

Original article

Reducing the risk of HIV transmission among adolescents in Zambia: Psychosocial and behavioral correlates of viewing a risk-reduction media campaign

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Abstract

Purpose: The purpose of this study was to evaluate phase I of a theoretically informed media campaign designed by youth in Zambia to encourage their peers to adopt risk-reduction practices to protect themselves from sexually transmitted infections and human immunodeficiency virus (HIV). The Helping Each other Act Responsibly Together (HEART) campaign conveys information for young people ages 13 to 19 years about sexually transmitted infections, HIV, and acquired immune deficiency syndrome transmission and prevention, and promotes abstinence, a return to abstinence, or consistent condom use as viable risk-reduction practices.

Methods: Separate sample baseline and follow-up designs were used to evaluate phase I of the HEART campaign among adolescents aged 13 to 19 years. The 1999 baseline survey had a sample of 368 male and 533 female adolescents; the 2000 follow-up survey comprised 496 male and 660 female adolescents.

Results: Controlling for age, sex, educational attainment, and urban or rural residence, logistic regression analyses demonstrated that, compared with nonviewers, campaign viewers were 1.61 times more likely to report primary or secondary abstinence and 2.38 times more likely to have ever used a condom. The odds ratio of condom use during last sex was 2.1 for respondents who recalled at least 3 television spot advertisements compared with other respondents.

Conclusions: The positive correlations between HEART campaign viewership and HIV risk-reduction practices demonstrate that mediated messages can influence adolescents. The HEART campaign is among a range of programs in Zambia designed to enable young people to protect their reproductive health. Future research should capture the independent as well as the synergistic effects of multiple campaigns and interventions. © 2006 Society for Adolescent Medicine. All rights reserved.

Keywords: Abstinence; Adolescents; Condom use; Gender differences; Health behavior; HIV and AIDS; Zambia

Young Zambians are highly vulnerable to human immunodeficiency virus (HIV) transmission. The 2001–2002 Zambia Demographic and Health Survey (ZDHS) reports an overall HIV prevalence rate of 16% among Zambians 15 to

49 years of age [1]. Among youth ages 15 to 19 years the prevalence rate is 6.5% among women and 1.9% among their male counterparts. Rates jump dramatically among the next older cohort: 16.6% of women and 4.4% of men ages 20 to 24 years test positive for HIV. Rates for urban residents are more than double the rates found among rural adolescents and young adults. The prevalence rate among youth is tragically high; if the national prevalence is maintained at 16%, the lifetime risk for acquired immune defi-

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ciency syndrome (AIDS) death for Zambian boys and girls who are currently 15 years old is 50% [2]. Inasmuch as 34% of the population is aged 10 to 24 years [3], the reproductive health knowledge and practices of Zambia's youth will continue to influence demographic and health trends for decades to come. Indeed, social norms embraced by Zambian youth today may well presage society-wide acceptance of these social norms in the years ahead, and can be expected to prove highly consequential, given the current prevalence of HIV in Zambia.

While the 2001–2002 ZDHS findings reinforce the urgent need for immediate, strategic action informed by evidence-based programs, the sense of urgency is not new. Studies from the middle to late 1990s demonstrated that Zambian youth were at considerable risk for contracting HIV and other sexually transmitted infections (STIs). The Zambia Sexual Behavior Survey (SBS) 1998 [4] was an important source of information, when the Helping Each other Act Responsibly Together (HEART) campaign was first conceptualized. The SBS 1998 found that by the age of 15 years, 37% of boys and 27% of girls were sexually experienced. Among those 15 to 19 years old, 62% of the boys and 59% of the girls reported that they had had sex. Of those who were sexually experienced, 84% reported that they had not used a condom the last time they had sex. By the age of 19, only 16% of Zambian youth report that they have never had sex. Among sexually active youth who had never married, 24% of boys and 14% of girls reported that they had more than 1 partner in the year prior to the survey. Another troubling factor was that the 1996 ZDHS [5] found that 64% of adolescent girls and 70% of adolescent boys believed they were at no risk for contracting HIV. Clearly, ample evidence pointed to the need to inform young people about HIV and to encourage them to take protective actions.

In light of this situation of high prevalence coupled with perceived invulnerability among youth, government officials in Zambia called for the development of programs to inform youth about HIV and AIDS. The Government of the Republic of Zambia asked the United States Agency for International Development (USAID) and its implementing partner, the Zambia Integrated Health Programme (ZIHP), to work with the Central Board of Health, the National AIDS Council and Secretariat, nongovernmental organizations, and young people themselves to design the program. As part of this effort, Zambian youth designed the HEART campaign, with technical assistance from the USAID-funded ZIHP. Launched in November 1999, the campaign's goal was to encourage social norms supportive of sexual practices that would reduce the risk for contracting HIV or STIs. Specifically, the campaign highlighted primary abstinence as a viable choice for those with no sexual experience, and either a return to abstinence, hereafter referred to as secondary abstinence, or consistent condom use for sexually active young persons.

In this article, we present an assessment of the extent to

which campaign recall among Zambian adolescents is associated with knowledge, attitudes, perceived efficacy, social norms, and practices that reduce the risk for HIV and STI transmission.

Methods

Project description

Theoretical framework.

