Understanding Perceptions of HIV Risk among Adolescents in KwaZulu-Natal

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Understanding Perceptions of HIV Risk among Adolescents in KwaZulu-Natal

Abstract

Risk perception has been theorized to be an important antecedent for adopting protective behavior. It is a key construct of research applying the Health Belief Model and other behavior change models. In relation to HIV, risk perception is an indicator of perceived susceptibility to infection, a measure of one's understanding of AIDS transmission as well as willingness to consider behavioral changes. However, there remains much we do not know about what drives risk perception, especially among youth. This study identifies factors that influence the calculation of HIV risk perception among a group of adolescents in South Africa. Data, collected in 1999 from 2,716 adolescents aged 14-22, are used to explore factors predicting risk perception. Logistic regression models suggest connectedness to parents and community for males and females, self-efficacy to use a condom among males and living in a household with a chronically ill member for females are associated with HIV risk perception. We conclude that a greater understanding of the connection of adolescents to their communities and adults in their lives is needed, and ways in which programs can alter the environments in which adolescents form opinions, make choices, and act should be incorporated into program design.

Key words: HIV/AIDS, adolescent health, risk reduction, perception of risk

Understanding Perceptions of HIV Risk among Adolescents in KwaZulu-Natal

Introduction

This paper examines the determinants of perception of risk among adolescents and young people who are living through one of the most severe HIV epidemics globally. South African youth are incredibly vulnerable to HIV infection. Recent population-based survey data from 2002 indicate about 9.0% of 15-24 year-olds nationally (12.0% of females and 6.1% of males) and 8.3% in Kwa Zulu-Natal (KZN) are infected (Mandela Foundation, 2002). These rates are already very high, and the sexual behavior of this group over the next few years will help determine the trajectory of the epidemic in the coming decades. Public health programmers urgently need better understanding of the dynamics of how adolescents decide who to have sex with and whether to use condoms or not, and perceptions of risk is believed to be one important element of this set of dynamics.

Public health, including epidemiology, health education and other applied sciences, has looked at individual risk from a number of perspectives. These have included the social-psychological perspective on the one hand and sociological/anthropological perspectives on the other. The social-psychological discipline has been most influential through the theory of cognizance (how individuals process information) and the sociological and anthropological perspectives have influenced public health programs in respect to the debates around what constitutes the individuals situation within our, so-called, “risk society.” These two perspectives are discussed below to help develop models that can be tested to explain factors that influence adolescents’ conceptual understanding of their own risk, in relation to HIV.

This is a complex area of research, with numerous contradictory theses and hypotheses. Public health programming has traditionally walked a delicate tightrope between multiple disciplinary perspectives, drawing on the social–psychological perspectives for the theories behind health education and individual responses to information cues, and using sociology to augment the psychological explanations for behavior. These frameworks have particularly influenced those in the socio-demographic field of inquiry to look at more structural impacts on

behavior. Anthropological models have influenced the way public health researchers understand the influence of cultural norms and responsibilities on individual behavior.

Cognitive theory, a highly orthodox and popular approach in social psychology, centers around a view of individuals as *active processors of information*, and that the effect of any stimulus, or information, depends on how it is categorized and interpreted by the perceiver (Eiser, 1986). Further, this interpretation depends on both attributes of the stimulus, and on prior expectations and standards of comparison. One of the core elements of the cognitive approach, is the recognition that although human beings are decision makers (extraordinaire) they are not necessarily *rational* decision-makers, and that they can bring all sorts of assumptions, historical experience and ideology to this decision making. This is partly acknowledgement of the myriad biases that enter when incorrect information is at hand, but it also derives from other forces that play important roles in *how* information is processed. The influence of group norms, community-wide myths, and collective experience has increasingly been incorporated into the cognition theoretical frameworks. This has been important for the field of adolescent reproductive health, though little empirical data has been available to test any of these theories.

We know factual knowledge alone, in the context of AIDS, does not appear to change behavior. In fact, many studies have concluded that no significant relationship exists between sexual knowledge and safe sex (Farmer and Kim, 1991, Sobo, 1995, Macintyre et al., 2001a). But if knowledge of the facts of HIV transmission plays little obvious role in increasing the likelihood of safe sex, what does? Researchers began in the 1980s to ask about the stage that comes between knowledge and action, which is perception of individual risk (e.g., Prohaska et al., 1990).

Perception of risk is a key determinant in the Health Belief Model (HBM) (Janz and Becker, 1984) and the theory of reasoned action (Ajzen and Fishein, 1980), both of which have been often used in AIDS risk reduction programs (Prohaska et al., 1990). The argument is that people use condoms (or have only one partner or postpone sexual initiation) if they think the costs of the potential illness (the negative consequences) outweigh the costs of buying condoms, overcoming reluctance to wear a condom, and demanding that it be used every time. Many of

these models that are based on rational, logical thought processes, also acknowledge that emotion (self-efficacy and self-esteem) may have a mediating effect on the risk perception, but few have examined the mechanisms behind emotion (Sobo, 1995).

Very low perception of risk, even in relatively high prevalence situations has been reported in a number of settings. For example, in Ethiopia, Sahlu et al. (1999) found that only 17% of men and 2% of women, despite high and correct knowledge of HIV transmission, acknowledged that they were at *any* risk of HIV. In Tanzania two recent studies have reported increases in perception of high risk among young men and women in Dar Es Salaam, though they still underestimate their own risk relative to data from the national surveillance system. Of the Tanzanian students interviewed, 25% felt that they were at personal risk of having HIV. Meanwhile, 41% thought their friends were at great risk (Maswanya et al., 1999). In Zambia, Magnani et al. (2001) report that although 52% of the young people interviewed in a cross-sectional study knew someone with AIDS, most of the younger group of adolescents did not think they were at risk of getting AIDS. MacPhail and Campbell (2001) report that almost 70% of the young South African men they spoke to said there was "no chance of their becoming infected or that they didn't know whether or not they were personally vulnerable." Conversely, a Gambian study in a low prevalence area found that the adolescents considered that they were the *most at risk group* in the country for HIV (Miles et al., 2001), and that this group seemed to overestimate their risk. Intense public media attention and health education programs may lead to teens over-estimating their risk.

