process of change in sexual behavior: first is the knowledge that HIV is sexually transmitted and second is the adoption of protective behavior, such as fewer extramarital partners, sexual fidelity and condom use. The network-related determinants are represented by the similar, or different, risk perceptions and the similar, or different, protective practices of the respondent's network partners as well as the nature of the ties among the network partners. Section 6 is a discussion of our findings and a conclusion.

2. Background: Talking about sex, AIDS, and protective behavior in sub-Saharan Africa

There is increasing evidence that local networks are important in sub-Saharan Africa in translating and interpreting the risk of HIV/AIDS and in facilitating the behavioral changes in response to increasing HIV/AIDS risks. Such translation and interpretation accompany the spread of HIV/AIDS, quite similar to the role of social networks in the diffusion of modern family planning (Rutenberg and Watkins 1997, Watkins 2000). For example, Philip Setel (1999) reports that in Tanzania 1992-1993 there was a great deal of 'ambiguity and uncertainty' about AIDS: "Nearly all parties in Kilamanjaro discussed risk, male-female relationships and the meaning of reproductive and sexual action in reference to specific examples of personal behavior. In other words, the qualities and capacities of individual men and women confronting and confronted with particular situations were central to local discussions about AIDS" (Ibid: 90).

Local interpretation may be particularly important for AIDS prevention messages in sub-Saharan Africa due to the discrepancy between program messages and well-established attitudes and behaviors (Tawfik and Watkins 2003). In particular, program messages that urge abstinence, fidelity, or condom use conflict with local understandings of sexuality: HIV/AIDS prevention programs promote postponement of first sexual intercourse but premarital sex still appears to be common (Harwood-Lejeune 2000). In a household survey, conducted in Malawi in 2001 among ever-married women and their husbands by Watkins and collaborators, almost all of the respondents reported having engaged in premarital sex, either with the person they subsequently married or with someone else (Bracher et al. 2003). Moreover, it appears that sex is not a taboo topic for discussion among adolescents and young adults (Nnko and Pool 1997, Basompra 2001). In focus groups conducted by Helitzer-Allen (1994), girls between the ages of 9 and 12 said that their friends who were having sex talked about it among themselves; they also evaluated male sexuality, "'especially', said one, 'when girls are in their multitudes at the river, or when going or coming from school.'" Slightly older girls (ages 13-15) reported even more open discussions about sex and male sexuality. One said "'I found three girls at the open well telling each other how they feel when doing sex. One was telling her friends that her first time to do sex she felt very painful but now she feels OK and she does enjoy it'" (Ibid: 62).

Semi-structured interviews in Kenya and Malawi with married men and women, as well as the related discussion in the literature, show that there is typically an acknowledgment that strict fidelity is an appropriate and ideal behavior in the age of AIDS, despite the fact that it was not considered as such in the past (Watkins and Schatz 2001). Moreover, there is increasing evidence that both married women and married men discuss strategies of prevention with social network partners. Women talk

with each other about how best to persuade a spouse to be faithful, men talk with each other about how to maintain variety in sexual partnerships without the risk of AIDS (Zulu and Chepngo 2003, Kaler 2003). In particular, it is well-known to males that a woman's physical appearance is not sufficient to evaluate whether she is HIV infected or not. Men therefore talk with friends to gain local knowledge about a woman's past sexual behavior and whether she stayed in urban areas – places perceived to offer a greater risk of HIV.

There is uncertainty about whether younger women or older ones are more likely to be infected. Although some men say that younger women are preferable, others disagree. Much the same suspicion of younger unmarried women was noted in Zambia, where "There is a preference for having married women or men as girlfriends or boyfriends because they are more likely to have fewer sexual partners and, it is believed, less likely to have an STD" (Bond and Dover 1997:386).

Condoms are perceived as an unattractive option in the context of premarital, extramarital sex and especially within marriage. It has been widely reported that men tell each other that sex with condoms is 'like eating sweets in a wrapper', that condoms have little holes, that they are deliberately laced with the HIV virus, that women dislike them and that they are 'useless' because they 'burst' (e.g. Bond and Dover 1997 for Zambia, Varga 1997 for South Africa, Temin et al. 1999 for Nigeria, Kahler 2002 for Malawi). There is also 'empirical', almost scientific, analysis of condoms. Respondents in Watkins' Malawi survey often claimed that either they themselves, or a cousin, or a friend, had subjected condoms to empirical tests: filling them with water and finding that they leaked, or finding little 'animal-like things swimming around'. Yet, we also found evidence that condoms are being taken seriously as a strategy when men are overcome by temptation. Thus, however colorful the objections to condoms, they are clearly being used (Watkins 2003).

The kinds of conversations described above are consistent with our earlier discussion that local networks may play a significant role in responses to HIV/AIDS. But is there anything about the characteristics of these networks that might indicate whether some types of networks are more effective in promoting – or hindering – change than others?

Social network theory suggests that an actor is influenced by her network partners if these individuals are visible and important to her. Visible means that the network partners are recognized and known by the respondent, either by a direct relationship, or indirectly. Both conditions, visibility and importance, arise from two different network properties: social cohesion and structural equivalence (Friedkin 1993, Marsden and Friedkin 1993, Marsden 1998). Within cohesive structures, network members are visible and influential because they are connected with one another, either directly, or indirectly by paths of short length (e.g. a friend of a friend). "[…] members of a

cohesive group are more likely to be aware of each other's views on an emergent issue than are actors who are not members of the group. Moreover, visible opinions are likely to be salient in cohesive groups because members are embedded in a field of interpersonal cross-pressures that encourages reciprocity and compromise" (Friedkin 1993: 862). Structural equivalence locates sets of actors who have "[…] identical profiles of relationships to actors in the system" (Marsden 1998: 8). Identical profiles lead to identical positions and roles. Therefore, structurally similar individuals are important to one another because they are in comparable social situations.

The following argumentation will concentrate on the influential aspects of social cohesion because our empirical analysis rests on data from small ego-centered networks that give information on the characteristics of direct relationships between a focal actor and a number of network partners (see Section 3). Structural equivalence of network partners is therefore difficult to establish with our data, while cohesion can be inferred from the characteristics that describe the relation between the respondent and her/his network partners.

Network structures of varying degrees of cohesiveness are expected to have different processes of interpersonal influence based on learning and/or on social norms. For example, it has been suggested that people rely more on information from network partners they know well and trust than on information from acquaintances. But if a network is primarily composed of confidants, new and heterogeneous information is less likely to enter the network (Granovetter 1973). Furthermore, it is likely that if an individual knows the several people in her network quite well, they will also know each other well. This creates dense network structures that may have especially powerful influence on the creation, or upholding of norms (Coleman 1990). In contrast, open network structures facilitate processes of 'social learning' (Montgomery and Casterline 1996, Kohler, Behrman, and Watkins 2001). Less connected networks tend to be composed of weak ties and therefore their members may be in contact with more heterogeneous and distant network partners than the members of more cohesive networks. Furthermore, they tend to be characterized by a smaller number of close relationships, so that their members may maintain a larger number of interpersonal relationships. Thus, they receive more information that is heterogeneous and new and normative pressures are less intense. This provides opportunities for the development of new attitudes as well as for the emergence of new behaviors.

3. Data and Variables

The data we use for the following analyses are from the Kenya Diffusion and Ideational Change Project (KDICP) which includes semi-structured interviews and focus groups

as well as a quantitative panel study of households conducted by Watkins and collaborators in South Nyanza District, Nyanza Province, Kenya (Note 1). The survey was carried out in four rural sublocations (administrative units): Obisa, Kawadhgone, Owich, and Wakula South. Although the sublocations were selected purposely than randomly, a comparison of the KDICP with data for rural Nyanza Province from the Kenya Demographic and Health Survey from 1993 shows that the KDICP data is representative of the province (Reynar 2000). The sampling frame was a list of villages in each of the four sites. From this list, enough villages were randomly selected to provide the desired sample size, consisting of all married women age 15 to 49 and their husbands (Note 2). There were three waves of the household study conducted in December 1994/January 1995, in December 1996/January 1997, and in January/February 2000 (Note 3). The analyses for this paper, however, concentrate on the second wave of the survey, consisting of 740 women and 565 husbands, because this second wave was the first round of the survey that contained detailed questions about HIV and AIDS. Although respondents in the initial sample were all married, by the time of the second wave some respondents had lost a spouse to death or divorce.

During the last decade, the number of HIV-infected people increased steadily in Kenya. In 1990, 5,8% of the Kenyan population between 15 and 49 years of age was infected. This proportion increased to 13.9% by the end of 1999 with an annual rate of growth of 11% (The World Bank 2000, UNAIDS/WHO 2000). No detailed statistics for South Nyanza District are available. However, data from Rachuonyo District, which is a new district in Nyanza Province and which covers one of the four research sites, show that 30% of pregnant women tested at an antenatal clinic surveillance site were HIV positive (U.S. Census Bureau 2000). There are few indications of any AIDS-education programs in the study sites, although many have radios and are thus exposed to media messages.

South Nyanza is inhabited primarily by Luos, a patrilineal, patrilocal and polygamous tribe. The compounds are ideally headed by a patriarch, with houses for each of his married sons and his sons' wives and children. When a man dies, his widow is supposed to be 'inherited' (Note 4). There is also relatively little economic and social stratification in South Nyanza. Most residents are engaged primarily in subsistence agriculture, supplemented by small-scale business, some wage labor, and occasional remittances from urban relatives. Almost all respondents lived in mud huts with thatched roofs, although some had more costly metal roofs. Those who complete secondary school look for work in the cities; those who do not find jobs and return to the rural areas are engaged in much the same activities as those who have never been to school.