The present intervention was guided by a revised stage theory of behavior change [6]. Specifically, the theory posits that behavior change occurs in a sequential series of steps that unfold as a consequence of interactions. Stage theorists gradually came to understand that, rather than occurring in a linear fashion, behavior change occurs within the social contexts and thus is influenced by a host of social factors. Thus, as it has evolved, stage theory has incorporated variables such as perceived risk, social norms, self-efficacy, and collective efficacy into the explanation of communication effects. Cleland and Wilson [7] use the term "ideation" when referring to the constellation of cognitive, emotional, and social factors associated with behavioral change. Their central contention is that common language and geographic proximity allow "changing perceptions, ideas, and aspirations" to be shared, that is, communicated, with members of one's community. While communication often serves to reinforce shared beliefs, values, and social norms, communication channels can also broadcast reconstructed beliefs, values, and social norms that have been altered by the introduction of new ways of thinking. Research has demonstrated that communication interventions can introduce and promote new ways of thinking. For example, in the area of family planning communication there is substantial evidence that theory-based, media campaigns influence contraceptive practices directly as well as indirectly [6,8–12]. A growing body of literature also demonstrates that media campaigns and other forms of communication, including community mobilization efforts and interpersonal communications, can also influence HIV risk-reduction practices [13–19]. This ideational framework based on stage theory informed the HEART campaign.

Intervention.

The HEART campaign is a multimedia program that uses television (TV) public service announcements as the cornerstone, with radio spot advertisements (ads), music and music videos, and posters, billboards, and other print material to reinforce the STI and HIV risk-reduction messages, as well as community-based efforts in rural areas. Since the middle to late 1990s the World Health Organization, USAIDS, United Nations International Children's Emergency Fund (UNICEF), and the Centers for Disease Control and Prevention, among other national and international organizations, have called for youth participation in

the design, implementation, and evaluation of programs intended for youth, yet the term has been variously defined and implemented [20,21]. From conceptualization through evaluation of the HEART campaign, young people have been active participants.

Of, by, and for youth, the campaign features young persons who convey messages that their peers designed to reach Zambian adolescents. A team of communication and adolescent reproductive health specialists came together with 7 young people to develop the media campaign. The design team comprised individuals from organizations that specialized in communication, community partnerships, social marketing, youth participation, support for persons living with HIV and AIDS, and faith-based approaches, as well as from government organizations. In short, the program resulted from broad-based collaborative efforts, and was not the product of any one organization or sector. The team was responsible for strategic planning, campaign development, and implementation. Young people on the design team who had contributed to programs in at least one type of communication program (e.g., print media, radio, peer education, video, drama) were the key decision makers for critical aspects of the campaign.

To ensure broad-based youth involvement, a Youth Advisory Group (YAG) was established, and initially comprised 35 young people from 11 youth organizations. At least one of the YAG members tested positive for HIV (HIV+); all were in close contact with people living with HIV or AIDS. After reviewing available data, the YAG segmented the target adolescent audience into 4 groups: abstinent male and female adolescents, and sexually active male and female adolescents who were not consistent condom users. The campaign's core intended audience was youths 13 to 19 years old. The team developed communication objectives and messages for each target group. Cognizant of the need to build their intervention on a theoretical framework, the team sought to develop and communicate messages that could influence ideational factors, such as knowledge, attitudes, and social norms, as well as enhance self-efficacy by upholding abstinence and condom use as the only viable alternatives. The campaign was intended to create a belief that unprotected sex is not an option. Based on direction from the YAG, professional agencies developed message concepts and scripts that were tested for appeal and comprehension through focus group discussions and in-depth interviews; post-broadcast ad surveys were conducted to test reach and recall.

The design team recognized that most urban youth would have access to TV, whereas most rural youth would not. Indeed, the design team designated urban youth as the primary intended audience for the televised messages, yet they did not want to ignore rural youth. Therefore they pretested the messages with both urban and rural youth, in anticipation of reaching as wide an audience as possible. As a result of the audience segmentation and message devel-

opment, the team developed 5 TV health communication ads for phase I (November 1999–May 2000).

“Ice” portrays a young man named Ice who contracts an STI as a result of his cavalier refusal to use a condom, and ends with the tag line, “Use a condom every time you have sex.”

“Choices” highlights the prerogative of young men to choose abstinence until they are ready to make another choice, and gives them reasons why they might choose abstinence.

“Mutale and Ing’utu” portrays 2 young women, 1 thin and 1 plump, and reveals that the plumper of the 2 friends is HIV+, which was designed to counter the widespread misconception that people who are HIV+ appear emaciated; in Zambia, HIV is commonly referred to as the “slim disease.” The main message was, “You can’t tell if someone has HIV by the way they look.”

“When He Says . . .” cautions young women to be wary of men’s efforts to seduce them before they are ready for sex. It encourages young women to be proud of their virginity, and implies that young women should wait until marriage for their sexual debut.

“When It Matters” depicts a playful, young couple. As they become seriously involved the ad ends with the tag line, “When there is love . . . use it,” at which point the socially marketed MAXIMUM condom is shown. It is also worth noting that this was the first ad aired in Zambia to include brand advertising for condoms.

The overall campaign goal was to provide a social context in which prevailing social norms could be discussed, questioned, and reassessed. By placing communication about abstinence and safer sex on the national agenda, the design team anticipated that the campaign would encourage young people to adopt safer sex, ultimately contributing to the nationwide effort to reduce the incidence of HIV and AIDS, and other STIs.

This article reports findings from the 1999 baseline and August 2000 surveys, the latter of which was designed to assess the outcomes of messages televised during phase I of the campaign (aired from November 1999 through May 2000). The media campaign was televised nationally, albeit with the understanding that urban youth compared with rural youth would have better access to TV. Community-based and school-based activities that were part of the HEART campaign were not universally available in the 12 demonstration districts, so the evaluation of those activities would require a different research protocol than used in 1999 and 2000 surveys. Therefore questions regarding participation in those activities were not included in the surveys.

