Audience Segmentation as a Social-Marketing Tool in Health Promotion: Use of the Risk Perception Attitude Framework in HIV Prevention in Malawi

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Objectives. We sought to determine whether individuals' risk perceptions and efficacy beliefs could be used to meaningfully segment audiences to assist interventions that seek to change HIV-related behaviors.

Methods. A household-level survey of individuals (N=968) was conducted in 4 districts in Malawi. On the basis of responses about perceptions of risk and beliefs about personal efficacy, we used cluster analysis to create 4 groups within the risk perception attitude framework: responsive (high risk, strong efficacy), avoidance (high risk, weak efficacy), proactive (low risk, strong efficacy), and indifference (low risk, weak efficacy). We ran analysis of covariance models (controlling for known predictors) to determine how membership in the risk perception attitude framework groups would affect knowledge about HIV, HIV-testing uptake, and condom use.

Results. A significant association was found between membership in 1 or more of the 4 risk perception attitude framework groups and the 3 study variables of interest: knowledge about HIV ($F_{8,\ 956}=20.77$; $P<.001$), HIV testing uptake ($F_{8,\ 952}=10.91$; $P<.001$), and condom use ($F_{8,\ 885}=29.59$; $P<.001$).

Conclusions. The risk perception attitude framework can serve as a theoretically sound audience segmentation technique that can be used to determine whether messages should augment perceptions of risk, beliefs about personal efficacy, or both. (*Am J Public Health.* 2009;99:2224–2229. doi:10.2105/AJPH.2008.155234)

Malawi has been greatly affected by AIDS. In 2007, approximately 68 000 deaths in Malawi were attributable to this pandemic,[1] and AIDS prevalence is currently estimated at 11.9% among Malawian adults, a figure that has changed little since 2004.[2] Prevalence of HIV infection in the southern region of the country is 17.6%. As of 2005, life expectancy for women in Malawi was 42 years, and life expectancy for men was 41 years.[3] The number of orphans in the country who have lost either parent to AIDS almost tripled in 6 years, from 201 000 in 2001 to 560 000 in 2007.[1] Approximately 840 000 adults in Malawi are currently living with HIV.

There is an urgent need for long-term strategies to promote behaviors that protect Malawians from HIV infection. A number of efforts to address the growing problem are currently under way, including provision of antiretroviral treatments and promotion of HIV testing and counseling. It is only recently that comprehensive programs to prevent AIDS transmission have been undertaken, one of which is the Malawi BRIDGE project, described here.

THEORETICAL BACKGROUND

Interventions that promote the rejection of risky behaviors and the adoption of protective behaviors are likely to be more effective if they are informed by sound behavior theory.[4] In this paper, we turn to the social-marketing literature to determine the role that audience segmentation techniques can play in promoting behaviors that reduce HIV transmission in Malawi.

Audience segmentation is a key principle in both commercial and social marketing.[5,6] It is based on the idea that audience members can be grouped into clusters on the basis of a theoretically meaningful underlying characteristic that renders clusters internally homogenous in their response to a campaign or intervention.[7,8] These clusters, or audience segments, are often formed on the basis of broad demographic characteristics, including age, gender, social class, and neighborhood of residence. This approach is effective to the extent that consumption of the item being sold or promoted also varies according to the demographic profile of the market segment. Using the target audience's income as a market segmentation tool, for example, works well when the distinguishing feature of the item being sold is its cost. Segmenting audiences solely on the basis of their demographic profile, however, may be a less effective strategy if the item being sold or promoted has a broad, universal appeal, such as health promotion.[5,9]

Recently, attention has been focused on developing audience segmentation criteria on the basis of a combination of audiences' psychological and demographic profiles.[10] Derived from marketing techniques, this "psychographic" approach selects variables on the basis of their ability to predict health behaviors. Audience members are then segmented according to how they fare on these variables, and communication materials are disseminated to maximize the resonance between the tastes and predilections of the audience segment and the nature of the appeal.[11,12] In Tanzania, for example, Schellenberg et al.[13] showed that social-marketing techniques significantly improved the uptake of insecticide-treated nets for malaria prevention. Health communication scholars[14] point out that the 3 primary considerations in this effort are communication channel properties, message features, and audience characteristics, i.e., targeting, tailoring, and audience segmentation, respectively. We focused on the last of these constructs, audience segmentation, to elucidate how audiences reacted to a communication campaign to promote HIV prevention in Malawi. The underlying idea is similar to the audience

segmentation approach adopted by Yun et al.,[15] who found that communication patterns and important psychosocial outcomes differed significantly according to the audience demographic profile in South Africa.