Across all sites, one half of the respondents reported owning a radio and 37% of women and 61% of men had spent six months or more after marriage outside their

village, usually in a city. Women leave the area to visit maternal relatives living elsewhere in Nyanza, or a husband who has migrated for work. Funerals, which are frequent due to the high level of AIDS, bring relatives and friends to the area for a few days. Nonetheless transportation remains irregular and expensive and telephones are rare. Frequent interaction is therefore largely restricted to members of the local community.

An important feature of the KDICP data is that they include information on ego-centered networks. In particular, the respondents (ego) were asked to give information about their network partners with whom they 'chatted' about AIDS. The word 'chat' was used in the data collection in order to indicate that the survey was interested not in lectures or counseling sessions at the clinics, but rather in informal interactions. The number of network partners ranged from 0 to 50, and about 50% of women and 55% of men report four or fewer network partners. Detailed questions were asked about the characteristics of a maximum of four of these partners (Note 5). Thus, there is information about the economic status, educational level, age, and the gender for a total of 1,869 network partners for female respondents and 1,501 network partners for male respondents. These network partners were further delineated using terms often employed in network studies to characterize the relationships between the respondent and her network partners, such as the nature of the relationship (confidant, friend, or acquaintance), its duration, the frequency of contact and spatial distance (living in the same compound, village, or sublocation). In addition, the respondent was asked about the network partner's response to AIDS: how worried the network partner was about his, or her, risk of infection and what he, or she, thought was the best way to protect oneself against AIDS (Note 6).

In the analyses that follow, we examine the determinants of two central aspects of behavioral change for HIV-prevention. First, individuals' association of HIV/AIDS infection with sexual intercourse, and second, the favored methods to avoid HIV/AIDS infection. Individuals' association of HIV/AIDS infection was measured in the following way. Respondents were first directly asked whether they think they might contract HIV or not. If a respondent agreed upon this general question or replied that she did not know whether she might contract HIV or not, an additional question was asked about the specific way she thought she might become infected: by dirty needles, by blood transfusions, by shaving and razors, by sexual intercourse with the marriage partner, with a girlfriend (only for men), with another sexual partner (only for women), or with a sex worker (only for men). Respondents could name only one way of transmission. With the help of these two questions, the following dummy-variable is constructed: On the one hand, the different ways of sexual transmission are united in one category; on the other hand, the reference category consists of all respondents that denied in the first question any risk of HIV infection. Therefore, the variable gives

information whether the respondent perceives sexual intercourse in general as a way of HIV-transmission or whether she thinks not to become HIV infected at all. To have an unambiguous reference category, all replies of respondents that perceive dirty needles, shaving and razors, or blood transfusions as ways of transmission are coded as invalid answers.

Variables about the favored methods to avoid HIV/AIDS infection are constructed in a similar way. Respondents were first asked directly whether they ever used a method to avoid catching the HIV virus or a sexually transmitted disease. If a respondent agreed, she was asked about the method she used. Responses to this question were initially unprompted, and if a prompt proved necessary, the interviewer was instructed to mention abstinence, sex with a spouse only, or condoms. We focus in our analyses particularly on the preference for condoms and the preference for fidelity as methods to reduce AIDS risks. Therefore, two variables are constructed: whether the respondent prefers fidelity and whether she prefers condoms. The reference category for both variables consists of all respondents that stated in the first question that they had not used any kind of protective method. To get unambiguous reference categories for these variables, all replies of respondents that prefer another method are coded as invalid answers, i.e. 'abstinence', 'condoms', 'medication', or 'another way' for the variable that measures preference for fidelity, and 'abstinence', 'fidelity', 'medication' or 'another way' for the variable that measures preference for condoms.

We believe that three aspects of the context in which the data were collected influenced the responses and thus the interpretation of our dependent variables. Firstly, despite the fact that the survey was not done for the government of Kenya, it was perceived as research by the government and by foreign donors. Thus, many respondents answered strategically because they expected benefits to flow, either for the community or, preferably, for themselves. These response strategies differed for men and women (Miller, Watkins, and Zulu 2001). Secondly, preventive methods, especially condom use and levels of extramarital sex, are likely to be underreported. Condom use is associated with sex with a commercial sex-worker and extramarital sex is perceived as the most serious source of HIV-infection. This underreporting is to some extent the result of AIDS prevention programs in Kenya, which emphasized transmission through extramarital sex and particularly sex with a prostitute. Moreover, respondents may also be in denial that family members may have died from AIDS (Note 7). Consequently, respondents probably underreport both extramarital sex and protective measures because this would mean that they acknowledge their engagement in risky behavior. Thirdly, within the group of respondents that used some method of protection, the majority of both males and females reported that they relied on fidelity. While we believe that some of these respondents actually used condoms, as noted above, the reporting of this condom use was incomplete. It is likely that some respondents

circumvented this awkward interview-situation by answering not in terms of their own behavior but rather what they perceived to be the best approach to prevention (Watkins, personal communication). In summary, therefore, fidelity and condom use are best interpreted as indicators of attitudes: what the respondent believes as an appropriate preventive measure for those engaging in, or tempted to engage in, extramarital sex.

4. Methods and specifications

The multivariate analyses that follow explore the influence of social interactions about HIV/AIDS on the two dependent variables described above: the respondent's perception that HIV is transmitted sexually and the method favored by the respondent to reduce the risk of HIV/AIDS infection. Since several analyses have already investigated the general role of social interactions for AIDS/HIV infection, our analyses focus in particular on the question of whether the structure of social networks and the characteristics of network partners modify the influence of social interactions and constitute important aspects in how social networks are likely to affect behavioral change in response to AIDS.

4.1 Explanatory variables for analyses of risk perception

Before embarking on these analyses, however, we will discuss several other aspects that are likely to be influential in the context of AIDS and AIDS-related behavioral changes and therefore need to be included as right-hand-side variables in our analyses. In particular, the KDICP data allows for the analyses of three further dimensions that might influence the respondents' perceived risk of contracting HIV through sexual intercourse: their knowledge about the disease, their personally perceived direct or indirect (because of spouse's sexual activities) involvement in risky behavior, and the presence of deaths that might be caused by AIDS in their personal environment. Knowledge about AIDS is measured by a variable about whether a respondent knows that HIV is transmitted by sexual intercourse or not. Knowledge depends also on opportunities of receiving information, and wealthier households tend to have more access to information, including information about HIV/AIDS. This aspect is reflected in our analyses by including a variable whether the respondent's house has a metal rather than a thatch roof.

Respondent's involvement in risky behavior was not asked directly in the questionnaire and therefore three indicators have to be used. The first indicator measures whether the respondent is at risk of HIV infection from her husband or his

other wives because these are involved in sexual relationships with other women or men. Female respondents were asked the following question: "Do you suspect or know that your husband has had sexual relations with other women (women who are not his wives)?" Male respondents were asked for each of their wives: "Do you suspect or know that your wife has had sexual relations with other men?" If a female respondent replied that she knows for her husband and a male respondent replied that he knows for at least of one of his wives about other sexual relations, this information is used as an indicator that the respondent is at risk of HIV infection from her husband or his wife (wives). Respondents who 'suspect' sexual relations, state that they 'cannot know what their partners do', or think that their 'partners do probably not have sexual relations' constitute the reference category. All these respondents are treated as not at risk of HIV infection from their partners, because they do not know exactly about sexual relations of their partners (for related analyses of risk perceptions and suspected spousal infidelity, see Smith 2003). The second indicator measures respondents' and their partners' opportunity for sexual relationships with other men and women. Jobs are rare in South Nyanza and therefore many men leave the region temporarily or permanently to find a job somewhere else in Kenya. It is widely believed that men seek other partners when they are away from their wives. It is also believed, but to a lesser extent, that women seek other partners when their spouse is away. Within the questionnaire, female respondents were asked whether their husband usually stays in the compound or whether he usually stays somewhere else. Male respondents were asked in the same way where they usually stay. Thus, if women replied that their husbands, or if men replied that they themselves, stay usually somewhere else, these answers give information about opportunities and motivation for wives and husbands to engage in extramarital sexual relations. The third indicator is an opinion question that indirectly measures a respondent's probability of having extramarital sexual partners. All respondents were asked to evaluate the following statement: "A woman (for female respondents)/a man (for male respondents) can be satisfied with just one sexual partner". The respondents could 'agree', 'neither agree/disagree' or 'disagree' with the statement. We think that respondents who disagree with this statement tend to accept extramarital sexual relationships in general and therefore tend to be more willing to enter into this kind of relationship.

Finally, we think that those individuals who personally know people who have died of AIDS see AIDS as a salient threat (instead of tests, AIDS as the cause of death is usually attributed on the basis of the symptoms experienced by deceased persons prior to death). Therefore, the third dimension that might be influential on respondent's risk perceptions rests on the following question: "How many people do you know who you think may have died from AIDS or chira?" Chira, a local sexual-transmitted disease, was included in the question because it is apparently often used when a person

is reluctant to say that a relative or friend may have died of a disease associated with immorality. However, we hypothesize that the more a respondent knows about people that died from AIDS or chira, the more she is worried about the disease and the more she perceives, because of rumors or of information, sexual intercourse as a source of infection.

Finally, we add variables about respondent's age and educational level to cover basic personal characteristics as well as about the locations of the interviews to control for possible regional variations.