"Optimistic" bias is a central theoretical issues for adolescent research on perception of risk (Eiser, 1986). Optimistic bias theory (which is part of the cognitive approach in social psychology) says that many people think along the lines of "AIDS/STDs/pregnancy/cancer etc… can't happen to me" with a consequence that many systematically underestimate their risk in comparison to the real risk. The hypothesized determinants of this bias towards under-estimation of risk may include the difficulty in realizing that an illness that may affect you in later years needs to be actively prevented today, and therefore it is treated as a very distant possibility. A second potential factor underlying underestimation of risk is the general notion of adolescent

invulnerability. Adolescents tend to undervalue their own risk, certainly when they compare themselves with adults, but even in comparison to their peers.

Third, admitting to being at risk of HIV means, in many people's minds, admitting to place oneself in the category of a stigmatized person. AIDS in South Africa (as elsewhere) carries enormous stigma, related to both the fear of dying and death and the long held association of AIDS with homosexuals and prostitution. Homosexuality among many sectors of South African society is virtually a taboo notion, while prostitution is associated both with poverty and immorality. None of these categories are enticing, especially to adolescents still unsure of their identity. Thus, to perceive oneself as high-risk the individual adolescent has to either overcome the thought and image of the stigmas or perhaps to have had some other over-riding shock, perhaps through personally knowing someone who has died of the disease.

Only a few studies have focused on the possible influences of peers and parents on the accuracy of individual risk perception, although Edem and Harvey (1995) discuss the influence of family through the discussions about HIV and the use of condoms. Van Landingham (1995) shows the potential for peer influence and especially peer group norms on whether individuals condone the use of condoms or not. There is a growing body of literature that shows the relative connectedness of adolescents to their schools, their peers and their families (not in that order) may be important protective factors, and thus operate as suppressors of risk. However, Magnani et al., (2001) have recently demonstrated a weaker than expected association between adolescents' sexual risk-taking behavior and their connection to parents. Magnani's study was conducted in Zambia, and the authors hypothesize that adolescents growing up in Lusaka may be extraordinarily affected, due to the high prevalence of HIV and AIDS, to disruption within and among households, thus dampening the protective effect of connections in the household.

The influence of experience and personal knowledge of someone with HIV/AIDS is also thought to influence risk perception, and has been studied in a number of different settings using different methods. The notion behind this experiential theory is that AIDS does not become real, or denial is preferable, including denial of risk, until one witnesses someone ill or dying of AIDS. In 1995, Sweat et al. (1995) reported that young Thai men had very high fears of HIV, yet low

perception of their own risk of acquiring the disease. In focus groups, individuals said that their perception was low because they "had never known anyone with AIDS," and because "prostitutes [that they had visited] had health certificates" (Sweat et al., 1995). Bosga et al. (1995) report that men who engaged in risky behavior did not perceive their behavior as such, unless they had known someone who was ill or who had died from AIDS. In South Africa, MacPhail and Campbell (2001) report conflicting views of HIV risk among young people about the level of HIV infection in the community of Khutsong, a township outside the mining town of Carltonville. Some of their respondents thought AIDS "is not common here" (said by a 20-25 year old woman). This in a context of very high infection rates, with one survey (Williams et al., 1999) suggesting over 40% of South African young adults (20-25) may be infected. In the same study, other respondents agreed that AIDS *was* a threat to the community, with more women than men agreeing with this sentiment. Some commented that personal experience with AIDS was "forcing people to acknowledge that it really exists." Finally, a cross national comparative study of men's behaviors in Zambia, Uganda and Kenya found that a lower level of risky behavior, controlling for all other factors, was associated with the respondent having personally known someone who had died of AIDS (Macintyre et al., 2001a).

But regarding perception of risk as an outcome opens one up to the charge of having a recursive model. This has often been discussed in relation to the HBM. For example, Montgomery et al. (1989) gives several examples where the expected association between perception of risk and relatively safe sexual practices is found; i.e., that the higher the perception of risk the more likely condoms are being used. But Havanon et al. (1992) argue that men who were engaging in risky sexual behavior were aware of the risks involved and acknowledged they were at high risk; i.e., that the higher the perception of risk, the more likely the men were *not* using condoms. Other examples come from studies of intravenous drug users in the U.S. who are reported to use their knowledge of the prevalence of HIV in their neighborhoods to predict their perception of their own risk (Valle et al., 1999). One study among adolescents in the US (Ellen et al., 1996) describes the determinants of perception of risk as including past condom use, as well as number of lifetime partners, and a belief that the adolescent would prevent STDs and

could also recognize someone with an STD. And young sexually active Nigerians who perceive themselves as being at high risk of testing positive to HIV, were also more likely to have *never* used condoms (Edem and Harvey, 1995).

The influence of the social context and environment on individual perception of risk has been the concern of sociological and anthropological debates for many years. The concept of the relationship between modernity and risk is currently a major theme within sociological theoretical thinking. Theorists such as Douglas, Giddens, Arendt, Beck and Foucault have emphasized the need to look outside the individual to the structural influences that surround us as individuals in order to judge the varied influence of risk, including the perception of risk, on our behavior and social relations. This tradition has influenced the theoretical thinking around adolescent reproductive health for several years (DiClemente, 2000), and on HIV prevention tactics for about a decade (Sweat et al., 1995 and Coates, 1997). Meanwhile, empirical studies in the U.S. have begun to test structural and environmental relationships to adolescent behavior, mostly in relation to the risk and protective factors framework (see Resnick et al., 1997; Jessor et al. 1998). However, much less has been done to test these distal factors in developing country contexts (Magnani et al., 2002; Macintyre et al., 2001b).