THE RISK PERCEPTION ATTITUDE FRAMEWORK

The risk perception attitude framework[16,17] is a theoretical perspective that can be used to segment audiences on the basis of their perceptions of risk and their beliefs about personal efficacy. On the basis of the role of personal efficacy in social cognitive theory[18] and the role of threat perceptions in the extended parallel process model,[19] the risk perception attitude framework posits that efficacy beliefs moderate the effect of risk perceptions on self-protective behavior. According to the risk perception attitude framework, perceptions about the risk of a disease are usually not sufficient to motivate people to act, but when high risk perceptions are coupled with strong efficacy beliefs, people are motivated and able to engage in self-protective behaviors.

The risk perception attitude framework classifies people into 1 of 4 groups. When risk perceptions and efficacy beliefs are both weak, people are described as holding "indifference" attitudes. They are not motivated to act because of their low risk perception; nor do they perceive that taking action is within their control. Hence, people holding indifference attitudes tend not to engage in protective behaviors. At the other extreme, those with high risk perceptions and strong efficacy beliefs are described as holding "responsive" attitudes. Because of their high risk perceptions, they are motivated to act, and this motivation is facilitated by strong efficacy beliefs. These individuals engage extensively in self-protective behaviors. Those with low risk perception but strong efficacy beliefs are described as holding a "proactive" attitude. They are driven by their strong beliefs about personal abilities, but they tend not to engage in self-protective behaviors because their risk perceptions are not sufficient to motivate them to change. Finally, those with high risk perceptions and weak efficacy beliefs are described as holding "avoidance" attitudes. For these individuals, high risk perceptions act as motivators for action, but their weak efficacy beliefs tend to prevent them from engaging in the recommended behaviors.

Applying social-marketing techniques, we tested the central propositions of the risk perception attitude framework in the context of the Malawi BRIDGE project. The central research question we pursued was: Can risk perceptions and efficacy beliefs be used to segment audience members to enable us to understand their knowledge about HIV and their enactment of 2 self-protective behaviors (testing for HIV and use of condoms)? The focus on these outcomes was dictated by a number of considerations. First, we were concerned about the role of myths (e.g., the role of mosquitoes in HIV transmission) and traditional beliefs in Malawi (e.g., that having sex with a virgin can cure AIDS), which the intervention sought to change. Second, testing for HIV is a critical first step in providing treatment and care, and it is being actively promoted for preventing HIV infection in Malawi.[20] Finally, promotion of condom use was one of the central objectives of the Malawi BRIDGE project.

METHODS

Data for this study come from the Malawi BRIDGE project,[21,22] a mass-media and community-based behavior-change program initiated in 2003. The project's objective was to promote AIDS prevention behaviors. Primary intervention messages were disseminated through community mobilization efforts undertaken with local partners, nongovernmental organizations, the National AIDS Commission of Malawi, and mass media, including radio, posters, and booklets. (A more complete description of the project is available online at http://www.jhuccp.org/africa/malawi.)

A household survey (N=968) was conducted in 2007 in 4 Malawi districts (Kasungu, Mulanje, Mzimba, and Salima). A random sampling procedure that was stratified by presence or absence of intervention was adopted in each of the 4 districts. In the first phase of the sampling, areas under the purview of the BRIDGE program were identified within each district, and households were selected within these areas through proportional (to size) random sampling procedures. In the second phase, we identified nonintervention areas within the same district that represented equivalent population density and were geographically distal from intervention areas (to minimize contamination and maximize contrasts between intervention and nonintervention areas). All individuals aged 15 years and older were eligible to participate, but only 1 individual per household (selected at random) was eligible to participate. While conducting surveys, each interviewer chose the gender of the first participant of the day at random and then alternated between males and females.