4.2 Explanatory variables for analyses of favored protective methods

A different set of explanatory variables is included in our analyses to represent the determinants of a respondent's favored protective method: knowledge about AIDS, awareness about AIDS, and perceptions of sexual relationships as serious sources of infection.

Knowledge is measured directly by the variable corresponding to whether a respondent knows that the AIDS virus is transmitted by sexual intercourse. Awareness about AIDS was not asked directly and therefore an indictor-variable is used: whether husband and wife have discussed chances of getting infected with HIV. Results from qualitative interviews in the KDICP show that couples do not talk about AIDS in an abstract manner, but rather about their personal risks of contracting the virus (e.g. see Kaler 2003 for a related analysis in Malawi). Therefore, all respondents that give an affirmative answer to the question whether they ever talked to their husbands/wives about the chances that they themselves or their husbands/wives might get infected with AIDS are interpreted as individuals who are aware about HIV and AIDS. Consequently, the reference category consists of all respondents that did not talk with their husbands/wives about this topic. Finally, we hypothesize that an individual's favored protective method is also dependent on his or her perception about what kinds of sexual relationships are serious sources of infection. No detailed hypotheses about these possible causalities can be formulated. However, we want to explore whether, for example, the perception that sex with the spouse is a serious source of infection has a different impact on the favored protective method as the perception that sex with a sex worker is a serious source of infection. Moreover, we will explore whether condoms are evaluated as an appropriate way of protection within different kinds of sexual relationships

The list of explanatory variables is completed again by variables about respondent's age and educational level as well as about the locations of the interviews.

4.3 Representation of social networks

To analyze the influence of communication networks on respondents' AIDS related risk perceptions and favored protective methods, we use the risk perceptions and favored protective methods of the network partners with whom the respondent has chatted about AIDS. Network partners' risk perceptions are covered by responses to the question, "How does [the network partner] think she/he might catch AIDS?" Response categories are the same as those offered to the respondent: 'sexual intercourse', 'shaving/razors', 'needle/injections', 'transfusions', and 'other'. In the analyses of preferred protective methods, we use the question, "What did [the network partner] think was the best protection?", with the responses being 'abstinence', 'fidelity', 'condom use', 'medication' and 'other'. Because we are interested in the role of group structure and particularly the cohesiveness of social networks, we also include measures of the network composition. In particular, cohesiveness is measured by various characteristics of the relationships between the respondent and his/her network partners: how long the respondent has known each partner, where the partner lives, the frequency of their interaction, the closeness (confidant, friend, acquaintance), the homophily of the relationship (same or different gender, same or different age), the nature of the relationship (e.g. family member, friend, acquaintance) and whether the relationship is multiplex. Relationships that consist of two or more contents are multiplex. In our data, a relationship between a respondent and a network partner is multiplex, when the following two contents are present: the respondent ever lent money to the network partner and the respondent gives occasional or regular help to the network partner's family. All these variables are indicators, or predictors, of the strength of network ties (Marsden and Campbell 1984) and therefore provide information about a network's cohesiveness. Thus, the more a network is characterized by indicators and predictors of strong ties the more it is composed by a dense web of relationships.

An important caveat of our analyses is that the results cannot necessarily be interpreted as causal influences of communication networks on the respondents. This is primarily due to the fact that we analyze cross-sectional data that do not control for unobserved characteristics of a respondent or her/his socioeconomic context that affect the AIDS-related behaviors and expectations as well as the structure and composition of the social network. In particular, networks seem to be characterized by homophily, i.e., respondents choose particular network partners for communication in part because there is a preference for talking with people similar to oneself (Watkins and Warriner 2003). Analyses that address this issue explicitly are beyond the scope of the present paper. Nevertheless, related studies that utilize fixed effect estimations in combination with the longitudinal nature of the KDICP data have shown that relevant influences of social networks on the adoption of modern family planning and assessments of HIV/AIDS

risk persist even after controlling for the unobserved selection of network partners (e.g. Behrman, Kohler, and Watkins 2002, 2003).

5. Results

The presentation of the empirical results starts with a brief discussion of descriptive findings about the respondents' risk perceptions and favored protective methods. It continues with a description of the characteristics of women's and men's AIDS-related communication networks. Finally results from various logistic regressions are presented that identify particular network characteristics as significantly associated with respondents' perceptions of becoming infected with HIV and respondents' opinions about sexual fidelity and condom-use as appropriate methods of protection.

5.1 Gender specific risk perceptions and favored protective methods

Most respondents are aware of the risks of HIV infection. 77.0% of all women and 74.1% of all men in the survey think that they might become infected (see the results for all respondents in Table 1). Moreover, the majority of respondents perceive sexual intercourse as the most serious means of becoming infected. However, there are differences between women and men. Men are more involved in extramarital sexual relationships than women and consequently recognize these activities as putting them at risk. Women, on the other hand, are aware of this behavior and therefore 54.1% of them think that the husband is the most likely source of infection.

This high level of awareness of HIV infection through sexual intercourse does not necessarily imply that the respondent engages in protective behavior. 28.6% of all female respondents and only 29.0% of all women who perceived sexual intercourse as a serious source of infection ever used a protective method. Men, however, report using protective behavior significantly more often than women (46.5 % vs. 28.6%) and more men than women perceive sexual intercourse as risky behavior and used a method of protection (48.9% vs. 29.0%). Men also favor the use of condoms significantly more than women. Women, on the other hand, perceive their husbands as primary sources of infection. Despite this pattern, however, protective methods like condoms are not widely accepted between marriage partners and therefore only a small number of women favors condoms. Rather, most of them think that sexual fidelity is an appropriate protective method.

Table 1: *Perceived sources of HIV-infection and favored ways of protection by gender*

	All respondents					All respondents that reported about two or more network partners				
	Women		Men		Sign.	Women		Men		Sign.
Risk perception										
Respondent thinks that she/he might catch AIDS	77.0	(558)	74.1	(395)	n.s.	78.2	(391)	75.1	(314)	n.s.
Sources of infection:										
Sexual intercourse with …										
… couple(s)	54.1	(302)	25.1	(98)	***	55.2	(216)	25.0	(78)	***
… other partner/girlfriend	22.0	(123)	25.1	(98)	n.s.	21.2	(83)	27.6	(86)	**
… prostitute	--	--	23.8	(93)	--	--	--	21.5	(67)	--
Injection	16.7	(93)	19.2	(75)	n.s.	17.6	(69)	18.6	(58)	n.s.
Transfusion	3.6	(20)	4.6	(18)	n.s.	3.6	(14)	5.8	(18)	n.s.
Other source	3.6	(20)	2.1	(8)	n.s.	2.3	(9)	1.6	(5)	n.s.
Total	*100.0*	*(558)*	*99.9*	*(390)*		*99.9*	*(391)*	*100.1*	*(312)*	
Protective behavior										
Ever used a way to avoid HIV-infection	28.6	(211)	46.5	(262)	***	32.2	(164)	50.9	(223)	***
Favored method (multiple answers):										
Abstinence	2.4	(5)	6.1	(16)	**	2.4	(4)	6.3	(14)	*
Sex only with husband/wife	86.7	(183)	67.6	(177)	***	86.0	(141)	66.4	(148)	***
Condoms	14.2	(30)	37.0	(97)	***	14.6	(24)	39.0	(87)	***
Medication	--	--	1.9	(5)	--	--	--	1.8	(4)	--
Other way	3.8	(8)	2.3	(6)	n.s.	4.9	(8)	2.7	(6)	n.s.

Percentage, (number of cases).

Levels of significance: * < 0.10; ** < 0.05; *** < 0.01; results are taken from a χ^2-test and indicate significant differences between the subgroups of female and male respondents.

To analyze the characteristics and structure of egocentered networks, an actor's personal network has to consist of two or more members. Therefore, the subsequent multivariate analyses rest on the sub-population of respondents (509 women and 438 men) that reported about AIDS-related communication networks with a size of at least two network partners. However, as the mean values in Table 1 show, this selection does not lead to a noteworthy bias according to the distribution of respondents' risk perceptions and favored protective methods.