The HEART campaign is ongoing; community-based

and school-based activities, as well as the media program continue. Results of the August 2000 survey informed the development of subsequent phases of the campaign. Phase II of the media component was initially aired in December 2000, and selected ads were broadcast again in 2002; phase III began airing in January 2003; and phase IV began airing before the end of 2003. The subsequent phases continued to encourage abstinence and the delay of sexual debut and, for those who were sexually active, consistent condom use. One ad in phase III highlighted adolescent girls discussing reasons to delay sexual debut. It also disparaged “sugar daddies,” because they “may give you more than you want. They could give you HIV.” Other phase III ads focused on the importance of condom use “every time,” because “you can’t tell by looking.” The program through which HEART was funded came to an end in September 2004. While there are plans to continue HEART as part of a newly funded 5-year program, the direction it will take under new management has yet to be determined.

Evaluation methods

Setting.

The setting for this study is Zambia, a landlocked country covering an area of some 753,000 square kilometers in southern Africa. The 2000 census [3] reported a population of 9.3 million. Approximately 36% of the country’s population reside in urban areas, a proportion that has declined steadily from a high of 40% in 1980; this decline has been concurrent with the weakening economy. The most densely populated provinces, Lusaka and Copperbelt, which combined constitute nearly 30% of the total population, are also the most urbanized.

The ZIHP carries out interventions in 12 demonstration districts, although certain interventions, including mass media programs, are accessible throughout the country. The 12 demonstration districts are located in Copperbelt, Central, Southern, Eastern, Luapula, and Northern provinces. Zambia’s Central Board of Health, in consultation with USAID, selected the districts. It is worth noting that Lusaka, which accounts for 14% of the population [2] and is the largest urban area in Zambia, is not among the demonstration districts, and thus was not included in the 2 surveys that constitute the basis of this study.

Youth survey.

To evaluate the campaign the research team used a quasi-experimental, separate-sample baseline and follow-up design [22]. The baseline cross-sectional sample survey was conducted from July to November 1999 to establish benchmark indicators as the basis for the evaluation of ZIHP interventions. The survey was designed to be representative of the 12 districts where ZIHP interventions would be implemented. Sample size was selected proportionate to the population of each of the 12 districts, and households were identified using a stratified, multistage design. Each district

is divided into catchment areas, which surround the urban and rural health centers located in the district. Every household in a given district is included in the catchment area of 1 health center. For each district, 1 urban and rural health center was randomly selected. The catchment areas were then divided into approximately equal sections based on population served. The research team then randomly selected 1 or 2 sections per catchment area, depending on population size within the district. In the field the supervisors selected every third to fifth household, according to instructions given and based on population density. Within the selected households interviewers collected data from women aged 15 to 45 years and men aged 25 to 64 years, as well as a separate sample of youth aged 13 to 19 years. Within the selected households, all young people aged 13 to 19 were interviewed; the youth sample comprised 368 male and 533 female adolescents. The potential problem of intrahousehold correlations was rectified during analysis by using the survey command in STATA.

The sampling frame for the follow-up replicated that used in the baseline survey, although in the 2000 survey only a youth sample was selected. The research team estimated that a sample of 1,000 (500 boys, 500 girls) would provide a confidence level of greater than 95%, with separate estimates for young men and young women. To achieve this target, and assuming a response rate of approximately 85%, 800 households were selected because all male and female household members aged 13 to 19 years would be asked to participate in the survey. The final sample comprised 496 young men and 660 young women.

Inasmuch as this study was designed to evaluate the outcomes of the messages that were broadcast during phase I, follow-up respondents who recalled at least 1 of the public service announcements are compared with those who did not remember seeing any of the TV ads. To take into account secular changes that occurred in the period between the 2 surveys, baseline and follow-up results are compared.

Procedures and instruments

The questionnaire comprised closed-ended questions and a few open-ended questions, and yielded information about the reproductive health knowledge, attitudes, and behaviors of young people ages 13 to 19 years. The key variables included demographic characteristics, media habits, sexual relations, attitudes toward and perceived social norms regarding abstinence and condom use, as well as knowledge and attitudes about STIs and HIV. The questionnaire was reviewed and approved by the Monitoring and Evaluation Division of the Central Board of Health in Zambia, and by the National Health Research Advisory Committee in Zambia, to ensure that it was culturally and age-appropriate. The questionnaire was developed in English, translated into 4 local languages, backtranslated, pretested, and revised as indicated by the pretest results before administering the

survey in English, Bemba, Nyanja, Tonga, and Lozi, as appropriate.

The follow-up questionnaire comprised all questions in the baseline questionnaire. In addition, questions to assess viewership of the HEART campaign, which was aired after the 1999 survey was fielded, were added to the follow-up survey instrument. The campaign-related questions were field tested among 50 young men and 50 young women; adjustments to those questions were made accordingly. The final questionnaire was reviewed for cultural appropriateness by the Central Board of Health in Zambia. Teams of 5 interviewers overseen by a supervisor conducted the survey over a 3-week period in August 2000.

Four behavioral outcomes were measured in the study: never had sex (primary abstinence); previous sexual experience, but not within the past 12 months (secondary abstinence); ever use of condoms; and condom use during last sexual intercourse.

Measures

Self-efficacy with respect to the ability to refuse unwanted sexual relations was assessed by asking female respondents whether they believe they have the right to refuse unwanted sex; whether they know how to refuse unwanted sex; and to describe how they would refuse unwanted sex. A scale of 0 to 3 was created from responses to these questions.

To create an efficacy scale for condom use, 1 point was given for each positive response to the following items: feels comfortable purchasing condoms, knows where to buy a condom, feels comfortable asking partner to use a condom, would refuse to have sex if the partner was unwilling to use a condom, and feels confident that the partner would not leave if respondent refused to have sex without a condom ($> = .62$). The last item was included in this efficacy scale because it reflects a strong sense of self-confidence, that is, that the respondent's partner would respect her or his right to insist on condom use.