Much of the focus of the risk and protective factors framework emphasizes the importance of "connectedness." This has ranged from connection to peers, to school and to family members. It is hypothesized that having higher levels of connectedness provides the adolescents with protection from harms, provides positive role models, and is indicative of access to other development assets (money, work, opportunities for extra curriculum activities etc.). The important variables have ranged from the standard socioeconomic and education related variables at the household level, to measures of how well the adolescent is linked to their family, and does he/she have a close relationship with a parent or parent-figure, an older sibling or close family relation with whom they can discuss reproductive health matters including AIDS.

The community or environmental variables that have emerged as possibly important predictors include factors related to the physical environment that lead to perceptions of safety for the community members including young people (Sampson et al., 1997; Cohen et al., 2000).

These have been measured using a rating of the cleanliness of the neighborhood, as well as how the municipality or bureaucracy functions in relation to rubbish collection, waste water management and provision of water for the inhabitants of the area. All of these measures are interpreted as possible, measurable associations between individual's perception of risk and the likelihood that he or she will act in risky ways. A well-ordered environment, often associated with higher socio-economic strata, may well co-exist with and perhaps even influence the perception that individuals within this community are at low risk for everything negative (including HIV). Conversely, a disordered and violent environment may also co-vary with a perception that members of that community are at high risk for everything, including HIV. Communal levels of the perception of risk for the general population within a specific community may well influence (through gossip or through the talk of leaders) individuals to see themselves at a particular level of low or high risk.

In sum, the picture is a mixed one, with some adolescents appearing to view the fact that they have never or rarely use condoms as indicative that they are at high risk of becoming or being HIV positive, while others may perceive themselves at high risk (in general) and therefore use condoms out of fear of contracting the disease. The calculus of risk is clearly complex, and drawing definite conclusions from this review of a few studies is unwise (see also Poppen and Reisen, 1997).

The premise underlying "safe sex" programs is that most individuals are assumed to want to avoid serious disease—so the determinants are the perceived probabilities (and consequences) and the perceived costs and benefits of a risk reduction strategy. However, this premise also assumes that individuals have full knowledge of both these costs and the benefits of this strategy. What are the probabilities and estimates that go into the calculation of risk? Presumably, they include: the past history of their current partner in terms of STDs, their own past history and their former partners' histories, where these partners have come from and their area of residence, whether any of them have also been exposed through other channels (e.g., drugs or blood transfusion), etc. Are young people's prior experiences, for example, with a STD, make it

more likely that they may subsequently place them selves in a high-risk group? Do friends influence each other?

Teenagers and young adults in South Africa are being forced to calculate this risk and then to operate within a very difficult, and rapidly changing environment. One writer offers a very pessimistic idea in relation to AIDS-risk when she says "accurate perceptions of AIDS risk [may be] beyond our cognitive capabilities" (Sobo, 1995). We take a different view—that researchers must try to disentangle the determinants and impact of perceptions of risk in order to use the information to help adolescents calculate the costs and benefits of a risk reduction strategy and offer them support and services to act on it. To this end, we employ multi-level models to identify the individual, social and environmental factors that influence the calculation of risk by adolescents living in the heart of the AIDS epidemic in South Africa using data from the study *Transitions to Adulthood in the Context of AIDS in South Africa* (Rutenberg et al., 2001).

Data and Methods

The study *Transitions to Adulthood in the Context of AIDS in South Africa* was carried out in KwaZulu-Natal in 1999. KwaZulu-Natal (KZN) is situated on the east coast along the Indian Ocean, and with a population of 8.4 million is the most populous province in South Africa. The province is approximately 45% urban and includes Durban, the largest port and third largest city in the country. Just under one-quarter of the country's black population resides in the province. KZN has one of the highest levels of HIV in the country; with HIV prevalence among all antenatal care attendees (the site of national surveillance system for HIV) at 34% in 2001 (South African Department of Health, 2002). While the data from the population-based survey reported earlier (Mandela Foundation, 2002) that showed youth in KZN as having a prevalence of about 8.3% is slightly less alarming than the surveillance data, there is nevertheless one of the worst generalized epidemics among youth going on in KZN at the moment.

For this study, two districts in KZN—Durban Metro and Mtunzini—were purposely selected in order to encompass urban, transitional and rural regional variation within the province. Within these districts, sample households (i.e., households with at least one resident 14-22 years

of age) were chosen using a modified stratified, multi-stage cluster sampling approach often referred to as the "segmentation method" (Turner et al., 1996). Prior to fieldwork, Census Enumeration Areas (EA) were stratified into race categories (African, Indian, White) based upon their majority composition. EAs were allocated to racial categories proportionally to their representation in the population in the two districts. In the first stage of sample selection, 118 EAs were chosen from a sampling frame consisting of all EAs in the two districts using a systematic-random sampling procedure with probability-proportional-to-size (PPS). At the second stage, EAs were divided by field supervisors into approximately equal sized segments of about 50 households based upon a "quick count" of households undertaken as a preliminary field operation. One segment was then selected randomly and interviewers attempted to obtain the information sought from all households and youth within that segment, visiting households up to three times. The data collection teams were composed of male and female Africans, Indians and Whites in proportion to the distribution in the sample. Interviews were conducted by a field worker of the same race and gender as the respondent.