5.2 Gender specific communication networks about AIDS

To analyze differences in the composition of the AIDS-related communication networks of men and women, mean values of the various characteristics of relationships and the network partners' attributes were computed on the basis of all partners in one

Table 2: *Characteristics of communication networks about AIDS; the characteristics are reported for the complete network as well as for the sub-network of network partners that either perceive risk of infection because of sexual intercourse or that do not perceive any risk (All respondents who reported about two or more network partners)*

	Whole network[a]			Sub-network of partners that perceive sexual intercourse as risk[b]			Sub-network of partners that do not perceive any risk[c]		
Relationship characteristics	Women	Men	sign.	Women	Men	sign.	Women	Men	sign.
Risk perception[d]	0.53 (0.437)	0.61 (0.439)	***	--	--		--	--	
Basic characteristics									
Duration of relationship[e]	3.61 (0.540)	3.81 (0.349)	***	3.61 (0.606)	3.81 (0.393)	***	3.62 (0.593)	3.75 (0.482)	***
Location of network partner[f]	3.99 (1.227)	3.89 (1.123)	n.s.	4.01 (1.331)	3.92 (1.231)	n.s.	4.04 (1.411)	3.72 (1.296)	***
Frequency of contact[g]	3.86 (0.936)	4.04 (0.816)	***	3.88 (1.033)	4.12 (0.842)	***	3.88 (1.069)	3.88 (1.042	n.s.
Emotional closeness[h]	2.29 (0.517)	2.36 (0.451)	**	2.33 (0.557)	2.40 (0.496)	*	2.25 (0.616)	2.30 (0.568)	n.s.
Homophile relations									
Same gender[d]	0.80 (0.286)	0.89 (0.218)	***	0.82 (0.314)	0.90 (0.243)	***	0.82 (0.311)	0.88 (0.272)	**
Same age[d]	0.20 (0.266)	0.28 (0.282)	***	0.23 (0.333)	0.30 (0.353)	**	0.17 (0.295)	0.24 (0.343)	***
Multiplex relations									
Lending money[d]	0.40 (0.344)	0.46 (0.353)	***	0.43 (0.505)	0.51 (0.398)	**	0.37 (0.405)	0.42 (0.410)	n.s.
Intensity of help[i]	2.24 (0.345)	1.95 (0.575)	***	2.24 (0.397)	1.98 (0.624)	***	2.24 (0.430)	1.91 (0.627)	***
Nature of relationship[d]									
Spouse's family	0.17 (0.282)	0.03 (0.106)	***	0.17 (0.322)	0.02 (0.101)	***	0.18 (0.315)	0.03 (0.127)	***
Respondent's family	0.12 (0.225)	0.10 (0.219)	n.s.	0.12 (0.251)	0.11 (0.247)	n.s.	0.11 (0.257)	0.10 (0.256)	n.s.
Other relatives	0.44 (0.364)	0.43 (0.344)	n.s.	0.46 (0.424)	0.41 (0.384)	*	0.46 (0.415)	0.46 (0.415)	n.s.
Friends	0.20 (0.298)	0.34 (0.335)	***	0.21 (0.342)	0.36 (0.382)	***	0.18 (0.315)	0.30 (0.381)	***
Other network partners	0.06 (0.177)	0.10 (0.228)	***	0.04 (0.153)	0.09 (0.237)	***	0.07 (0.212)	0.12 (0.278)	**
N	**503**	**432**		**325**	**305**		**293**	**209**	

Mean value, (standard deviation).

Levels of significance: * < 0.10; ** < 0.05; *** < 0.01; results are taken from t-tests and indicate significant differences between the subgroups of female and male respondents.

[a] All respondents that reported about two ore more communication partners.

[b] All respondents that reported about two ore more communication partners and about one or more communication partner(s) that perceived sexual intercourse as a source of HIV-infection.

[c] All respondents that reported about two ore more communication partners and about one or more communication partner(s) that did not perceive a risk to become HIV-infected.
[d] Dummy coded variables. Therefore, the mean values give information about the proportion of relationships/network partners with the particular characteristic.
[e] Values of duration of relationship: 1 = spoken once or twice, 2 = less than a year, 3 = 1 to 5 years, 4 = more than 5 years.
[f] Values of location of network partner: 1 = Nairobi, Mombasa, somewhere else, 2 = elsewhere in South Nyanza, 3 = same location (as respondent), 4 = same sub-location, 5 = same village, 6 = same compound.
[g] Values of frequency of contact: 1 = less than once a year, 2 = about once a year, 3 = once a month, 4 = at least once a week, 5 = almost every day.
[h] Values of emotional closeness: 1 = acquaintance, 2 = just a friend, 3 = confidant.
[i] Values of intensity of help: for female respondents: 1 = never, 2 = rarely, sometimes, 3 = often; for male respondents: 1 = never, 2 = frequently, 3 = often.

network. This was also done for four subgroups of network partners: all partners in a network who perceive sexual intercourse as a risk, all partners who do not perceive any risk, all partners who prefer fidelity as a protective method, and all partners who favor the use of condoms. Therefore, the results in Table 2 and Table 4 represent subgroup specific, overall means and their standard deviations.

The majority of the respondents' communication partners about AIDS perceive sexual intercourse as a serious source of infection (see first row in Table 2). Men's communication networks contain significantly more individuals who perceive sex as a possible threat than do women's networks. However, the percentage of risk-perceivers within the communication networks is lower than the percentage among the respondents.

The characteristics of women's and men's ego-centered networks show that communications about HIV infection and AIDS take place in everyday life. Both networks are on average characterized by relationships to people who have been known to the respondent for an extended time period, live in the respondent's immediate environment, met at least once a week with the respondent and are of the same gender as the respondent. They are also characterized by emotionally closer relationships: women as well as men, on average, described their network partners as friends. Furthermore, there exist frequent help relationships between the respondents and the families of their network partners.

Despite the above similarities, women's and men's networks are differently constituted. Men tend to know their communication partners for a longer time and tend to meet them more frequently. Men's relationships are more homophilous. Women's networks on the other hand are more often composed of relationships to members of their husbands' families than are men's networks, which only sporadically list members of their wife's (wives') families. Women report less often having relationships to friends and to other network partners – like chiefs or workmates – than men do. Many of these differences are caused by the Luo's patrilocal marriage system. Husbands stay at the compound of their parents and marry women who are not related to the husbands'

families and who have to come from other parts of Nyanza. Thus, after marriage women have to build up new relationships at their husband's location.

These patterns of different characteristics in men's and women's communication networks also hold for the different subgroups of network partners that perceive sexual intercourse as either a serious potential source of infection, or as no threat at all. A comparison of these subgroups, divided between women and men, shows that there are only slight differences within women's networks, but more pronounced differences within men's networks. The subgroup of risk-perceivers among men's networks can be characterized as containing more intense, closer, homophile and multiplex relationships than the subgroup of non-perceivers.

Similar to the respondents, most of the network partners (on average 63.0%) favor sexual fidelity as an appropriate way to avoid HIV-infection. The use of condoms is the second choice with an average share of 18.0% for women and of 21.0% for men. However, contrary to the significant differences in fidelity and condom use between male and female respondents there is no difference regarding these protective methods among the network partners in the communication networks (see Table 3).

Table 3: *Average proportion of network partners that favor fidelity or condoms by gender*
(All respondents who reported about two or more network partners)

	Gender of respondent		
Favored protective method	Women	Men	Sign.
Fidelity	0.63	0.63	n.s.
	(0.360)	(0.365)	
Condoms	0.18	0.21	n.s.
	(0.296)	(0.310)	
N	**489**	**427**	

Mean value, (standard deviation).
Levels of significance: * < 0.10; ** < 0.05; *** < 0.01; results are taken from a χ^2-test and indicate significant differences between the subgroups of female and male respondents.

The separation of the communication networks into network partners who either favor fidelity, or condom use, leads to a similar distribution of relationship characteristics as the separation of network partners into risk-perceivers and non-perceivers (see Table 4). However, network partners who favor condom use tend to be less closely related to the respondents than network partners who favor fidelity. This applies especially to women's networks because their network partners who favor condom use tend to live further away than men's network partners, are less frequently in contact and belong more often to women's families of origin.

Table 4: *Characteristics of communication networks about AIDS according to network partners' favored protective method (All respondents who reported about two or more network partners)*

	Sub-networks defined by network partners' favored protective method					
	Fidelity[a]			Condoms[b]		
Relationship characteristics	Female	Male	Sign.	Female	Male	Sign.
Basic characteristics						
Duration of relationship	3.59	3.80	***	3.67	3.73	n.s.
	(0.592)	(0.422)		(0.569)	(0.613)	
Location of network partner	4.08	3.90	*	3.64	3.61	n.s.
	(1.265)	(1.271)		(1.531)	(1.425)	
Frequency of contact	3.92	4.05	*	3.64	3.92	**
	(1.004)	(0.928)		(1.184)	(1.125)	
Emotional closeness	2.28	2.33	n.s.	2.32	2.36	n.s.
	(0.568)	(0.527)		(0.598)	(0.587)	
Homophile relations						
Same gender	0.82	0.88	***	0.71	0.91	***
	(0.308)	(0.266)		(0.414)	(0.252)	
Same age	0.22	0.27	**	0.22	0.30	*
	(0.309)	(0.352)		(0.369)	(0.396)	
Multiplex relations						
Lending money	0.41	0.46	n.s.	0.42	0.50	*
	(0.388)	(0.394)		(0.448)	(0.438)	
Intensity of help	2.24	1.94	***	2.19	1.90	***
	(0.389)	(0.648)		(0.419)	(0.686)	
Nature of relationship						
Spouse's family	0.18	0.02	***	0.19	0.03	***
	(0.308)	(0.099)		(0.357)	(0.133)	
Respondent's family	0.11	0.10	n.s.	0.17	0.09	**
	(0.241)	(0.247)		(0.325)	(0.258)	
Other relatives	0.44	0.44	n.s.	0.42	0.40	n.s.
	(0.402)	(0.403)		(0.450)	(0.423)	
Friends	0.20	0.32	***	0.17	0.36	***
	(0.309)	(0.369)		(0.353)	(0.432)	
Other network partners	0.08	0.12	**	0.05	0.11	**
	(0.216)	(0.268)		(0.203)	(0.290)	

Mean value, (standard deviation).
Levels of significance: * < 0.10; ** < 0.05; *** < 0.01; results are taken from t-tests and indicate significant differences between the subgroups of male and female respondents.
[a] All respondents that reported about two ore more communication partners and about one or more communication partner(s) that favored sexual fidelity as a method to avoid HIV-infection.
[b] All respondents that reported about two ore more communication partners and about one or more communication partner(s) that favored condoms as a method to avoid HIV-infection.
See footnotes in Table 2 for codings of the relationship characteristics.