Because of low literacy rates among the surveyed population, data were collected through oral interviews conducted by interviewers who were hired by a Malawian research firm contracted for data collection. This can, of course, introduce social desirability biases: people may be more reluctant to divulge stigmatized beliefs and behaviors to an in-person interviewer. To reduce some of these biases, interviewers first participated in a week-long training workshop in Lilongwe on human-participants issues and interview methods. After the training workshop, the questionnaire used in the study was pretested with residents in Lilongwe, after which adjustments were made to improve clarity and flow. The questionnaire itself was translated from English into 2 languages, Chichewa and Tumbuka. These 2 versions were then back-translated into English to establish semantic equivalence.

Measurement

Perceived risk. Three questions gauged participants' perceptions regarding their risk of HIV infection; they were asked how likely they thought it was that they would get infected with HIV in the next 6 months, the next year, and in their lifetime. Responses were coded on 3-point scales and were averaged into an index (α=0.92; mean [SD]=1.74 [0.74]).

Efficacy beliefs. In accordance with social cognitive theory,[16] we conceptualized efficacy beliefs as individuals' confidence to enact specific behaviors. Participants were asked questions about their perceived ability to engage in 4

behaviors pertaining to condom use: (1) initiate discussion about condom use with sexual partner, (2) talk about condom use with sexual partner, (3) use a condom during every sexual act, and (4) negotiate condom use with sexual partner. Responses were coded on a 5-point scale and were averaged into an index (α=0.92; mean [SD]=4.24 [1.34]).

Formulation of the 4 risk perception attitude framework groups. Respondents' scores for perceived risk and efficacy beliefs were used to categorize them into the 4 risk perception attitude framework groups: responsive (high risk, strong efficacy), avoidance (high risk, weak efficacy), proactive (low risk, strong efficacy), and indifference (low risk; weak efficacy). A 4-group cluster analysis was conducted with perceived risk and efficacy beliefs as the clustering variables. The 4-group solution converged in 4 iterations, yielding 4 clusters corresponding to the 4 risk perception attitude framework groups. Both perceived risk ($F_{3,\ 962}$=1195; P<.001) and efficacy beliefs ($F_{3,\ 962}$=2202; P<.001) were associated with the cluster classifications.

Knowledge about HIV. Knowledge about HIV was measured by asking participants 13 true-or-false questions pertaining to the transmission of HIV/AIDS, use of condoms as a means of protection, and whether reducing number of sexual partners reduces chances of an HIV infection, among other topics. Each correct response was worth 1 point, and the sum of points awarded for all correct responses was converted to a percentage score (α=0.52; mean [SD]=77.0% [15.0]). The low reliability, which reflects the fact that all the constituent variables were dichotomous (i.e., all responses were either correct or incorrect), increases random variation in the index, thus increasing the likelihood of not detecting meaningful results.

HIV testing. Participants were asked whether they had ever been tested for HIV and, if not, whether they desired to be tested. Respondents were categorized into 1 of 3 groups: those who had already been tested (n=360; 37.4%), those who had not been tested but desired to get tested (n=466; 48.4%), and those who had not been tested and did not desire to get tested (n=136; 14.2%). The 3 groups were assigned scores of 3, 2, and 1, respectively.

Condom use. Respondents were asked whether they had used a condom the last time they had sex; 18.5% responded affirmatively. They also were asked how often they used a condom when they had sex. Answers to this question were coded on a 5-point scale ranging from 1=never to 5=every time (mean [SD]=1.91 [1.24]). Responses to the 2 questions were standardized (mean [SD]=0 [1]) and averaged into an index of condom use.