All households in the selected EAs with one or more adolescents between the ages of 14 and 22 were eligible. Within sample households, two separate individual structured questionnaires were administered. First, a household questionnaire was administered to an adult (age 18 or over) in the household. For the most part this adult was a parent or other adult relative (e.g., grandparent, aunt). When an adult was not available, the interviewer discontinued with the household and returned at a later time when an adult was said to be available. The interview solicited information on numbers and background characteristics of usual residents of the household, household assets and expenditures (as indicators of socioeconomic position), living conditions (e.g., building material, number of rooms), economic shocks (e.g., death in the family, loss of job, abandonment or divorce), expenditure, government assistance, and knowledge of and attitudes toward selected adolescent sexual-reproductive health issues.

Based on the roster of residents obtained in the household interview, all youth aged 14-22 were eligible for interview. These interviews covered the background characteristics of the respondents, education history, work experience, exposure to school-based life skills programs,

sexual relationships, contraceptive and condom knowledge, attitudes and use, knowledge and perception of HIV risk, connectedness to school, family and community, alcohol and drug use, and reproductive history.

Interviewers obtained informed consent for both household and youth interviews. For youth under the age of 16, parental consent was also obtained. Attempts were made to ensure privacy by conducting the interviews in a separate room when possible or even going outside**.** Respondents did not receive any compensation for their time. Interviews were face-to-face and responses were recorded on paper and then subsequently entered into a database.

Data collection resulted in 1,974 household and 3,052 individual interviews with adolescents aged 14-22. The interviews were conducted in 113 sample EAs during September and October 1999. A separate community survey was conducted six months after the adolescent and household interviews (May 2000) in the same 113 EAs. For this study, a *community* was defined by the administrative boundaries of the EA. Two complementary methods were used. First, data was gathered through observation: where interviewers, using a structured checklist, assessed the presence and quality of physical infrastructures, community maintenance and general observable cleanliness of those structures.

Second, data were collected using a street intercept module where interviews were conducted with people living in the community. Respondents were recruited at several central locations in the community, such as in shopping centers, bus stops, or along busy streets. Interviewers were conducted with 40 respondents living in the EA, of which half were male and half female and half between the ages of 14 and 30 years and half above age 30 in order to obtain information from older and younger community members. The EA boundaries were described to the respondents to establish their eligibility to participate and to define for them the area to which questions were referring. Questions on the perceived levels of crime and safety were asked. Also, the perception of HIV risk and attitudes toward people living with AIDS were assessed.

Teams of six pairs (four African, one Asian and one White pair) were trained for the community surveys. Training included discussion of the outcomes of the household and

individual adolescent surveys, followed by the purpose of the community study and the methodologies to be employed, specifically interview and observation techniques. Pilot testing was conducted to ensure that common definitions of items be observed. Each team was assigned a number of communities and each member of the team went to collect the data (observation and street intercept) separately. Two to three days were allocated for each EA. Findings and experiences from each team were compared; differences in perceptions and definitions of observed items were discussed and consensus achieved. Two external quality controllers visited six other areas each and reported only minor adjustments to the schedules. Finally, as each team returned from the field, they debriefed with the research team who probed and "interviewed" the interviewers, supplementing the maps and making adjustments to the schedules where necessary. Although these street intercept surveys were only quasi-random, a post hoc analysis matching various variables across the household, individual and community surveys suggest that the individuals interviewed in the street intercept module were similar in characteristics such as socio-economic, education levels, knowledge and attitude regarding HIV, and other variables available across the three surveys. Moreover, data from the two community modules were analyzed at the EA level, which were randomly selected. Therefore, the street intercept data was aggregated at the community/EA level.

Variable Measurement

The dependent variable is whether the adolescent perceives himself or herself at no risk or at any risk based on his or her response to the following question: *Do you think you have no risk, a small risk, a moderate or a great risk of getting the AIDS virus in the next 12 months?* Overall, 76% of the respondents said they were at no risk, while 24% said they were at some risk of getting the AIDS virus—13% reported they were at a small risk, 4% reported a moderate risk, and 7% said they were at great risk.

The classification of risk behavior is based on responses to questions about whether the respondent had ever had sex, used condoms, and the number of sexual partners in the past 12 months. Respondents were classified as having low-risk behavior if they had never had sex, had

not had sex in the past year, or had no more than one partner during the past 12 months and always used condom with that partner. Respondents were considered to have high-risk behavior if they had two or more partners in the past 12 months or had one partner and inconsistent condom use. The decision to use a dichotomous categorical variable for risk behavior was based on previous research (Cantania et al., 1990) and sample size available.

We tested a number of variables which we hypothesized are related to risk perception based on an extensive literature review of adolescent risk taking and community level impacts on adolescent behavior. Individual level variables include age, race, and residence (Durban metro or Mtunzini). We also include reported confidence in using a condom (the self-efficacy index), connectedness to a parent, knowledge of someone who has died of HIV/AIDS, willingness to have a person living with HIV/AIDS as a friend, thinks those who are HIV positive should remain in school, connectedness to neighborhood (has friends in the neighborhood), has experienced forced sex (females only), and whether the individual reported any STD symptoms in the past 12 months (either gender). The household-level variables in the model are whether a household member was chronically ill in the last 12 months and whether HIV/AIDS was discussed often at home. Community-level social and economic environmental measures include the percentage of the community with paved roads, the perceived safety in the community, and the percent of adolescents in the neighborhood who are enrolled in school. The measure of adult perception of the degree of HIV risk in the community is based on the proportion of those over 30 who think youth in their neighborhood are at high risk of AIDS. We also asked all community informants if they knew of someone in their community who had died of AIDS.