5.3 Determinants of risk perception

The goal of the subsequent multivariate analyses is to identify variables that are important for the respondents' risk perceptions. This is done in three steps. First, we analyze the effects of knowledge about AIDS and the general awareness of AIDS as a health risk (Table 5, Model 1). Second, we study whether there is a basic influence of networks on the respondent's risk perceptions (Table 5, Model 2). Thus, the proportion of network partners that perceive sexual intercourse as a source of HIV infection is added to the model. Finally, we analyze the influence of the characteristics of the communication networks (Table 6).

The results show that only the particular variables corresponding to knowledge about AIDS and the perceived direct or indirect involvement in risky behavior have significant influences on women's and men's risk perceptions (see Table 5, Model 1). For a woman it is the knowledge that HIV is transmitted through sexual intercourse and the awareness that she is married to a husband she perceives as unfaithful that exerts influence on her risk perception. All the other variables show strong but not significant effects in the expected directions. Men's risk perception is primarily associated with their involvement in and opinion about multiple sexual relationships. Men who think that at least one of their wives is unfaithful, or who agree that multiple sexual partnerships are a part of men's nature think that they might become infected through sexual relationships with a higher probability. In contrast to women, knowledge shows a strong positive but not significant effect on men. Finally, among the control variables, women's and men's risk perceptions decline with increasing age. This is because older respondents are less aware of HIV-infection and AIDS and may also be less sexually active.

Although these results rest on a subgroup of respondents with AIDS-related communication networks that consist of two or more partners, most of them reflect associations that are also valid for the population of all respondents (see estimates of Model 1 for all respondents in Table A.1 in the Appendix). However, there is one remarkable exception. Within the population of respondents with two or more network partners, knowledge that AIDS is transmitted by sexual intercourse is much more strongly associated with risk perception than within the population of all respondents.

Respondents' risk perceptions also depend significantly on the risk perceptions of their communication partners (Table 5, Model 2). The more women's and men's networks are composed of people who perceive sexual intercourse as a serious source of infection, the more the respondents share this view.

To explore the influence of characteristics of the communication networks, we perform interaction analyses between the networks' composition of partners who either

Table 5: *Logistic-regressions of women's and men's probability to perceive sexual intercourse as a way of HIV-infection (All respondents who reported about two or more network partners)*

	Women			Men		
	Statistics	Model 1	Model 2	Statistics	Model 1	Model 2
Age	32.24	–0.039**	–0.030†	41.77	–0.032**	–0.024*
	(8.35)	(0.017)	(0.018)	(12.42)	(0.013)	(0.014)
Highest level of completed education:						
Primary	0.67	–0.091	–0.231	0.61	0.561	0.285
	(0.47)	(0.360)	(0.392)	(0.49)	(0.540)	(0.590)
Secondary	0.16	–0.317	–0.457	0.33	0.363	0.045
	(0.37)	(0.458)	(0.495)	(0.47)	(0.581)	(0.637)
House has a metal roof	0.28	–0.076	–0.115	0.23	–0.075	–0.203
	(0.45)	(0.397)	(0.334)	(0.42)	(0.337)	(0.377)
Knows that AIDS is transmitted by sexual	0.95	1.491***	1.312**	0.97	0.824	0.444
intercourse	(0.22)	(0.543)	(0.577)	(0.17)	(0.762)	(0.819)
Husband / at least one wife is perceived to	0.18	2.673***	2.624***	0.05	1.789*	1.044
be unfaithful	(0.39)	(0.736)	(0.751)	(0.22)	(1.069)	(1.083)
Husband stays at compound	0.72	–0.348	–0.335	0.89	–0.570	–0.544
	(0.45)	(0.299)	(0.318)	(0.31)	(0.475)	(0.515)
Disagrees that 'a woman or a man can be	0.27	0.464	0.711**	0.50	0.877***	0.887***
satisfied with just one sexual partner'	(0.44)	(0.313)	(0.338)	(0.50)	(0.269)	(0.295)
Number of people known to have died from	1.69	0.279	0.261	1.84	0.058	–0.081
AIDS or chira (ln.)	(0.71)	(0.184)	(0.200)	(0.80)	(0.163)	(0.184)
Mean proportion of network partners that think they might catch AIDS by sexual intercourse	0.53 (0.43)	--	2.101*** (0.343)	0.63 (0.43)	--	2.274*** (0.347)
Locations:						
Obisa	0.25	–0.005	0.069	0.23	–0.853**	–0.530
	(0.43)	(0.331)	(0.357)	(0.43)	(0.361)	(0.397)
Owich	0.17	0.618†	0.689*	0.21	0.739*	1.075**
	(0.38)	(0.385)	(0.413)	(0.41)	(0.408)	(0.451)
Wakula South	0.26	0.798**	1.102***	0.27	–0.243	–0.149
	(0.44)	(0.359)	(0.394)	(0.45)	(0.363)	(0.401)
Constant		0.182	–0.871		0.986	–0.138
		(0.609)	(1.001)		(1.203)	(1.311)
N		**382**			**317**	

Statistics: Mean value (standard deviation) of right-hand-side variables; Model 1 and Model 2: unstandardized regression coefficient (standard error).
Levels of significance: * < 0.10; ** < 0.05; *** < 0.01; († < 0.11).
Reference categories: Education: no education; Locations: Kawadhgone.

perceive sexual intercourse as risky behavior and those who do not, as well as for the various relationship characteristics (Table 6). In particular, in order to analyze the interaction effects between risk perceptions and relationship characteristics, we introduce two new variables to our earlier model: the mean value for the relationship characteristic to be analyzed for the subgroup of network partners that perceive sexual intercourse as risky, and the mean value of the relationship characteristic for the subgroup of network partners that do not perceive there to be a threat of infection in general. Because these mean values also contain information about the networks' composition of risk perceivers and non-perceivers (they equal zero if there is no network partner in a particular subgroup present), we add two dummy variables that indicate whether there is at least one risk perceiver within the respondent's communication network and/or at least one non-perceiver.

The interaction variables in Table 6 were entered individually for each group of network characteristics (like 'duration', 'location', 'frequency', 'closeness', 'same gender', etc.). Table 6 therefore represents the results of several regression analyses, one for each group of network characteristics. For a clear presentation, we only report the effects of the interaction variables and we do not report the coefficients of the remaining variables included in the logistic-regression (Note 8).

An important result of the analyses in Table 6 is that women's risk perceptions depend much more on the characteristics of their communication networks about AIDS than do men's risk perceptions The more a woman's subgroup of risk-perceiving network partners consists of long lasting relationships, of network partners that live next to her, of those who are age mates, and whose families receive regular help from her, the more a woman perceives herself to be at risk of becoming infected through sexual intercourse. However, network characteristics are also influential in the other direction. If the subgroup of network partners who do not perceive any risk of HIV-infection is composed of long lasting relationships, of people women feel emotionally close to, and with whom respondents have special, trusting relationships (because they lend money to them), then respondents' perceived threat of becoming HIV-positive is reduced (Note 9).

The variables that characterize different groups of network partners (nature of relationships) in Table 6 are all coded as dummy variables (Note 10). Therefore, the reported results have to be interpreted relative to the corresponding reference categories: all network partners who do not belong to the role relationship that is analyzed in the particular model. For women, members of their family of origin, other relatives and other network partners have significant influence. However, the effects of the last two variables incline in the opposite direction, as expected. These results imply that it is not the particular role relationship that is of importance, but rather all other

Table 6: *Influences of network composition of different relationship characteristics on women's and men's probability to perceive sexual intercourse as a way of HIV-infection*
(Logistic-regressions using all respondents who reported about two or more network partners)

	Women		Men	
	B	S.E.	B	S.E.
Basic characteristics				
Duration				
Sub-network of partners that perceive sexual intercourse as a risk	0.551*	0.317	–0.133	0.461
Sub-network of partners that do not perceive a risk at all	–0.501*	0.287	0.069	0.387
Location				
Sub-network of partners that perceive sexual intercourse as a risk	0.254*	0.145	–0.006	0.145
Sub-network of partners that do not perceive a risk at all	–0.095	0.115	–0.186	0.143
Frequency				
Sub-network of partners that perceive sexual intercourse as a risk	0.013	0.120	0.037	0.208
Sub-network of partners that do not perceive a risk at all	–0.154	0.150	–0.287	0.191
Closeness				
Sub-network of partners that perceive sexual intercourse as a risk	0.292	0.343	–0.019	0.351
Sub-network of partners that do not perceive a risk at all	–0.708**	0.280	–0.030	0.320
Homophile relations				
Same gender				
Sub-network of partners that perceive sexual intercourse as a risk	0.208	0.732	0.336	0.743
Sub-network of partners that do not perceive a risk at all	–1.056*	0.584	–0.617	0.645
Same age				
Sub-network of partners that perceive sexual intercourse as a risk	1.403**	0.685	–0.050	0.512
Sub-network of partners that do not perceive a risk at all	–0.305	0.525	–1.156**	0.561
Multiplex relations				
Lending money				
Sub-network of partners that perceive sexual intercourse as a risk	0.254	0.328	–0.673	0.459
Sub-network of partners that do not perceive a risk at all	–0.620	0.356	–0.149	0.470
Intensity of help				
Sub-network of partners that perceive sexual intercourse as a risk	0.621**	0.293	0.091	0.293
Sub-network of partners that do not perceive a risk at all	–0.360	0.243	–0.015	0.304
Nature of relationship				
Respondent's family				
Sub-network of partners that perceive sexual intercourse as a risk	0.740	0.514	0.335	0.491
Sub-network of partners that do not perceive a risk at all	–0.643†	0.398	–0.105	0.515
Husband's/wife's family				
Sub-network of partners that perceive sexual intercourse as a risk	0.342	0.453	0.387	0.897
Sub-network of partners that do not perceive a risk at all	0.303	0.346	1.405	1.138
Other relatives				
Sub-network of partners that perceive sexual intercourse as a risk	–0.731*	0.407	0.267	0.366
Sub-network of partners that do not perceive a risk at all	–0.237	0.333	–0.007	0.396
Friends				
Sub-network of partners that perceive sexual intercourse as a risk	–0.518	0.425	–0.199	0.366
Sub-network of partners that do not perceive a risk at all	–0.182	0.344	–0.597	0.387
Other network partners				
Sub-network of partners that perceive sexual intercourse as a risk	0.724	0.843	0.623	0.534
Sub-network of partners that do not perceive a risk at all	1.316**	0.529	–0.308	0.536
N	**382**		**317**	