Ideational factors considered in relationship to primary and secondary abstinence included spontaneously mentioned abstinence as a way to avoid HIV transmission, discussed abstinence with others, perceived social support for abstinence, perceived most friends to be abstinent, risk perceptions, and, among young women, registered a high level of self-efficacy to refuse unwanted sexual advances. Ideational factors related to condom use were spontaneously mentioned condom use as a way to avoid HIV transmission, perceived self at moderate to high risk for HIV transmission, discussed safer sex with others, and registered a high level of self-efficacy to use condoms.

Data collection

For both baseline and follow-up surveys, youth between the ages of 18 and 24 years conducted the interviews. All

field staff involved with the youth surveys participated in an extensive training course to learn how to conduct the interviews with adolescents. It is common practice in Zambia to obtain participants' oral consent; therefore interviewers read the informed consent form to the potential respondents. Once oral informed consent was obtained, young women interviewed female respondents and young men interviewed male respondents through face-to-face interviews using a structured questionnaire. Interviews were conducted in or near the homes of survey respondents, depending on where privacy could be ensured.

Statistical analysis

Respondents for the 2 samples did not differ by age or educational attainment, but the baseline compared with the follow-up survey comprised significantly fewer rural male respondents and significantly more rural female respondents. Since residence is often correlated with ideational factors and related behaviors, it was necessary to adjust the samples so that the urban-rural distributions in the 2 samples would be comparable. Therefore both samples were adjusted to reflect the urban-rural distribution found in the 1996 Zambia Demographic and Health Survey (ZDHS) by creating weights. All data presented or discussed in this report are adjusted and thus are representative of youth in the 12 demonstration districts. We compared baseline and follow-up respondents on selected demographic, psychosocial, and behavioral variables using bivariate analysis. Next we conducted bivariate analysis to test differences between follow-up viewers and nonviewers. Chi-square statistics were used for statistical testing in those comparisons.

Multivariate logistical regression analysis was conducted to examine behavioral outcomes. We related the dependent variables, that is, abstinence (primary and secondary), ever use of condoms, and condom use at last sex, to campaign exposure, related knowledge, perceived efficacy, communication, and social normative variables, as well as to selected social and demographic variables. Finally, statistical tests of endogeneity were performed on the observed relationships between campaign exposure and behavioral outcomes, to determine whether unobserved influences could account for the observed relationships [23].

Results

Baseline and follow-up respondents were equivalent with respect to sex, mean age, and educational attainment (Table 1). In both surveys, more girls than boys were interviewed, owing in part to the difficulty of finding adolescent boys at home. Since all bivariate analysis was conducted separately for male and female respondents, this should not affect outcomes. About 5% in both surveys had never attended school, while approximately two fifths of the respondents had gone beyond primary school or grade 7. Because

Table 1
Percent of Survey Respondents With Selected Characteristics or Mean Value of Selected Measures, by Timing of Survey and HEART Campaign Viewership, Zambia 1999 and 2000 (Adjusted Data)

Variable	Timing*		Viewership	
	Pretest (n = 921)	Posttest (n = 1156)	Nonviewer (n = 552)	Viewer (n = 601)
Male respondent	41	43	42	44
Mean age (y)	15.8	16.0	16.0	16.1
Education (> primary)	38	42	25	59†
Currently in school	—	68	59	75†
Urban residence	45	45	28	61†
Own a television	—	31	12	55†
Watch television several times a week or more	—	39	2	71†

HEART, Helping Each other Act Responsibly Together.

* Differences between baseline and follow-up samples not significant.

† $p < .0001$.

adjustments were made on the basis of urban and rural residence, the 2 samples were equivalent in this regard.

To assess outcomes related to the HEART campaign as opposed to changes that may have happened over time even in the absence of this particular set of interventions, we examined differences between follow-up respondents who saw 1 or more of the televised health communication ads and those who saw none. We referred to these 2 groups, respectively, as viewers and nonviewers. Nonviewers included those who reported that they never watch TV as well as those who did not recall any of the ads. Male and female respondents were equally likely to recall the campaign. Nonviewers and viewers registered a mean age of approximately 16. Viewers of the campaign were better educated and more likely to be in school, and to live in urban areas, compared with nonviewers.

Campaign viewership

Television ownership clearly facilitated access to the HEART campaign. Fully 80% of respondents who reported TV ownership in their household recalled at least 1 of the televised health communication ads. About 36% of female and male respondents who lived in households without a TV set saw the campaign (data not shown).

Viewership of all health communication ads was significantly higher in urban than in rural areas, which was anticipated given the unequal distribution of TV ownership. Some 71% of urban youth and about 36% of rural respondents recalled at least 1 of the HEART TV ads. Nearly 43% of urban viewers and 14% of rural viewers recalled all 5 ads. Among all respondents, 24% of urban and about 8% of rural youth remembered all 5 TV ads. Significantly more male than female respondents remembered “Ice and “When It Matters”; young men and women were equally likely to recall the other health communication ads (data not shown). Young men and young women recalled on average just fewer than 2 messages.

For each ad recalled, viewers were asked whether they

had taken any action or actions after seeing that particular TV ad. Some 74% of male viewers and 68% of female viewers reported that they took at least 1 action as a result of having seen the campaign. This represents about 40% of all male respondents and 32% of all female respondents. The actions most commonly reported by respondents were, in order of magnitude, talking with others, such as friends, partners, spouses, or parents, about the ads; intention to abstain from sex; and intention to use condoms (Table 2). Age and educational attainment were positively associated with taking any of these actions. Male viewers were more likely than female viewers to state that they decided to use condoms as a result of the campaign. On average, young men reported 1.9 actions taken, and young women reported 1.5 actions ($p < .01$).

Only 1% of respondents to each of the 2 surveys said it is not possible to take preventive actions against HIV transmission. Follow-up male and female respondents were more likely than their baseline counterparts to list abstinence and condom use as means to avoid HIV (Table 3). Mutual faithfulness or monogamy was less likely to be cited as a way to avoid HIV by follow-up respondents compared with baseline respondents.