Program exposure. Respondents' exposure to the BRIDGE program was measured through 10 questions, each of which pertained to 1 of the 10 intervention channels (e.g., posters, pamphlets, and radio programs). Questions asked whether respondents recalled seeing or hearing the message on each channel, and if so, to what extent. Responses were standardized and averaged into a single index of program exposure (α=0.75; across 10 items, unstandardized mean [SD]=3.33 [2.35]).

Control variables. Control variables included gender, age, years of formal education, and marital status (married or living with a partner versus all other statuses).

Statistical Analysis

The 4 risk perception attitude framework groups were compared with each other through analysis of covariance (ANCOVA) models for each of the 3 dependent variables investigated in this paper—knowledge about HIV, HIV testing, and condom use. Covariates included gender, age, education, and marital status.

RESULTS

Characteristics of the 4 groups are shown in Table 1. Among female participants, the avoidance group was largest (60.8%); among male participants, the proactive group was largest (55.4%). The responsive groups were approximately the same proportion for both genders (53.5% of females versus 46.5% of males). The average age of members of the indifference group (the oldest group) was 42 years; the average age of the proactive group (the youngest group) was 30.6 years. The highest levels of education were found among the proactive group (6.8 years) and the responsive group (6.2 years). The proactive group had the largest proportion of people living alone (34.1%). Exposure to the BRIDGE project was highest in the responsive group and lowest in the avoidance group.

Exposure was further explored through analysis of variance models, using the risk perception attitude framework groups as the independent variable. The 4 groups differed in their exposure to the BRIDGE project ($F_{3,\ 962}$=3.03; P<.05). Post hoc analyses revealed that the avoidance group, which had the lowest level of exposure, was significantly different from the other 3 groups (P<.05). The other 3 groups, however, did not differ from each other in their level of exposure.

TABLE 1—Characteristics of the Risk Perception Attitude (RPA) Framework Groups: Malawi BRIDGE Project, 2007

	Responsive (n = 340)	Avoidance (n = 74)	Proactive (n = 453)	Indifference (n = 99)
Female, %	53.5	60.8	44.6	57.6
Age, y, mean ±SD	31.6 ± 11.9	37.1 ± 17.2	30.6 ± 13.4	42.0 ± 17.7
Years of education, mean ±SD	6.2 ± 4.0	3.7 ± 3.4	6.8 ± 3.8	4.3 ± 3.6
Live alone, %	24.4	20.3	34.1	25.3
Program exposure,[a] mean ±SD	0.22 ± 5.61	- 1.84 ± 4.62	0.16 ± 5.52	-0.01 ± 5.85

Note. The 4 groups were formed from cluster analysis results: responsive = high risk, strong efficacy; avoidance = high risk, weak efficacy; proactive = low risk, strong efficacy; indifference = low risk, weak efficacy. On all 5 variables, the difference across the 4 RPA framework groups was significant at P<.05.
[a]Exposure is the sum of 10 standardized scores; higher scores represent greater exposure to the BRIDGE program through its 10 intervention channels.

Knowledge About HIV

We ran an ANCOVA model with knowledge about HIV as the dependent variable. Covariates were gender, age, education, marital status, and program exposure; membership in 1 of the 4 risk perception attitude framework groups was the independent variable. The overall model was significant ($F_{8,\ 956}=20.77$; $P<.001$). With the exceptions of exposure to the BRIDGE project and marital status, each of the covariates was significantly associated with knowledge about HIV. Males were more knowledgeable than females ($t=2.95$; $P<.01$), education was positively correlated with knowledge ($r=0.32$; $P<.001$), and age was negatively correlated with knowledge ($r=-0.23$; $P<.01$). Membership in a risk perception attitude framework group was associated with knowledge about HIV ($F_{3,\ 956}=6.45$; $P<.001$). Post hoc analyses showed that the indifference group had lower knowledge than the proactive and responsive groups; means and standard errors are shown in Table 2. The responsive, avoidance, and proactive groups did not differ from each other with respect to knowledge about HIV.