Analysis

We used logistic regression to examine factors that predict risk perception. A methodological challenge is to understand the relationship between risk perception and risky behavior, as it could be in either direction. This is especially problematic when using cross-sectional data, because one cannot tell whether perceived susceptibility causes behavioral change, or merely reflects an understanding of the risks that that individual is taking. In order to try to approach this problem

from a slightly different angle, we control for behavioral risk by dividing our sample of adolescents into high and lower risk takers based on their reported sexual behavior and examine risk perception within each group. Previous analyses of this population of adolescents have underscored the sharp gender difference in HIV risk behaviors (Macintyre et al., 2001b; Rutenberg et al., 2000). We continue our detection of gender-specific influences by running separate models for males and females. STATA 7 was used to analyze the data. Its functions using "logit macros" can control for hierarchical multi-level models and cluster sampling designs were employed at all relevant stages. Weights were applied at all relevant levels—i.e., individual, household and community level. It should be noted however that these data are relevant only to the two districts—Durban Metro and Mtunzini magisterial district—that were purposely selected at the outset of the survey. Generalizing results to adolescent behavior and risk perception beyond these regions is incorrect.

Results

Distributions of the dependent and independent variables across gender and by their reported risky behaviors are shown in Table I. The table is divided by the self report of whether the adolescent reported recent risk behavior. Respondents were considered to have high risk behavior if they had two or more partners in the past 12 months or had one partner and inconsistent condom use, otherwise they were classified as engaging in low risk behavior. We next examined risky behavior by risk perception in order to consider four categories of adolescent HIV behavior risk (Table II). The first category we consider as "highly vulnerable," i.e., respondents with high-risk behaviors but no perception that they are at risk of HIV infection. This accounts for 20% of our sample. The majority of this group said that they believed they were not at risk because they were abstinent (17%), had only one sexual partner (26%), or always used condoms (30%). However, this is inconsistent with their reported behavior. We view these adolescents as a priority for programs concerned with addressing adolescents' vulnerability to HIV because their denial and lack of recognition of their risk means that they likely

Table I. Distribution of the dependent and independent variables by sex and risky behavior status

		Not engaged in risky behavior			Engaged in risky behavior		
Variables	Categories	Female	Male	Total	Female	Male	Total
Individual level variables							
Perceived at risk (Dependent Variable)	no/low	84.9	83.8	84.4	59.6	57.7	58.7
	Yes/high	15.1	16.2	15.6	40.4	42.3	41.3
Age	14-15	34.2	35.4	34.7	4.6	4.9	4.7
	16-19	49.8	50.2	50	51.5	55.1	53.2
	20-22	16	14.5	15.3	43.9	40.1	42.1
Race	Other	25.1	31.3	27.8	8.4	9.9	9.1
	African	74.9	68.7	72.2	91.6	90.1	90.9
Self-efficacy index**	1-1.5	38.1	18.3	29.5	18.6	5.5	12.4
	2-2.5	37.2	29.7	33.9	44.8	19	32.5
	3	24.7	52.1	36.6	36.6	75.5	55.2
1st close person in family	Other	49.6	40.5	45.6	61.1	53.4	57.5
	Mom/dad	50.5	59.5	54.4	38.9	46.6	42.5
Knows someone live/dead with HIV/AIDS	No	72.5	82.6	76.9	59.7	63.3	61.4
	Yes	27.6	17.4	23.1	40.3	36.7	38.6
Has many friends in the neighborhood	No	46.5	21.1	35.4	59.6	24.8	43.1
	Yes	53.5	78.9	64.6	40.4	75.2	56.9
HIV infected should remain in school	No	14.3	29	20.7	18.6	24.9	21.6
	Yes	85.7	71	79.3	81.4	75.1	78.4
Have PLWA as a friend	No	12.2	10.7	11.5	14.9	6.5	11
	Yes	87.8	89.3	88.5	85.1	93.5	89
Ever had forced sex	No	-	-	-	87.2	97.2	92
	Yes	-	-	-	12.8	2.8	8
Has STD symptoms (in past 12 months)	No	-	-	-	81.8	85.2	83.4
	Yes	-	-	-	18.2	14.9	16.6
Household member was sick	No	84.9	84.7	84.8	81.2	81.2	81.2
	Yes	15.1	15.3	15.2	18.9	18.8	18.9
Discuss HIV/AIDS at home	Often	23.5	24.9	24.1	24.9	29	26.8
	Sometimes	48	40	44.5	38.6	33.7	36.3
	Never	28.6	35.1	31.4	36.5	37.3	36.9
Community level variables							
Pct. With surfaced roads	100%	53.5	53.3	53.4	42.4	45.4	43.8
	25-75%	33.5	33	33.3	44.3	38.7	41.7
	None	10.2	9.2	9.8	10.6	12.4	11.4
	No roads	2.9	4.4	3.6	2.8	3.5	3.1
Community safety scale	0 - 4.9	43	41	42.1	52.6	54.7	53.6
	4.91 - 5.2	29.2	28.2	28.7	29.3	24.5	27
	5.21 - 6.0	27.8	30.8	29.1	18.1	20.8	19.4
Pct. Enrolled in school in the n'hood	<51%	1.1	1.3	1.2	2.8	1.8	2.4
	51-75%	49.4	50.4	49.8	63.8	62.5	63.2
	76-100%	49.5	48.4	49	33.3	35.7	34.4
Adult perception of youth HIV risk*	1 to 1.76	40.6	40.5	40.6	25.2	25	25.1
	1.77 to 2.5	35.7	32.3	34.2	35.8	42.2	38.8
	2.51 to 3	23.7	27.2	25.3	39	32.8	36.1
Pct. Knows someone in n'hood died of AIDS	0-25%	29.7	36.3	32.6	12.6	15	13.7
	25-50%	32.3	33.6	32.9	37.6	41.4	39.4
	50-75%	30.4	23.3	27.3	38.1	35	36.6
	75-100%	7.6	6.8	7.3	11.7	8.6	10.2
Residence	Mtunzini	27.6	23	25.6	27.2	36	31.4
	Durban	72.4	77	74.4	72.8	64	68.6
Total number		1,117	857	1,975	521	467	988

perceive current program messages about HIV and behavior change as personally irrelevant. We believe that understanding who is in this group and the reasons they believe they are not at risk is a high priority in order to develop messages that do resonate with this vulnerable group and are effective in eliciting behavior change. These issues are explored in the multivariate analysis described below.