Young people’s level of general HIV-related knowledge remained low after the campaign; fewer than 50% of respondents answered any given question correctly. Correct knowledge was significantly higher among viewers for only 1 of 3 questions: whether risk for HIV decreases after you have known your partner for a few months. Even then, only about a third answered correctly. Further analysis did show, however, that those who recalled the ad “Mutale and Ing’utu,” which carried the explicit message that “You can’t tell by looking,” were significantly more likely to respond no to the question, “Can you tell if someone is HIV+ by their appearance?” than were those who did not remember that particular TV ad (61% and 50%, respectively; $p < .01$).

Young people who reported that they had never had sex were asked questions regarding their attitudes about absti-

Table 2
Percent Who Reported Taking Specific Actions* and Mean Number of Actions Taken as a Result of Viewing the HEART Campaign, by Selected Demographic Characteristics, Zambia 2001 (N = 601)

	Talked With Others About Ads	Decided to Abstain	Decided to Use Condoms	Mean No. of Actions Taken (Range, 0–6)†
Age (y)				
13–14	29.1‡	18.7§	6.8§	1.1§
15–16	34.8	26.4	12.3	1.6
17–19	40.6	36.0	20.5	1.9
Gender				
Male	36.8	31.8	22.3§	1.9§
Female	35.2	26.2	8.6	1.5
Education				
None	—	—	—	—
Primary (1–7)	26.6§	15.5§	8.2§	1.0§
Secondary +	42.4	38.0	19.2	2.1
Residence				
Urban	39.2‡	32.2‡	16.6	1.9§
Rural	30.6	22.8	11.4	1.2
Total	35.9	28.6	14.6	1.6

HEART, Helping Each other Act Responsibly Together.

* Self-reported.

† Respondents were given 1 point for each of the following positive responses: talked with friends about ad, talked with spouse about ad, talked with parents about ad, talked about safer sex.

‡ Differences within cell significant ($p < .05$).

§ Differences within cell significant ($p < .01$).

|| Too few cases to report results.

nence. In light of recent findings from Namibia that most adolescents are unable to define the term “abstinence” correctly [24], it is important to note that the term was used in conjunction with several references to “not being sexually active.” Data analysis found that about 70% of abstinent respondents feel comfortable discussing their abstinence with their friends (data not shown). Differences between the baseline and follow-up respondents were not significant, nor did demographic characteristics affect responses. Follow-up respondents of both sexes were significantly more likely than were baseline respondents to state that fear of HIV was a major reason that they were not sexually active. Female respondents in the follow-up also expressed a heightened concern about pregnancy as a reason why they were delaying their sexual debut.

High levels of self-efficacy with respect to the ability to refuse unwanted sexual relations did not differ between baseline and follow-up respondents among either sexually inexperienced or sexually experienced female respondents. Viewers compared with nonviewers registered significantly higher levels of self-efficacy to refuse uninvited sexual advances, whether sexually experienced or sexually inexperienced.

Efficacy to use condoms was assessed only for sexually experienced youth. Follow-up male and female respondents registered significantly higher levels of efficacy to use condoms when compared with baseline respondents, and viewers scored significantly higher than did nonviewers. This

difference also held between viewers and nonviewers when controlling for education and socioeconomic status.

Bivariate analysis showed a positive correlation between viewership and willingness to discuss issues raised by the campaign. Viewers reported talking about abstinence as well as about safer sex with a significantly larger number of people than did nonviewers, and adolescents girls spoke with more people, on average, about these topics than did boys (data not shown).

Young men in the follow-up were significantly more likely than were their baseline counterparts to report that they were sexually experienced. For purposes of comparison with other surveys of Zambian adolescents, sexual behavior status was calculated for male respondents who were 15 to 19 years of age. About 33% of baseline male respondents in this age range reported that they had been sexually active in the year prior to the survey, which suggests underreporting given that the 1998 and 2000 sexual behavior surveys [4,25], the 2001–2002 ZDHS [1], and the follow-up survey all found that about 44% of male respondents aged 15 to 19 years reported that they had been sexually active in the past 12 months.

Bivariate analysis revealed a significant and positive relationship between viewership and abstinence; viewers were more likely to report that they were practicing primary or secondary abstinence. This was true among both young men and young women. Condom use at last sex is significantly higher in the follow-up study compared with the

Table 3
 Percent Distribution of Respondents, or Mean Value, by Knowledge, Psychosocial Factors, and Behavior Measures, by Timing of Survey, or HEART Campaign Viewership, Zambia, 1999 and 2000 (Adjusted Data)

Variable	Timing		Viewership	
	Pretest (n = 921)	Posttest (n = 1156)	Nonviewer (n = 552)	Viewer (n = 601)
Mention the following ways to avoid HIV				
Abstain from sex	50	60*	54	65†
Use condoms	36	54*	51	56
Not have multiple partners	30	22*	20	24
Correctly answer				
You can tell if someone has HIV or AIDS by the way they look.	45	43	43	42
You can tell if someone has HIV or AIDS by their reputation.	53	49	51	48
Your risk for HIV will become less after you have known your partner for a few months.	30	34‡	31	37‡
Reasons waiting to become sexually active (%)§				
Fear of pregnancy	12	26*	26	26
Fear of HIV or AIDS	24	37‡	36	38
Inconsistent with beliefs or life goals	24	28	25	30
Comfortable talking about delaying sex (% yes)§	72	70	65	73‡
High self-efficacy among female respondents to refuse unwanted sex				
No sexual experience§	75	73	64	79†
Sexually experienced	67	72	63	80†
Mean self-efficacy to use condoms (scale, 0–5)	2.9	3.4¶	3.1	3.8*
Perceives moderate to high risk for contracting HIV	11	16‡	17	16
Actions/behavior				
Mean number of people talked with about abstinence			2.2	3.4*
Mean number of people talked with about safer sex	—	—	1.5	2.0*
Sexual experience among male respondents				
Primary abstinence (no sexual experience)	58	40*	36	43
Secondary abstinence (no sex over past 12 months)	14	22¶	20	25
Currently sexually active	28	38¶	44	32¶
Sexual experience of female respondents				
Primary abstinence (no sexual experience)	57	60	58	63
Secondary abstinence (no sex over past 12 months)	10	10	8	12
Currently sexually active	32	29	34	25*
	(n = 389)	(n = 549)	(n = 254)	(n = 295)
Ever use of condoms	29	33	24	43*
Condom use last sex	13	23†	16	31†

