Health Education & Behavior
38(2) 159–170

DOI: 10.1177/1090198110378588
http://heb.sagepub.com
SAGE

Outcomes of an HIV Prevention Peer Group Intervention for Rural Adults in Malawi

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Abstract

This study used a quasi-experimental design to evaluate a six-session peer group intervention for HIV prevention among rural adults in Malawi. Two rural districts were randomly assigned to intervention and control conditions. Independent random samples of community adults compared the districts at baseline and at 6 and 18 months postintervention. Using multiple regressions controlling for six demographic factors, intervention district adults had significantly more favorable outcomes at 6- and 18-month evaluations for condom attitudes, self-efficacy for community prevention, self-efficacy for practicing safer sex, partner communication, using condoms ever in the past 2 months, and community prevention activities. Knowledge and hope for controlling the epidemic were significantly higher in the intervention district only at the 6-month evaluation; having a recent HIV test was significantly higher only at 18 months. Levels of stigma and the number of risky sex practices did not decrease when demographic factors were controlled. Expanding peer group intervention for HIV prevention would benefit rural adults.

Keywords

behavior change, HIV prevention, peer groups, community participatory research, rural adults

Introduction

HIV prevention remains one of the most important strategies for controlling the AIDS epidemic in sub-Saharan Africa, including Malawi, where an estimated 12% of adults ages 15 to 45 are already infected with HIV (Joint United Nations Programme on HIV/AIDS [UNAIDS] & World Health Organization [WHO], 2009). Heterosexual contact accounts for nearly 90% of HIV transmission in Malawi (Garbus, 2003; National Statistical Office [NSO], 2005), so promoting safer sexual behaviors that are socially acceptable is very important (Strebel et al., 2006). Rural adults especially need prevention. More than 84% of Malawian adults live in rural areas (NSO, 2005), where most have limited access to HIV prevention information and resources. Although HIV rates are lower in rural areas than in urban Malawi, the latest data suggest that HIV prevalence in rural areas is increasing rapidly (NSO, 2005). To begin meeting these needs, we developed a peer group intervention for HIV prevention for rural adults.

Rural adults in Malawi continue to practice risky sexual behaviors, including multiple sexual partners and low condom use (Helleringer & Kohler, 2007; McCreary et al., 2008; NSO, 2005; Watkins, 2004). Changing these behaviors requires changing knowledge deficits and negative attitudes that sustain unsafe behaviors. Surveys in Malawi and many other African countries have found that most adults can identify unsafe sex as the major route of HIV transmission and can name behaviors to reduce sexual transmission, for example, abstinence, being faithful or reducing partners, and using condoms (Benotsch et al., 2004; Ghosh & Kalipeni, 2005; Kalipeni & Ghosh, 2007; Letamo, 2007; Lindgren, Rankin, & Rankin, 2005; NSO, 2005; Watkins, 2004). However, qualitative studies identify persistent incorrect beliefs about HIV transmission and a lack of comprehension about how facts fit together or relate to prevention (Benotsch et al., 2004; McCreary et al., 2008). Attitudes widely documented to block prevention behaviors include hopelessness about the epidemic, stigmatization of persons living with HIV (PLWH), reluctance to be tested or use condoms, and lack of self-efficacy for behavior change

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(Barden-O'Fallon et al., 2004; Garbus, 2003; Kaler, 2003; Letamo, 2007; Meyer-Weitz, 2005; NSO, 2005; UNAIDS, 2006). Stigmatization of HIV and AIDS is prevalent in most African countries, and fear of stigmatization is related to lack of HIV prevention efforts (Benotsch et al., 2004). Highly negative attitudes toward condoms in Malawi also remain a barrier to prevention (Chimbiri, 2007).