The second category is comprised of adolescents who are at risk and recognize they are at risk, which accounts for 14% of our sample. Nearly half of this group reported being at risk because they had unprotected sex (30%) or because they have multiple partners (18%). According to classic health belief and AIDS risk reduction models, because these adolescents recognize their risk factors they should be predisposed to interventions and support that help them behave safely.

The third group is the "worried well"; they believe they are at risk but currently report no risk behaviors. These account for 10% of the sampled youth. It may be that they are concerned because of the generalized HIV/AIDS epidemic in South Africa or because they perceive their immediate environment as risky, e.g., know someone who is infected with HIV or observe considerable peer pressure or coercion to have unprotected sex. It may be they have recently changed their behavior and lowered their personal risk because of their concerns. Indeed, 35% of respondents in this group reported abstinence as their reason for feeling at risk when in fact they may have meant that because they felt susceptible to HIV they were abstaining from sex. Adolescents are also concerned about the risk of HIV transmission if a road or sports accident was to occur, that is, that they would be exposed to HIV infected blood from another injured person or while receiving first aid treatment.

The fourth group, the majority of adolescents—56%, is those who have no risk factors nor do they perceive they are at risk. Three-quarters of these adolescents are not yet sexually active; they may view themselves too young for sex, the opportunity for sex may not yet have presented itself or they have deliberately postponed sexual initiation to reduce their HIV risk.

Table II. Percent distribution of sample according to intersection of behavioral risk and risk perception

	Perception of risk:	
Behavior:	Some risk	No risk
Risky behaviors	.14	0.2
No risk behaviors	.10	0.56

Total sample size = 2963

In multiple regression logistic models, very few of our hypothesized variables were significant predictors of risk perception among adolescents who reported current risky behavior. Using the criterion of a p-value of .05 or less, we found two significant predictors for males and three predictors for females (Table III). Among boys who were engaged in risk behaviors, a greater degree of confidence to use a condom was correlated with a lower perception of risk. The risk perception of girls engaged in high-risk behavior is correlated with age—with the likelihood of reporting feeling at risk of HIV increasing with age. Those girls reporting having a member of the household sick in the past 12 months were also more likely to see themselves at risk. Both genders who report themselves as willing to have a friend who was a PWLA were associated with higher risk, though the direction of effect differed between boys and girls. Girls being *less*, and boys *more* likely to see themselves at higher risk (p=.07 for boys*, p=.015 for girls*).

Among boys who were *not* engaged in risky behaviors, being African, compared to other race, and never discussing HIV/AIDS at home were associated with a lower perception of risk, although the odds ratio for race is only marginally significant, while confidence to use a condom, and adult perception of HIV risk in the community were all associated with a greater individual perception of risk (Table IV). A important predictor of risk perception for females who were *not* engaged in risky behavior is also the proportion of adults in the community who think youth are at risk—the higher the proportion, the more likely a female adolescent is to declare she, herself, is

Table III. Logit models predicting perceived at risk of HIV infection who are engaged in risky behavior

		Boys				Girls			
Independent Variables	Measure	OR	+/- 95%	CI	p-value	OR	+/- 95%	CI	p-value
Age	(continuous)	1.05	0.94	1.18	0.397	1.15	1.04	1.26	0.005
Race	Other	1.00				1.00			
	African	0.69	0.28	1.73	0.43	2.27	0.65	7.86	0.198
Self-efficacy index**	(continuous)	0.47	0.23	0.95	0.036	0.85	0.57	1.25	0.406
1st close person in family	Other	1.00				1.00			
	Mom/dad	1.14	0.71	1.84	0.589	0.81	0.47	1.41	0.462
Knows someone live/dead with HIV/AIDS	No	1.00				1.00			
	Yes	1.18	0.65	2.17	0.584	0.94	0.63	1.4	0.757
Has many friends in the neighborhood	No	1.00				1.00			
	Yes	0.74	0.35	1.55	0.421	0.85	0.56	1.31	0.465
HIV infected should remain in school	No	1.00				1.00			
	Yes	1.07	0.63	1.84	0.794	1.45	0.87	2.42	0.156
Have PLWA as a friend	No	1.00				1.00			
	Yes	2.63	0.89	7.77	0.079	0.47	0.25	0.86	0.015
Ever had forced sex	No					1.00			
	Yes					1.83	0.83	4.04	0.136
Had STD symptoms (in past 12 months)	No	1.00				1.00			
	Yes	1.86	0.8	4.29	0.149	1.44	0.8	2.58	0.222
Household member was sick	No	1.00				1.00			
	Yes	0.98	0.53	1.81	0.953	1.7	0.99	2.91	0.055
Discuss HIV/AIDS at home	Often	1.00				1.00			
	Sometimes	1.15	0.67	1.98	0.613	1.45	0.8	2.63	0.224
	Never	1.21	0.59	2.47	0.607	1.33	0.69	2.57	0.391
Pct. With surfaced roads	100%	1.00				1.00			
	25-75%	1.52	0.69	3.35	0.296	0.92	0.45	1.86	0.808
	None	1.14	0.43	2.99	0.792	0.81	0.22	2.96	0.752
	No roads	1.25	0.21	7.48	0.804	1.39	0.41	4.74	0.594
Community safety index	(continuous)	1.18	0.63	2.23	0.601	1.05	0.64	1.75	0.838
Pct. Enrolled in school in the n'hood	(continuous)	0.71	0.07	6.79	0.764	0.56	0.04	7.13	0.652
Adult perception of youth HIV risk*	(continuous)	1.01	0.61	1.67	0.984	1.85	0.87	3.95	0.11
Pct. Knows someone in n'hood died of AIDS	(continuous)	0.94	0.25	3.48	0.92	0.31	0.07	1.48	0.142
Residence	Mtunzini	1.00				1.00			
	Durban	0.77	0.37	1.63	0.499	0.88	0.46	1.68	0.693
Sample size		407		484					
Log likelihood		-262.932		-295.982					
p-value of global test		<0.001		0.005					
Pseudo R-squared		0.053		0.095					