HEART, Helping Each other Act Responsibly Together; HIV, Human immunodeficiency virus; AIDS, acquired immune deficiency syndrome.

* Differences within cell significant ($p < .0001$).

† Differences within cell significant ($p < .001$).

‡ Differences within cell significant ($p < .05$).

§ Asked only of those who had never had sex (Baseline: N=532; Follow-up: N=607; Nonviewers: N=246; Viewers: N=361).

|| Asked only of sexually experienced respondents.

¶ Differences within cell significant ($p < .01$).

baseline study. Viewers contrasted with nonviewers were significantly more likely to report ever use of condoms as well as condom use at last sex.

Multivariate analyses

Bivariate analysis of the key independent variable, that is, recall of the HEART campaign, and dependent variables yielded many significant associations, as shown above. Those variables that showed significant bivariate associations were entered into regression equations.

First we examined the relationship between campaign viewership and abstinence, whether primary or secondary. As reported above, bivariate analysis revealed a positive

relationship between primary or secondary abstinence and viewership; in short, nonviewers were significantly more likely to report that they had had sex within the past 12 months than were viewers. Since age, sex of respondent, education, and urban versus rural residence are often correlated with sexual choices and could account for this relationship, we included those variables in the multiple logistic regression. Other variables entered into the equation included perceptions regarding normative sexual behavior, communication about abstinence, and spontaneous mention of abstinence as a way to avoid HIV.

The odds that viewers reported that they were currently abstinent were 1.6 times as great as the odds that nonview-

Table 4
Odds Ratios of Abstinence, Ever Use of Condoms, and Condom Use During Last Sex (2000 Survey Respondents)

	All respondents (N = 1156)		Respondents Who Have Had Sex in past 12 Months (N = 353)			
	Currently Abstinent (OR)		Ever Use of Condoms (OR)		Used Condom Last Sex (OR)	
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Background						
Gender (male vs female)	1.82*	1.74	1.87†	1.79	1.08	.88
Age (13–15 vs 16–19 years)	.33*	.32*	2.0	2.11	1.76	1.5
Education (primary or less vs beyond primary)	.92	.92	2.1†	2.08†	2.9‡	4.2‡
Currently in school (no vs yes)	2.51*	2.70*	.94	.83	.91	.80
Urban residence (urban vs rural)	.80	.78	1.02	1.06	.93	.67
Campaign viewer						
Saw at least 1 TV spot (0 vs 1+)	1.71‡	1.70‡	2.28‡	2.29‡	NS	
Saw at least 3 TV spots (no vs yes)					2.23†	2.34†
Estimated error from campaign exposure	NA	0.96	NA	.93	NA	0.39
Mentioned abstinence as a way to avoid HIV (no vs yes)	1.63‡	1.60‡				
Talked about abstinence (talked with 0–2 people vs >3 people)	.78	.73†				
Believes most or all friends of same sex are abstinent (no vs yes)	2.90*	3.0*				
Mentioned condom use as a way to avoid HIV (no vs yes)			1.52	1.48	1.4	1.35
Believes condoms protect from HIV (no vs yes)			1.13	1.16	1.08	1.06
Talked with at least 2 people about safer sex (no vs yes)			2.14‡	2.07†	1.88	1.90
Perceived risk for HIV (none or low vs moderate to high)			1.8†	1.84†	1.45	1.33
Self-efficacy to use condoms (\leq mean vs $>$ mean)			4.49*	4.27*	3.44§	3.14
Pseudo r^2	.17	.18	.21	.20	.18	.19

OR, Odds ratio; HIV, human immunodeficiency virus; NS, not significant; NA, data not available.

* Differences within cell significant ($p < .0001$).

† Differences within cell significant ($p < .05$).

‡ Differences within cell significant ($p < .01$).

§ Differences within cell significant ($p < .001$).

ers said they were abstinent (Table 4, Model 1). Being in school, female, and of younger age were all associated with abstinence. Talking with a wider range of individuals was negatively, although not significantly, associated with abstinence. The perception that most friends were abstinent was highly significant as a predictor of abstinence, as was spontaneous mention of abstinence as a way to protect oneself from HIV.

Campaign exposure can also be measured in terms of level of exposure, given that there were 5 ads and respondents were asked about each. Communication research often finds a “dose effect”; that is, the more messages to which a viewer is exposed, the greater the effect. Therefore we regressed the independent variables of age, educational attainment, urban or rural residence, gender, and campaign exposure, using the scaled exposure variable, which ranged from 0 to 5, on the dependent variable abstinence. According to the multiple regression analysis, the more HEART ads recalled, the greater the likelihood that the respondent reported abstinence. In this equation, adjusted r^2 increases to .20 (data not shown). One might argue that a selectivity bias, one of the most serious threats to the internal validity of 1-group research designs, accounts for the relationship.