Levels of significance: * < 0.10; ** < 0.05; *** < 0.01; († < 0.11).

kinds of role relationships that make up the reference category. The general influence of men's communication networks on their risk perceptions is only sporadically mediated by the networks' structures. Only a network composition of age mates who perceive no risk of HIV infection at all shows a significant negative effect on men's risk perception. Altogether, women's risk perceptions tend to be substantially influenced by cohesive network structures. This is because the significant effects of duration, location, closeness, lending money and intensity of help. Therefore, strong relationships are influential and strong relationships build cohesive network structures. Men, however, are more influenced by open networks. Only the number of risk-perceivers in men's networks are influential in their perception of risk and no relationship characteristic mediates this influence in a significant, positive way.

5.4 Determinants of favored protective method

The analyses for the determinants of the favored protective method are carried out in the same manner as the analyses of risk perceptions (Note 11). Because of the small number of women who favor condoms, the analyses concentrate on fidelity for this group. For male respondents however, the influences on both fidelity and condom use are examined. Table 7 reports several factors to be influential on the women's and men's favored protective methods (Model 1). The probability for favoring fidelity depends on the educational level. Furthermore, marriage partners' common awareness of the risks of becoming HIV positive significantly increases the probability of favoring fidelity. Favoring sexual fidelity also depends strongly, but not significantly, on women and men having the correct information about the main route of infection, i.e. that HIV is transmitted through sexual intercourse. The influences of perceived serious sources of infection show different patterns for women and men. For women, the significant negative effect of other sexual partners is a puzzling result. A possible interpretation is that this variable also measures women's extra-marital sexual activities. Women are less likely to be sexually faithful just because they have other sexual partners, independent of whether these are perceived as sources of infection or not. For men however, sexual fidelity as a protective method is influenced to some extent, but not in a significant way, by the perception that sexual intercourse with prostitutes is a serious source of infection.

To identify how much the results of this baseline model for the population of respondents with two or more network partners also represents the population of all respondents, similar analyses for the population of all respondents are made. A

Table 7: *Results from logistic-regressions on women's and men's probability to favor sexual fidelity or the use of condoms as a way to avoid HIV-infection*
(All respondents who reported about two or more network partners)

	Women		Men			
	Fidelity		Fidelity		Use of condoms	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Age	–0.009	–0.008	–0.013	–0.013	–	–
	(0.014)	(0.014)	(0.011)	(0.011)	0.079***	0.077***
					(0.018)	(0.018)
Highest level of completed education:						
Primary	0.564*	0.608*	1.243**	1.226**	--	--
	(0.339)	(0.340)	(0.599)	(0.599)		
Secondary	0.823**	0.856**	1.267**	1.232**	0.496	0.518†
	(0.411)	(0.412)	(0.625)	(0.627)	(0.320)	(0.322)
Knows that AIDS is transmitted by sexual	0.710	0.742	1.145	1.110	1.386	1.733
intercourse	(0.598)	(0.603)	(0.828)	(0.830)	(1.279)	(1.358)
Talked with husband or wife (wives) about	0.554**	0.516**	1.213***	1.201***	2.104***	2.115***
the chances to get infected with AIDS	(0.240)	(0.241)	(0.326)	(0.327)	(0.527)	(0.527)
Perceived serious sources of infection:						
Sexual intercourse with	–0.213	–0.161	0.122	0.137	–0.040	–0.097
husband/wife(wives)	(0.284)	(0.287)	(0.326)	(0.363)	(0.530)	(0.536)
Sexual intercourse with other	–0.714*	–0.653†	–0.021	0.014	0.398	0.308
partner/girlfriend	(0.399)	(0.401)	(0.375)	(0.379)	(0.449)	(0.456)
Sexual intercourse with prostitute	--	--	0.373	0.384	1.141**	1.106**
			(0.400)	(0.401)	(0.504)	(0.509)
Injections, transfusions, etc.	–0.008	0.038	–0.313	–0.303	–0.487	–0.497
	(0.341)	(0.343)	(0.358)	(0.359)	(0.532)	(0.534)
Network partners' preferred protective behavior:						
Mean proportion of network partners	--	0.556*	--	0.216	--	--
that prefer fidelity		(0.317)		(0.340)		
Mean proportion of network partners	--	--	--	--	--	0.708
that prefer use of condoms						(0.472)
Locations:						
Obisa	–0.289	–0.311	–0.648*	–0.647*	–0.630	–0.603
	(0.304)	(0.306)	(0.345)	(0.349)	(0.417)	(0.418)
Owich	0.810***	0.723**	0.384	0.354	–0.924*	–0.830†
	(0.310)	(0.314)	(0.342)	(0.345)	(0.505)	(0.512)
Wakula South	0.066	0.017	–0.004	–0.025	–0.678†	–0.627
	(0.294)	(0.296)	(0.334)	(0.336)	(0.416)	(0.421)
Constant	–2.102**	–2.567***	–2.962**	–3.036**	–0.794	–1.615
	(0.863)	(0.909)	(1.208)	(1.214)	(1.530)	(1.716)
N	**447**		**334**		**276**	

Levels of significance: * < 0.10; ** < 0.05; *** < 0.01; († < 0.11).
Reference categories: Educational level: concerning fidelity: no education; concerning condom use: no education or primary education; Perceived serious sources of infection: no perception to catch AIDS at all; Locations: Kawadhgone.

comparison of Table7 and Table A.2 in the Appendix shows that within the population of respondents with two or more network partners education is more strongly associated with preferences for fidelity and condom use than within the population of all respondents. Moreover, within the population of male respondents conversations between husband and wife (wives) about the chances of becoming infected with AIDS have stronger impact on fidelity and condom use than within the population of all male respondents.

The probability that men will favor condom use is influenced by five factors: age, educational level, awareness about AIDS, correct knowledge about HIV-transmission and the perception that sexual intercourse with a prostitute is a serious source of infection. Older males are not only less sexually active but they also tend to favor more often traditional values regarding sexuality and are therefore less likely to favor modern protective methods like condoms. The significant positive effect of common awareness between a husband and wife about the risk of AIDS does not lead to the conclusion that couples use condoms. This is because men's perception that they might become infected through sexual intercourse with their wife, or wives, has no influence on their probability of favoring condoms. Moreover, this method of protection is only partly accepted for relations with their girlfriends. Both results indicate that condom use is not an appropriate protective method within close and intimate relationships. On the other hand, it is accepted in the context of sex workers and therefore men's perception that sexual intercourse with prostitutes puts them at risk of infection has a strong positive and significant influence.

The probability that women will favor sexual faithfulness depends significantly on the number of network partners who also favor this method of protective behavior (Model 2). The probability that men will favor condom use is also influenced by their communication networks, but not in a significant way. Overall, women's and men's favored protective methods are influenced by less the opinions and practices of their communication partners than are their risk perceptions.

Table 8 lists the influences of the subgroup specific mean values of different network properties on the women's and men's favored protective behaviors. The sub-group characteristics are entered individually in the analyses (similarly to Table 6), and Table 8 reports the relevant interaction terms of all analyses (Note 12). The probability that women will favor sexual fidelity is significantly and positively associated with subgroups of network partners that also prefer this method and that are composed of longer lasting relationships, of age mates, or of members of the respondent's family. However, subsequent analyses show that the positive effect of duration is primarily related to members of the respondent's family of origin. Furthermore, other relatives and friends show stronger positive but not significant

Table 8: *Influences of networks' composition of different relationship characteristics on women's and men's probability to favor sexual fidelity or the use of condoms as a way to avoid HIV-infection (Logistic-regressions using all respondents who reported about two or more network partners)*