** Higher score indicate more confident (2 items: 1. confident to get condom when needed, 2. confident in using condom correctly)
*Higher score indicates increasing risk

Table IV. Logit model predicting perceived at risk of HIV infection who are *not* engaged in risky behavior

		Boys				Girls			
Independent variables	Measure	OR	+/- 95%	CI	p-value	OR	+/- 95%	CI	p-value
Age	(continuous)	1.08	0.92	1.26	0.334	1.09	1.00	1.18	0.064
Race	Other	1.00				1.00			
	African	0.43	0.16	1.16	0.096	0.43	0.13	1.48	0.182
Self-efficacy index**	(continuous)	2.02	1.4	2.91	<0.001	1.05	0.79	1.41	0.735
1st close person in family	Other	1.00				1.00			
	Mom/dad	0.81	0.5	1.31	0.389	0.58	0.42	0.8	0.001
Knows someone live/dead with HIV/AIDS	No	1.00				1.00			
	Yes	0.92	0.56	1.5	0.731	1.32	0.8	2.17	0.28
Has many friends in the neighborhood	No	1.00				1.00			
	Yes	0.59	0.24	1.46	0.256	0.94	0.64	1.37	0.743
HIV infected should remain in school	No	1.00				1.00			
	Yes	0.71	0.43	1.16	0.168	1.45	0.71	2.97	0.308
Have PLWA as a friend	No	1.00				1.00			
	Yes	0.93	0.24	3.58	0.91	1.23	0.41	3.73	0.709
Household member was sick	No	1.00				1.00			
	Yes	1.15	0.66	2.03	0.619	2.21	1.43	3.41	<0.001
Discuss HIV/AIDS at home	Often	1.00				1.00			
	Sometimes	0.93	0.53	1.62	0.799	2.5	1.38	4.53	0.002
	Never	0.57	0.34	0.96	0.033	1.31	0.63	2.75	0.47
Pct. With surfaced roads	100%	1.00				1.00			
	25-75%	1.11	0.6	2.05	0.736	1.18	0.53	2.62	0.678
	None	1.55	0.46	5.25	0.484	0.36	0.07	1.82	0.218
	No roads	0.42	0.11	1.57	0.198	0.7	0.12	4	0.685
Community safety index	(continuous)	0.82	0.58	1.15	0.241	1.21	0.4	3.67	0.734
Pct. Enrolled in school in the n'hood	(continuous)	0.37	0.02	7.25	0.511	0.72	0.04	12.02	0.816
Adult perception of youth HIV risk*	(continuous)	2.24	1.4	3.58	0.001	4.57	2.15	9.74	<0.001
Pct. Knows someone in n'hood died of AIDS	(continuous)	1.23	0.26	5.73	0.794	0.48	0.06	3.55	0.471
Residence	Mtunzini	1.00				1.00			
	Durban	6.99	1.94	25.2	0.003	0.67	0.32	1.41	0.286
Sample size		814		1,011					
Log likelihood		-314.735		-372.172					
p-value of global test		<0.001		<0.001					
Pseudo R-squared		0.126		0.138					

** Higher score indicate more confident (2 items: 1. confident to get condom when needed, 2. confident in using condom correctly)

*Higher score indicates increasing risk

at risk. Females were more likely to report perception of high risk if they are older and if they report sometimes discussing HIV at home compared to those who discussed it often and if there had been a chronically ill household member in the past 12 months. Females were less likely to think they were at risk if they named their mother or father as the family member they felt closest to. Finally, residence inside the Durban metro area, compared to the more rural Mtunzini area is a powerful predictor of boys, not engaged in high-risk behaviors, to perceive themselves at high risk for HIV.

Discussion

South Africans are living in the midst of a terrifying epidemic. The year these data were collected, 1999, was still relatively early in terms of how visible the epidemic was in the country. Yet, we know from the surveillance data that this age group of 14-22 is a vital sub population at tremendous risk of acquiring the virus. Many of the adolescents we interviewed know this fact, but translating this first into a perception of being personally at high risk and then of altering their own behavior require significant changes. For consistent protection there must be accurate knowledge and extremely high access to STD treatment and condoms. For total protection there must be abstinence from sex. Compounding all this are two other major factors; stigma against AIDS, which may well extend into a range of behaviors that illustrate denial and fear, and the well-established notion in developmental psychology of the feeling of invulnerability amongst youth. Optimistic bias and stigma may reinforce each other in a complex syndrome that directly affects young people's calculus of their own risk. This paper only begins to examine these factors. Much more information is required for programs to be able to help youth in South Africa navigate this epidemic.