That is, abstinent youth may “self-select” themselves to remember the abstinence ads, indicating that they differ from those who did not recall the messages in ways that predispose them to abstinence. In short, recall of the abstinence messages was endogenous to abstinence. Student t tests for equal means found that abstinent youth were no more likely to recall messages that promoted abstinence than they were to remember messages about HIV prevention. Moreover, abstinent youth were equally or more likely than sexually active youth to recall the ads that promoted the use of condoms to protect oneself from HIV and STIs.

Nonetheless, given the serious threat that the selectivity bias poses to the validity of the findings, we tested for potential endogeneity. Campaign exposure was regressed on household ownership of TV, urban or rural residence, educational attainment, age, and whether the respondent was in school. For the abstinence equation, sex, urban or rural residence, educational attainment, age, whether the respondent was currently in school, whether the respondent believed most of his or her friends were abstinent, and the number of people with whom the respondent had discussed abstinence over the past 12 months were included. In short, TV ownership was excluded from the abstinence equation,

and sex was excluded from the viewership equation, for identification purposes. The error term from the first equation was not significant when included in the abstinence equation (Table 4, Model 2). That is, the endogeneity test found no statistical evidence to reject the null hypothesis that campaign exposure is an exogenous variable [23,26]. The disturbance (error) terms from the equations for the 2 endogenous variables, viewership and abstinence, were statistically uncorrelated.

Next we turn to the question of whether viewership is positively correlated with condom use, while holding age, gender, residence, and educational attainment constant. While the analysis regarding current sexual status, that is, abstinent or sexually active in the 12 months prior to the interview, included all respondents, analysis related to condom use was restricted to those who reported that they had had sex within the past 12 months. Given that the campaign had been on the air only over that period, viewership could not have influenced condom use among those who reported secondary abstinence, even though it could have influenced their decision to return to abstinence (as discussed above).

Logistic regression analysis demonstrated that viewers were 2.3 times more likely to report ever use of a condom when contrasted with nonviewers, controlling for background variables (Table 4, Model 3). Older, better educated, and female respondents were more likely to report ever use of condoms than were others. Condom use is positively associated with communication about safer sex and self-efficacy to use condoms. The perception of moderate to high risk for contracting HIV was marginally ($p = .055$) associated with condom use. The literature has found inconsistent associations between perceived risk and condom use, primarily because the context for responses is rarely specified [27]. In this study respondents were asked why they responded as they did to the question about risk. Those who expressed relatively high levels of perceived risk were more likely to say that they were sexually active, do not always use a condom, and do not practice safe sex. This finding suggests that inconsistent condom users recognize their vulnerability but do not always seek to protect themselves. We can assume that campaign exposure is exogenous, given that the error term was not significant (Table 4, Model 4); in short, the Bollen test did not provide any statistical evidence of endogeneity.

Finally, logistic regression did not show a significant relationship between campaign exposure, defined as recall of at least 1 message, and condom use at last sex. However, there was a clear dose effect (Table 4, Model 5). When 3 or more messages were regressed on condom use at last sex, high-recall viewers were 2.1 times as likely as were low-recall viewers and nonviewers to report condom use during last sex. Risk perception was not associated with condom use at last sex. Respondents who were older, better educated, had communicated with at least 2 people about safer

sex, and who expressed a high level of self-efficacy were significantly more likely to report condom use at last sex.

The results of the endogeneity test for the equation that estimates condom use during last sex are shown in Table 4, Model 6. Again, the estimated error term from viewership is not significant, and thus does not provide statistical support for the argument that viewership is endogenous.

Discussion

The televised messages of the HEART campaign reached just over half of adolescents between the ages of 13 and 19 years and nearly three fourths of urban youth, the primary intended audience for the TV campaign. Given that 40% of respondents said they had not watched any TV over the past year, the reach of the campaign was comprehensive among those who ever watch TV. Young women were as likely as were young men to have seen the TV ads. This finding is important for program planners because it indicates that, unlike their older counterparts, young women have overcome the gender barrier in this respect. Urban youth were almost twice as likely as were rural youth to have seen the televised messages. Given the central role of Zambian languages in oral communication, a more precise picture of reach and effect would have been drawn had other components of the HEART campaign been assessed. The campaign comprised a range of activities, including radio messages, which were more accessible to rural audiences than were televised programs, and community outreach programs, which were conducted primarily in rural areas. Radio broadcasts were in the 7 official Zambian languages as well as in English. The study would have been stronger had it included questions about the entire range of HIV and STI risk reduction activities for youth rather than focusing solely on the health communication TV ads. The outcomes may well have been more robust had other communication activities been included in the survey instrument, as found in studies of several multimedia campaigns that promoted risk-reduction practices among adolescents and reached 90% of their intended audiences [19,28].

While the survey format does not easily lend itself to the venerable Weberian tradition [29], which challenges the social thinker to understand action from the perspective of the actor, respondents were given the opportunity to describe what actions, if any, they had taken as a result of viewing the public service announcements. All analyses related to campaign exposure were necessarily restricted to respondents in the 2000 survey, because the campaign was aired after the 1999 survey. More than two thirds of youth noted that the campaign prompted them to talk with others about the ad, decide to abstain from sex until they were more mature, or to use a condom. Respondents were significantly more likely to report that the campaign had prompted them to abstain from sex than to use condoms. This finding is important, given the controversy that erupted

in January 2001 in Zambia when a group of influential adults claimed that the campaign promoted condom use at the expense of a clear abstinence message. At that time the HEART ads were pulled off the air, but were reintroduced 2 months later following a spontaneous and unified response on the part of young people that enabled the HEART design team to effectively negotiate the reintroduction of the campaign.