	Women		Men			
	Fidelity		Fidelity		Condoms	
	B	S.E.	B	S.E.	B	S.E.
Basic characteristics						
Duration						
Sub-network that prefers fidelity / condom use	0.455**	0.225	–0.145	0.308	–0.103	0.424
Sub-network that prefers another method	–0.271	0.324	–0.097	0.283	0.203	0.489
Location						
Sub-network that prefers fidelity / condom use	–0.151	0.097	0.052	0.110	0.027	0.173
Sub-network that prefers another method	–0.096	0.109	0.054	0.131	0.075	0.144
Frequency						
Sub-network that prefers fidelity / condom use	–0.118	0.117	0.007	0.150	0.181	0.224
Sub-network that prefers another method	–0.148	0.140	0.067	0.179	0.102	0.206
Closeness						
Sub-network that prefers fidelity / condom use	–0.024	0.216	0.234	0.268	0.047	0.422
Sub-network that prefers another method	–0.316	0.236	–0.597*	0.307	0.826**	0.379
Homophile relations						
Same gender						
Sub-network that prefers fidelity / condom use	–0.720*	0.385	0.108	0.547	–1.032	0.943
Sub-network that prefers another method	0.256	0.404	0.158	0.677	–0.397	0.623
Same age						
Sub-network that prefers fidelity / condom use	0.677*	0.370	0.390	0.379	–0.285	0.593
Sub-network that prefers another method	0.078	0.445	–0.114	0.444	0.835*	0.494
Multiplex relations						
Lending money						
Sub-network that prefers fidelity / condom use	–0.150	0.311	–0.599	0.411	0.066	0.528
Sub-network that prefers another method	–0.381	0.372	0.308	0.400	0.336	0.457
Intensity of help						
Sub-network that prefers fidelity / condom use	–0.151	0.187	0.165	0.219	0.122	0.338
Sub-network that prefers another method	–0.095	0.207	–0.028	0.262	0.455†	0.278
Nature of relationship (all dummy-coded)						
Respondent's family						
Sub-network that prefers fidelity / condom use	0.462*	0.279	0.168	0.332	1.123	0.763
Sub-network that prefers another method	–0.088	0.384	0.502	0.602	0.388	0.456
Husband's/wife's family						
Sub-network that prefers fidelity / condom use	–0.345	0.270	0.402	0.577	–0.454	1.200
Sub-network that prefers another method	–0.421	0.417	1.019	0.760	0.258	0.757
Other relatives						
Sub-network that prefers fidelity / condom use	0.305	0.254	0.106	0.274	–0.497	0.466
Sub-network that prefers another method	0.132	0.320	–0.147	0.336	–0.014	0.359
Friends						
Sub-network that prefers fidelity / condom use	0.265	0.252	0.302	0.332	–0.004	0.447
Sub-network that prefers another method	–0.097	0.354	–0.281	0.495	0.552	0.362
Other network partners						
Sub-network that prefers fidelity / condom use	0.374	0.353	0.400	0.345	0.119	0.644
Sub-network that prefers another method	–0.949	0.674	–0.374	0.495	–0.131	0.469
N	**447**		**443**		**276**	

Levels of significance: * < 0.10; ** < 0.05; *** < 0.01; († < 0.11).

effects. The results for male respondents' preference for fidelity show no significant influences. Subgroups of network partners that favor fidelity and that stay in a trustworthy relationship with the respondent show the strongest effect. However, this effect is negative and therefore men's fidelity tends to be influenced more by casual relationships with network partners than by those who are especially trustworthy.

Men's preference for condoms, however, tends to be more influenced by their communication partners than their preference for fidelity. There is a strong positive effect of subgroups of network partners that favor condoms and that are at least composed of one member of the respondent's family. Furthermore, network partners that prefer another method of protection than condoms tend to be negatively influential if they are emotionally more distant from the respondent, if they are not age mates, or if their family is less involved in help relationships with the respondent. This is because of the positive signs of the particular coefficients.

5.5 The influence of heterogeneous networks on risk perception and protective behavior

Altogether, our results show that the characteristics of the communication networks about AIDS are of varying importance. They tend to be more influential on the women's and men's risk perceptions than on their favored protective method and they tend to exert more influence on women than on men. However, the results in Table 6 and Table 8 only give information about the significance of mean values, i.e. of central tendencies in the communication networks. Therefore, other measurements, especially of variation, should be considered in order to give a better picture of the relevance of these networks on risk perceptions and protective behaviors. We thus computed subgroup-specific standard deviations for all ordinal-scaled relationship characteristics (see footnotes in Table 2) and a simple index of heterogeneity for role relationships (Note 13). Since only subgroups of two or more network partners can be considered, the number of male respondents that favor condoms became too small for further analyses.

We introduce these measures of network variation in the model in the same way as we did it with mean variables before. The results concerning women's and men's risk perceptions (not presented here in detail) show that for both sexes there is no significant association with the heterogeneity of risk perceivers, or non-perceivers, among the communication partners about AIDS. However, this picture changes if we turn to the results regarding the probability that a respondent favors sexual fidelity as a protective method against HIV-infection (Table 9). On the one hand, women's probability is significantly and positively influenced by their subgroups of network partners that also favor this kind of protection if these are heterogeneously composed concerning their

locations, the frequency of contact, the intensity of help their families receive from the respondent, or the nature of their relationships. On the other hand, heterogeneous distributions of these variables and of the relationships' duration within the subgroup of network partners that prefer another method reduce women's likelihood of favoring sexual fidelity. Men's likelihood of favoring faithfulness depends on a different pattern of heterogeneous relationships. If the subgroups of network partners that favor sexual fidelity are heterogeneously composed concerning the frequency of contact, emotional closeness, and the intensity of help the network partners' families receive from the respondent then they exert a significant, positive influence causing men also to favor sexual fidelity. The heterogeneity of network partners who prefer another method, however, does not show any significant influence. Therefore, communication networks about AIDS tend to exert more influence on women's and men's favored protective methods when they have a heterogeneous composition of network partners and less influence when they consist of only particular relationship characteristics.

Table 9: *Influences of networks' heterogeneity of different relationship characteristics on women's and men's probability to favor sexual fidelity as a way to avoid HIV-infection*
(Logistics-regression using all respondents who reported about at least two network partners that favor fidelity and/or at least two network partners that favor another method)

	Women		Men	
	Fidelity		Fidelity	
	B	S.E.	B	S.E.
Basic characteristics				
Duration				
Sub-network of partners that prefer fidelity	0.425	0.309	0.381	0.274
Sub-network of partners that prefer another method	–0.634*	0.369	–0.122	0.381
Location				
Sub-network of partners that prefer fidelity	0.358**	0.167	0.237	0.165
Sub-network of partners that prefer another method	–0.794***	0.249	–0.075	0.244
Frequency				
Sub-network of partners that prefer fidelity	0.514**	0.215	0.376*	0.211
Sub-network of partners that prefer another method	–0.802***	0.286	–0.142	0.285
Closeness				
Sub-network of partners that prefer fidelity	0.011	0.353	0.932***	0.360
Sub-network of partners that prefer another method	–0.026	0.429	0.083	0.512
Multiplex relations				
Intensity of help				
Sub-network of partners that prefer fidelity	0.806**	0.328	0.690**	0.312
Sub-network of partners that prefer another method	–0.743*	0.387	–0.145	0.433
Nature of relationship				
Sub-network of partners that prefer fidelity	1.237**	0.619	0.858	0.616
Sub-network of partners that prefer another method	–0.667	0.592	1.276	0.994

Levels of significance: * < 0.10; ** < 0.05; *** < 0.01; († < 0.11).

6. Discussion and conclusion

In this paper, we have explored the influences of communication networks about AIDS on two aspects that are central to behavioral change for HIV protection. Our analyses focused on the perception of infection risk through (unprotected) sexual intercourse and the protective methods that are perceived to be appropriate, in order to avoid HIV infection. It is hypothesized that communication networks are influential because of a joint effect between the content of AIDS-related communication and the network structure the communicative relationships form. Individuals talk with their network partners about their perceptions of sources of HIV infection as well as about their opinions about and experiences with appropriate protective methods. These perceptions, opinions, and experiences are influential for the individual in different directions and to a varying extent, depending on the degree of cohesive structures in the communication networks.

In South Nyanza District, women's and men's perceived risk of HIV infection through sexual intercourse depends heavily on the presence of AIDS-related contents in their communication networks of everyday life, i.e. the proportion of their communication partners that perceive sexual intercourse as a source of infection. However, women's and men's perception that they will not become HIV infected at all, is influenced similarly by the proportion of network partners that think that they will not become HIV infected. For women, effects of cohesiveness also exist. Women's risk perception depends on their embeddedness in strong relationships. Our results show that for women the subgroups of network partners that perceive the risk of HIV infection through sexual intercourse become increasingly influential the more they are composed of long lasting relationships, of network partners who live nearby, and of close help relationships between the woman and her network partners' families. On the other hand, the subgroups of network partners that do not perceive any risk of HIV infection become increasingly influential the more they contain long lasting relationships, emotionally close and trustworthy network partners, and members of the family of origin. All these characteristics describe strong relationships that contribute to build cohesive network structures.

For men's risk perceptions, these kinds of influences are not relevant. However, this does not imply that for men weak ties and open network structures are more influential. Men's risk perceptions are unaffected by patterns of weak or strong ties as well as of open or cohesive structures in their communication networks. Their perceptions depend primarily on the number of partners in their communication networks that either perceive sexual intercourse as risky or not.

Women's and men's favored protective methods are also differently influenced by their communication networks. Women's preference for sexual fidelity depends

significantly on the proportion of network partners within their communication networks that favor this method. Men's preference for fidelity, however, does not depend on this proportion but male preference for condoms does (albeit weakly). Cohesive network structures exert some influence on the preferred protective method. Again, long lasting relationships, members of women's family of origin, and age mates are influential on women's likelihood of favoring sexual faithfulness. However, these effects are not as strong as for women's and men's risk perceptions. Therefore, women's and men's favored protective method is less dependent on cohesive characteristics of their communication networks. The subgroup of network partners who favor sexual faithfulness as a protective method becomes much more influential if it is heterogeneously composed regarding the network partners' locations, the frequency of contact and the intensity of help relationships with the network partners' families. Finally, women's preference for other protective methods also depends much more on heterogeneous communicative relationships than on cohesive network structures. A similar pattern can be found for men's preference for sexual faithfulness. If the subgroup of network partners that favor sexual fidelity is composed less of relationships of trust and more of heterogeneous relationships regarding the frequency of contact, emotional closeness, and the intensity of help to the network partners' families, the more men favor sexual faithfulness as a method to avoid HIV infection. These relationships do not represent cohesive network structures and we have to conclude that primarily open networks are responsible for women and men starting to think about protective methods and inclination to use them.