The results of the present analysis suggest that connectedness to parents and community seem to play a significant role in some adolescents' perception of their own risk. However, feeling connected appears to have very different effects for females compared to males. Parents seem to play an important role in helping girls feel safe by supporting them to resist peer pressure to engage in unsafe sex or by controlling their activities and friendships so as

to reduce the opportunities for harm. The converse, less family and community oversight, is associated with *lower* risk perception for boys. It may be that in this setting, the risk and sexual health of boys are relatively ignored compared to girls and boys are more likely to be ignorant of or to be in denial of their own risk.

Further evidence for the importance of adult influences may be seen in the strong positive relationship between adult perception of HIV risk from those adults (over 30) interviewed in the street intercept community surveys, and the adolescents' own perceptions, especially among those who do not seem to be practicing such high-risk behavior. The strong correlation reveals a high degree of concordance between the perceptions of adults and adolescents in these communities. The effects of this factor are particularly large for girls, suggesting that they may be more sensitive or more responsive to what is said in the community than boys. Another interpretation may be that boys and girls are being given very different messages at home. For example, girls may be being encouraged to abstain, use condoms, etc., while boys may still in some communities have less information, or be being encouraged to have more than one girlfriend. Other research has also identified this important gendered division in South African communities (Varga, 1997, Varga, 1998, LeClerc-Madlala, 1997).

A number of findings reinforce how much adolescent males and females differ in factors associated with their perception of risk. The fact that boys who are willing to have a friend who is a PLHA are more likely to see themselves at high risk, but girls are less likely may reflect considerable differences in the denial of illness between the genders, or it may be an artifact of our data, i.e. that very few boys or girls said they were unwilling to have a friend who is living with HIV or AIDS. The large coefficient predicting that boys or men living in Durban, but classified as not at risk, are nearly seven times more likely to see themselves at high risk is an important result. The fact that residence doesn't appear to make a difference for girls is also important, suggesting either that the messages of risk are being heard equally by all girls, or that boys in Mtunzini are more likely to be in denial about their own risk.

Further, in the males not engaged in risky behavior, boys with a higher score on the self-efficacy index in how to use a condom are significantly less likely to see themselves at high risk.

In other words, boys who are confident in how to obtain and use a condom feel protected from risk. However, the direction is reversed for boys who are not at risk—confidence to use a condom is associated with a greater perception of risk; it may be that a sense of vulnerability has spurred some boys to become adept at using this form of protection. Self efficacy in condoms does not appear associated with risk perception in these models for girls, which probably reflects the well established gender/power imbalance over the inability of girls to dictate condom use if their partners are reluctant or inexperienced (Varga, 1997).

Among girls who do not report risk behaviors, living in a household with a chronically ill member—some proportion of whom probably are affected by AIDS—seems to increase their sense of being at risk of HIV. Adolescent females are much more likely than adolescent males to shoulder the burden of care of an ill family member and this closeness to AIDS or another chronic illness increases the feeling of vulnerability.

Some of the factors suggested by the literature as potentially affecting risk perception had no relationship to reported risk in our models. For example, having experienced STD symptoms in the past 12 months—a clear marker of high-risk behavior—had no impact on risk perception. One reason for this is that we had a very small sample of youth reporting having experienced an STD. Our measure of social proximity through HIV/AIDS experience—"personally knowing someone infected with or who has died of HIV"—which we expected to act as a predictor of risk, failed. However, because of the stigma associated with AIDS, it may also be that the variable measuring the proximity of the epidemic through the presence of a chronically ill member of the household is capturing this impact of the epidemic, at least for girls.

Our models did poorly in predicting risk perception among adolescents, particularly male youth, engaged in risk behaviors. It may be that many of these adolescents are in denial or overly optimistic about their risk and thus their reporting is not easily explained by our conceptual models which relied on measures of knowledge, self-efficacy, and household and community influences and supports. Moreover, admitting to being at risk of HIV means, in many people's minds, admitting to place oneself in the category of a stigmatized person (Malcolm et al., 1998, UNAIDS 2000a, UNAIDS 2000b). AIDS, as acknowledged earlier, carries enormous stigma,

related to both the fear of death and the long-held association of AIDS with sinful or illegal behaviors. Homosexuality among many sectors of South African society is virtually a taboo notion, while prostitution is associated both with poverty and immorality. None of these categories are enticing, especially to adolescents still unsure of their identity. Thus, in order to perceive oneself in a high-risk category the individual adolescent has to either overcome the thought and image of the stigmas or perhaps to have had some other overriding shock (presence of a household member who is chronically ill, for example).

Risk perception may also be influenced by one's faith in oneself to predict who is a risky partner (Dodoo and Adomako, 2002). Thus the poor predictive power of the model may be due to omitted (and unavailable) variables for whether respondents believe they can predict who is infected with HIV and whether their sexual partners have characteristics which are associated with a lesser or greater likelihood of being HIV infected (e.g., look healthy or ill, fat or thin, stick to one partner or have multiple sexual partners). The variables we included in our models, which are not specific to a particular partnership, better predict a more generalized sense of risk for adolescents not currently engaged in risk behaviors, most of whom are not currently in a sexual partnership.

We hope that the results of this analysis will inform future behavior change programs in at least two ways. First, a greater understanding of the connection of adolescents to their communities, and to the adults in their households should be incorporated into program design. Greater efforts could be made to involve parents and other significant adults that surround them in the youth programs, not in a didactic role but in ways that support adolescents to examine their own behavior, make positive changes and protect themselves. Youth programming has widely recognized the role for peer educators but we are now beginning to increase our knowledge base about an effective role for adult mentors. Second, the results should remind program planners that an emphasis on the provision of information and even skills building has limits to how much it can help an adolescent change his or her behavior. Programs must also explore how they can alter the environments in which adolescents form opinions, make choices, and act.

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