HIV Testing

We ran an ANCOVA model with HIV testing as the dependent variable and with the same covariates as those used to test HIV knowledge. The overall model was significant ($F_{8,\ 952}=10.91$; $P<.001$). With the exceptions of exposure and age, each of the covariates was significantly associated with testing. In a univariate model, gender was not associated with testing ($t=1.49$; $P>.05$). Those who lived alone were less likely to get tested (mean [SD]=2.15 [0.69]) than those who lived with a spouse or partner (mean [SD]=2.26 [0.67]; $t=2.28$; $P<.05$). Education was positively correlated with testing ($r=0.19$; $P<.001$), and age was negatively correlated with testing ($r=-0.10$; $P<.01$). Risk perception attitude framework membership was associated with testing ($F_{3,\ 952}=9.91$; $P<.001$). Post hoc analyses revealed that the responsive and proactive groups had higher rates of testing than the avoidance and indifference groups.

Condom Use

An ANCOVA model with condom use as the dependent variable was significant ($F_{8,\ 885}=29.59$; $P<.001$). Except for exposure, each of the covariates was associated with condom use. Males were more likely to report condom use (mean [SD]=0.06 [0.97]) than females (mean [SD]=−0.07 [0.81]; $t=2.09$; $P<.05$). Those who lived alone were more likely to report condom use (mean [SD]=0.50 [1.22]) than those who lived with a spouse or partner (mean [SD]=−0.16 [0.70]; $t=9.89$; $P<.001$). Education was positively correlated with condom use ($r=0.23$; $P<.001$), whereas age was negatively correlated with condom use ($r=-0.28$; $P<.001$). risk perception attitude framework membership was associated with condom use ($F_{3,\ 885}=9.85$; $P<.001$). Post hoc analyses revealed that the responsive and proactive groups had higher rates of condom use than the avoidance and indifference groups.

TABLE 2—Scores of the Risk Perception Attitude (RPA) Framework Groups on Primary Outcomes: Malawi BRIDGE Project, 2007

	Responsive (n = 340), mean (SE)	Avoidance (n = 74), mean (SE)	Proactive (n = 453), mean (SE)	Indifference (n = 99), mean (SE)	F[a]
Knowledge about HIV	77.9[x] (0.76)	74.6[x,y] (1.65)	77.8[x] (0.66)	71.4[y] (1.44)	20.77
Testing for HIV[b]	2.30[x] (0.04)	1.95[y] (0.08)	2.28[x] (0.03)	1.99[y] (0.07)	10.91
Condom use[c]	0.11[x] (0.04)	−0.36[y] (0.10)	0.03[x] (0.04)	−0.27[y] (0.09)	29.59

Note. Entries are mean scores adjusted for covariates (gender, age, education, marital status, and exposure). For each row, entries sharing the same superscript are not significantly different at $P<.05$.
[a]*F*-value corresponds to the overall model (with RPA group membership as the independent variable, and 5 other covariates).
[b]Answers coded on a 3-point scale; higher numbers represent greater likelihood of getting tested for HIV.
[c]Standardized score; higher numbers represent greater frequency of condom use.

DISCUSSION

We sought to determine whether the risk perception attitude framework could be used to meaningfully segment audiences on the basis of their perceived risk and efficacy beliefs. The underlying idea was that, to the extent that the 4 risk perception attitude framework groups differ from each other, interventions can segment their audiences according to respondents' perceived risk and efficacy belief profiles. Intervention messages can then be targeted appropriately. For example, the indifference group could be targeted to receive messages that augment both risk perceptions and efficacy beliefs. Similarly, the avoidance group could be targeted with messages that enhance efficacy beliefs, the proactive group with messages that heighten risk perceptions, and the responsive group with messages that reinforce both vulnerability and efficacy. To demonstrate the potential utility of this approach, it was necessary to show that the outcomes were significantly different across the 4 groups.

Results of cluster analyses showed that the 4 groups were not distributed uniformly. The largest 2 groups (proactive and responsive) jointly composed 82% of the sample. Both of these groups were characterized by strong efficacy beliefs surrounding condom use, which meant that confidence in ability to use condoms was a distinctive feature of a large segment of the study population. The extent to which this feature is true of other populations is unknown, but it would seem that target audience clustering in terms of efficacy beliefs is a key characteristic that interventions should take into account during formative evaluations.