There was a significant increase between the baseline and follow-up surveys in the percentage of respondents who mentioned abstinence or condom use or both as means to prevent HIV transmission. Viewership (2000 survey respondents) was also positively correlated with mention of abstinence in this regard. At the same time, there was a secular decline in the percentage of young people who listed mutual faithfulness or monogamy as a way to avoid HIV. The design team purposely avoided the “be faithful” message, because they were concerned that it would be interpreted as “serial monogamy” and give young people an excuse to have unprotected sex, thus providing little protection. This issue has not been well researched; we simply do not know how young people would interpret and act on a “be faithful” message. This finding suggests, minimally, that program planners who work with youth to enhance their repertoire of risk-reduction practices should explore this option further. Furthermore, recent data demonstrate that the greatest risk for HIV transmission is among those who have multiple, concurrent partners [30].

Misleading beliefs about the way in which a person’s HIV status can be ascertained remain widespread despite phase I campaign messages designed to correct them. Subsequent phases have addressed these beliefs, but have not yet been evaluated. The campaign was more successful in generating communication about risk-reduction options; viewers were motivated to discuss a range of HIV-related issues with family and friends. Similar findings were reported in a study of the effects of a multimedia campaign to enhance sexual responsibility among youth in Zimbabwe [19].

One of the most important predictors of current abstinence was a respondent’s belief that most of his or her friends were not engaged in sexual relationships. Yet abstinence was no more likely to be perceived as a social norm by viewers than by nonviewers. Inasmuch as there are many countervailing messages in the media as well as in society at large, it would be useful in future studies to include questions about factors that might muffle the effects of youth-oriented interventions.

Campaign exposure enhanced self-efficacy, thus adding to the evidence that media programs can positively influence the belief that one can take protective action against HIV, as found in a study of an entertainment-education radio program in Tanzania [31]. Women who saw the campaign were more likely than were nonviewers to express a high degree of confidence that they could refuse uninvited sexual overtures. This was particularly evident among

young women who were sexually experienced. Viewers were also significantly more likely to practice abstinence, holding background variables constant, than were nonviewers. Enhancing self-efficacy to refuse sex in tandem with the abstinence message is an especially important message in Zambia today, given the higher levels of HIV infection among young women compared with young men and the not unrelated practice of older men paying for the sexual services of young women.

Viewership was positively and significantly associated with high levels of efficacy to use condoms as well as with ever use of condoms, holding background variables constant. This relationship also stood with respect to condom use at last sex, although it took a larger campaign “dose” to reveal a statistically significant correlation.

This study found highly significant correlations between campaign recall and positive outcomes related to HIV risk reduction, thereby contributing to the literature on this important topic. In some respects the results are less equivocal than those found in other studies on media programs and HIV risk-reduction outcomes. Middlestat et al. [14] found that exposure to a mass media campaign to reduce HIV transmission in St. Vincent and the Grenadines was positively and significantly correlated with some targeted beliefs and social norms, but was only marginally related to condom use. While Kim et al. [19] found similarly strong correlations between a multimedia campaign in Zimbabwe and abstinence, it was the confluence of activities that brought about the positive outcomes, not the radio program alone. Vaughan et al. [31] also found positive correlations between recall of a radio drama and positive outcomes in Tanzania, including self-efficacy with respect to preventing HIV and AIDS, communication about HIV and AIDS, a reduction in the number of partners, and condom use.

Study limitations

Studies of this nature are often faulted for relying on self-reporting; one would be hard pressed, however, to think of an acceptable alternative method to gather information about sexual practices. Because all similar studies use the same approach, comparative studies across time and space can be made. Still, the research team recognized this as a source of potential bias and, to that end, recommended the use of young interviewers to mitigate the extent of intentional or unintentional misrepresentation.

This study relies on 2 cross-sectional studies with separate samples; therefore previous knowledge, perceived social norms, experiences, and behaviors could not be controlled for in the analysis. In addition, because the baseline respondents were not asked questions about their media access, we do not know whether the 2 samples were equivalent in this respect. We presume that media access would influence respondents’ perceptions and actions related to HIV risk reduction.

The HEART campaign was not the only reproductive health program for youth in Zambia during the period of this study. It is likely that young people who saw the HEART campaign were also exposed to other programs. Although we were able to measure recall of specific campaign ads, the effects of the campaign cannot be attributed solely to that single intervention. Future studies should include questions about other media programs that carry complementary messages as well as about those that promote contradictory messages.

Finally, the positive correlations between the HEART campaign and positive outcomes point to limitations in the research design. While we know that HEART viewership was correlated with positive outcomes, we do not know how that occurred. Other research shows that young people need examples, such as the young protagonists featured in the HEART campaign ads, after which to model their words and actions, and also need the opportunity to practice those skills [32]. While we cannot conclude on the basis of our study how campaign exposure is related to the outcomes discussed above, the memorable characters in the HEART ads may well have given adolescents the opportunity to model their actions and rehearse skills, either in conversations with friends and family or through parasocial interaction with the HEART personalities. Clearly, to understand more fully how adolescents process these messages, qualitative research is needed.

Conclusions

Research of this nature is particularly daunting, owing not only to problems of attribution in a media-intensive environment but also to the inappropriateness of randomized trials in evaluating communication programs that cannot be delimited to a predetermined audience. Certain potentially difficult methodologic issues, such as endogeneity, can be statistically tested, as discussed above [23], to provide further statistical evidence that the findings are sound. Nevertheless, longitudinal studies are recommended and preferable to separate-sample designs, but are not always feasible owing to costs and attrition, to address difficult methodologic issues, such as reverse causality or selectivity bias. We should not allow these issues to discourage us from trying to build the body of evidence and advance the field of health communication.

As the number of countries with national communication programs on HIV and AIDS expands, it is essential to build a body of literature demonstrating the effects of HIV and AIDS campaigns on sexual behavior. We hope that this study will contribute to this growing literature. The findings presented here point to areas of progress as well as areas of concern in the ongoing effort to enable young people in Zambia to take critical, protective actions to safeguard their reproductive health, which will have great consequences for the future of the nation.

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