These results also reflect different opportunities to meet people with a particular risk perception, or with a positive attitude towards a particular protective method. The fact that unprotected sexual intercourse might lead to HIV infection is increasingly becoming common knowledge in South Nyanza District. This facilitates talking about AIDS, especially for females for whom trust is more important in social interactions about AIDS. Therefore, especially women can talk about this topic with people who live close and who they meet in their everyday life. On the other hand, there is a relatively widespread agreement about the best protection method among communities, and as a consequence, women and men report about more heterogeneous communication partners. However, it is remarkable that this heterogeneity, expressed by people who come from different areas of women's and men's social environment, exerts important influence on the favored protective methods of our respondents.

In summary, the findings in our study support and contribute to the cumulating evidence that social interactions are an important factor in understanding and facilitating behavior change in response to the AIDS epidemic. Moreover, our study shows that the structure and characteristics of network partners importantly mediate these influences on social interaction.

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Notes

1. Meanwhile, South Nyanza District was subdivided into three districts, but we retain the original name.
2. Many men have more than one wife, but each husband appears only once in the analyses in this paper.
3. For a more detailed discussion of the survey, sampling procedures, and data quality, see Watkins et al. 2003.
4. Recently, however, there have been indications that husbands' male relatives are refusing to 'inherit' a widow whose husband was suspected of having died of AIDS (Watkins, personal communication).
5. We follow the practice common in ego-centered network analyses of asking specific questions about only a subset of network partners (Laumann 1973, Fischer 1982, Burt 1984). Typically, the respondent is asked to report the number of people that form a particular network but is then asked detailed information about the first four or five respondents she names. Due to this nominating process, it is likely that some biases are embedded in the data (see Kohler 1998). A second weakness is that the measurements are based on recall and, as with any data reconstructed from memory, potential biases exist (Bernard et al. 1984, Brewer 2000, Brewer and Webster 1999).
6. While the information about the network partner in our data is exclusively obtained from respondent's reports, White and Watkins (2000) find a strong relationship in a subset of the KDICP data between the respondent's reports and the actual characteristics/behavior of the network partner. Nevertheless, White and Watkins (2000) also show substantial discrepancies and they show that respondents' reports are biased in two ways. First, egos tend to report that their alters do whatever they themselves do. Second, respondents attribute a higher level of contraceptive use to their network partners than the network partners themselves report. This discrepancy is primarily due to misreporting by the respondent rather than by the network partners. For a more general discussion of the accuracy and stability of survey responses in rural Africa, see for instance Bignami-Van Assche (2003).
7. Watkins and collaborators asked family members how a deceased member of the KDICP sample had died. They were often told that it was chira, a violation of taboos that is expected to eventually lead to weight loss and, if not treated, to death. When they asked neighbors what the cause of death was, however, they often received the answer that it was either AIDS or 'This dreadful disease of nowadays'.

8. The remaining variables are all variables that are used in Model 1 in Table 5 plus the two dummy variables that indicate whether there is at least one risk perceiver within the respondent's communication network and/or at least one non-perceiver.

9. The influences of the subgroup's basic characteristics can also be the result of particular groups of network partners. For example, women know members of their family of origin much longer than members of their husbands' families. Thus, the significant effects of the relationships' duration might primarily be caused by a network's composition of relatives from these families. Similar arguments can be found for the network partners' locations and the frequency of contact. Therefore, the influences of these variables are analyzed again under the control of the networks' compositions of the nature of the relationships. No deviant results can be found.
   Furthermore, it has to be assumed that supportive relational contents are closely associated to particular groups of network partners or particular characteristics of relationships. Therefore, the influences of 'lending money' and 'intensity of help' are reanalyzed under the control of the basic relational characteristics and of the networks' compositions of the nature of the relationships. The effect of help-intensity keeps untouched by these variables. However, 'lending money' tends to represent a network's composition of emotional close network partners or partners that are known for a longer time.

10. This is done because of the small numbers for some role relationships (see Table 4).

11. The determinants of protective behavior are also estimated by simple logistic-regressions. However, nested logistic-regressions, in which the particularly preferred protective method is embedded in the general opinion or intention to use protective methods against HIV-infection or not, are also possible. However, because of the small numbers and the fact that most of the women prefer sexual fidelity, simple logistic-regressions are used.

12. The remaining variables included in the logistic-regression are all variables that are used in Model 1 in Table 7 plus the two dummy variables that indicate whether there is at least one network member that favors sexual fidelity or condom use within the respondent's communication network and/or at least one network member that prefers another method.

13. The index of heterogeneity is computed by the formula

$$x = 1 - \sum_{g=1}^{m} \left(\frac{n_g}{n} \right)^2 .$$

m is the number of categories, n_g is the number of network partners that belong to category *g*, and *n* is the size of the whole network.

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Appendix

Table A.1: *Logistic-regressions of women's and men's probability to perceive sexual intercourse as a way of HIV-infection (All respondents)*

	Women		Men	
	Statistics	Model 1	Statistics	Model 1
Age	32.25	–0.029**	43.08	–0.044***
	(8.28)	(0.014)	(13.17)	(0.010)
Highest level of completed education:				
Primary	0.67	0.185	0.62	0.014
	(0.47)	(0.270)	(0.49)	(0.402)
Secondary	0.13	–0.119	0.29	–0.385
	(0.34)	(0.369)	(0.45)	(0.449)
House has a metal roof	0.24	–0.283	0.24	–0.002
	(0.43)	(0.248)	(0.43)	(0.283)
Knows that AIDS is transmitted by sexual intercourse	0.93	0.947***	0.96	0.089
	(0.26)	(0.357)	(0.20)	(0.596)
Husband / at least one wife is perceived to be unfaithful	0.16	2.605***	0.04	2.041*
	(0.37)	(0.601)	(0.20)	(1.058)
Husband stays at compound	0.74	–0.303	0.91	–0.475
	(0.44)	(0.246)	(0.29)	(0.432)
Disagrees that 'a woman or a man can be satisfied with just one sexual partner'	0.26	0.340	0.52	0.702***
	(0.44	(0.248)	(0.50)	(0.234)
Number of people known to have died from AIDS or chira (ln.)	1.53	0.275**	1.73	0.212
	(0.84)	(0.123)	(0.92)	(0.126)
Locations				
Obisa	0.29	–0.143	0.26	–0.934***
	(0.45)	(0.261)	(0.44)	(0.309)
Owich	0.20	0.580*	0.24	0.900**
	(0.40)	(0.302)	(0.43)	(0.355)
Wakula South	0.22	0.447	0.22	–0.206
	(0.41)	(0.298)	(0.42)	(0.327)
Constant		0.364		2.482
		(0.701)		(0.940)
N		**569**		**414**

Statistics: mean value (standard deviation) of right-hand-side variables; Model 1: unstandardized regression coefficient (standard error).
Levels of significance: * < 0.10; ** < 0.05; *** < 0.01.
Reference categories: Education: no education; Locations: Kawadhgone.

Table A.2: *Logistic-regressions of women's and men's probability to favor sexual fidelity or the use of condoms as a way to avoid HIV-infection (All respondents)*

	Women	Men	
	Fidelity	Fidelity	Use of condoms
	Model 1	Model 1	Model 1
Age	–0.009	–0.007	–0.072***
	(0.012)	(0.009)	(0.016)
Highest level of completed education:			
Primary	0.247	0.773*	--
	(0.265)	(0.403)	
Secondary	0.289	0.913**	0.753***
	(0.347)	(0.439)	(0.293)
Knows that AIDS is transmitted by sexual intercourse	0.996**	1.290*	1.757
	(0.466)	(0.660)	(1.187)
Talked with husband or wife (wives) about the chances to get infected with AIDS	0.799***	0.781***	1.661***
	(0.200)	(0.253)	(0.422)
Perceived serious sources of infection:			
Sexual intercourse with husband/wife(wives)	–0.248	0.036	0.099
	(0.241)	(0.318)	(0.507)
Sexual intercourse with other partner/girlfriend	–0.768**	0.049	0.772
	(0.328)	(0.335)	(0.420)
Sexual intercourse with prostitute	--	0.216	0.992**
		(0.332)	(0.451)
Injections, transfusions, etc.	–0.286	–0.241	–0.144
	(0.294)	(0.314)	(0.486)
Locations:			
Obisa	–0.512	–0.445	–0.602*
	(0.263)	(0.294)	(0.365)
Owich	0.837***	0.668**	–0.659
	(0.255)	(0.292)	(0.447)
Wakula South	0.181	0.298	–0.347
	(0.261)	(0.301)	(0.379)
Constant	–2.207***	–2.896***	–1.619
	(0.716)	(0.940)	(1.410)
N	**661**	**443**	**366**

Levels of significance: * < 0.10; ** < 0.05; *** < 0.01.
Reference categories: Educational level: concerning fidelity: no education; concerning condom use: no education or primary education;
Perceived serious sources of infection: no perception to catch AIDS at all; Locations: Kawadhgone.