Exposure to the BRIDGE project was lowest among the avoidance group. This group is thought to experience conflicting pressures: on the one hand, they are highly motivated by heightened perception of risks, but on the other hand they are unable to take preventive action because of weak efficacy beliefs. Thus, there is a need for creative ways to reach members of the avoidance group. In

addition, knowledge about HIV, rates of HIV testing, and likelihood of condom use were low for this group. The avoidance group was 60% female, and the level of education was the lowest for this group. It thus seems that interventions need to target less-educated women in the sample. Among the 4 groups, this group had the highest proportion of people living with a partner, suggesting that inclusion of partners may be a viable strategy for reaching avoidance-group members with intervention messages.

For each of the 3 outcomes reported in this paper, the responsive and proactive groups scored consistently higher than the other 2 groups. Given that a strong efficacy belief was the underlying characteristic of both groups, enhancing personal efficacy to take action would seem to be a fruitful intervention strategy to pursue. The importance of enhancing personal efficacy has been long known through social cognitive theory[18]; within the risk perception attitude framework, this insight can be applied in identifying particular audiences who need to be targeted with efficacy-enhancing messages. Our findings suggest that segmenting an audience on the basis of personal efficacy is likely to be a useful strategy in promoting change.

Limitations

The primary limitation of this study is the cross-sectional design, which makes it difficult to distinguish causes from effects. For example, perceptions of risk and beliefs about personal ability might motivate action, or they might be outcomes resulting from individuals' behaviors; in this study, we could not tell the difference. It is reasonable to assume that individuals who engage in high-risk behaviors construe their perceptions of risk on the basis of those behaviors. Similarly, those who have engaged in self-protective behaviors may have greater belief in their own efficacy as a result of having engaged in those behaviors. For the purposes of this study, we assumed that these perceptions and beliefs were motivators for the underlying behaviors, not effects of them. Distinguishing causes from effects is a worthy endeavor for future work, but the objective of this study was to examine the usefulness of audience segmentation on the basis of risk perceptions and efficacy beliefs. Our findings suggest that segmenting audiences on the basis of risk perceptions and efficacy beliefs provides a heuristic model for developing well-targeted messages.

Another limitation pertains to our measure of efficacy beliefs, which solely focused on efficacy with regard to condom use and thus were not specific to HIV testing. Given that efficacy beliefs tend to predict behaviors with greater accuracy when the underlying domains are similar, it is reasonable to expect that our models would have explained greater variance in HIV testing if the efficacy questions focused specifically on perceived ability to test for HIV.

Conclusion

It appears that the risk perception attitude framework can be used to segment audiences into meaningful clusters that can be used to effectively target HIV-prevention messages. The responsive group appears most likely to engage in self-protective behaviors, and the avoidance and the indifference groups appear least likely to do so; thus, the risk perception attitude framework can be used to determine whether particular audience members should be targeted with messages that promote perceptions of risk, perceptions of efficacy, or both. Messages tailored to these 2 dimensions and targeted to specific segments defined by the risk perception attitude framework are likely to be more effective than those that are not.

Our findings indicate that positive behavioral changes are likely to result when perceptions of personal vulnerability are coupled with strong efficacy beliefs. Perceptions of risk can thus be conceptualized as motivators of action, and efficacy beliefs can be conceptualized as facilitators of action. Indeed, the BRIDGE Program's campaign slogan—*Nditha*, meaning "I can" in Chichewa—was inspired by findings from our formative evaluation, which showed a need to enhance personal efficacy in the face of widespread tendencies toward hopelessness and fatalism. The risk perception attitude framework literature shows that risk-enhancing messages, by themselves, are likely to induce avoidance behaviors. It is only when such messages are coupled with those that enhance efficacy perceptions that sustainable behavior change is likely to occur. ■

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Human Participant Protection

This research protocol was approved by the Johns Hopkins University committee on humans in research.

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