HIV prevention interventions need to address contextual factors that affect individuals' willingness and ability to adopt safer behaviors (Benotsch et al., 2004; Gupta, Parkhurst, Ogden, & Muhal, 2008). In Malawi and elsewhere in Africa, gender-related factors limiting effective HIV prevention include male dominance over sexuality and condom use, women's difficulties negotiating about sexuality and safer sex, and double standards that permit or even encourage men to have multiple sexual partners (Benotsch et al., 2004; Buhler & Kohler, 2003; Chimbiri, 2007; Ghosh & Kalipeni, 2005; Gupta et al. 2008; Kalipeni & Ghosh, 2007; Kathewera-Banda et al., 2005; McCreary et al., 2008).

In addition to gender inequality, other contextual factors are barriers to HIV prevention (McCreary et al., 2008). In most African countries, including Malawi, reluctance to discuss sexual issues, especially between parents and children and between partners, is restricting access to information and hindering HIV prevention (Dancy, Kaponda, Kachingwe, & Norr, 2006; Fuglesang, 1997; Kachingwe et al., 2005; Kamlongera, 1997; McCreary et al., 2008; Norr, Norr, McElmurry, Tlou, & Moeti, 2004). In rural Malawi, marriage is very important for its social, economic, and security benefits. However, the divorce rate is high, with an estimated life-table probability of divorce between 40% and 65% (Reniers, 2003). Remarriage after divorce is common in rural areas and exposes adults to sequential multiple partners. Social expectations for childbearing in rural Malawi present additional challenges to HIV prevention (Bracher, Santow, & Watkins, 2003). Economic hardships also encourage migration of adult males into cities or towns to seek paid labor, thereby increasing the likelihood of partner separation, casual and transactional sex, and divorce (Englund, 2002; Ghosh & Kalipeni, 2005; Kalipeni & Ghosh, 2007; Kathewera-Banda et al., 2005).

Despite these barriers to HIV prevention, several African countries have decreased transmission through sexual behavior change (Coates, Richter, & Caceres, 2008). In both Zimbabwe and Tanzania, fewer multiple partners for older cohorts, delayed sexual debut, and condom use have all contributed to the decline in HIV prevalence (Gregson et al., 2006; Jorden-Harder et al., 2004; Lugalla et al., 2004). The most notable success confronting a generalized epidemic has been reported in Uganda (Low-Beer & Stoneburner, 2003, 2004; Stoneburner & Low-Beer, 2004). Green, Halperin, Nantulya, and Hogle (2006) attribute Uganda's success to a multisector approach that led to an initial reduction in multiple sexual partners, followed by increased condom use. Coates et al. (2008) and Potts et al. (2008) identify community mobilization and involvement as important elements of all these large-scale successes.

However, many HIV prevention initiatives have had limited success. Bollinger, Cooper-Arnold, and Stover (2004) found that most initiatives succeeded in increasing knowledge about HIV, but few documented sustained behavioral change. They concluded that this lack of evidence is due to weak or no evaluation, including lack of a control group, short follow-up periods, and failure to include either self-reported behavioral outcomes or biological markers of change.

Peer leader and peer group interventions based on a behavior change model that integrates health belief, reasoned action, and social-cognitive learning theories appear to be the most prominent and successful interventions in Africa (Bandura, 1982; Fishbein & Ajzen, 1975; Kebaatswe & Norr, 2002; Medley, Kennedy, O'Reilly, & Sweat, 2009; Merson, Dayton, & O'Reilley, 2000; Norr et al., 2004; Norr, Norr, Kaponda, Kachingwe, & Mbweza, 2007). Both peer leader and peer group interventions emphasize changing social norms and building self-efficacy or confidence to perform a particular behavior as essential precursors of behavioral change. Unlike peer leader interventions that train existing social network leaders to provide informal instruction and support for HIV prevention, peer groups are a series of semistructured meetings facilitated by trained members of the target group. Peer groups use skill-building, rehearsal with feedback, social support of the group, and values clarification discussion to develop new group norms and reinforce behavioral skills. However, nearly all reported peer interventions target high-risk groups such as commercial sex workers, their clients, truckers (Wilson & Halperin, 2008), in-school adolescents (Gallant & Maticka-Tyndale, 2004), or workers in urban companies (Mahajan, Colvin, Rudatsikira, & Ettl, 2007). Few peer group interventions have been reported for community adults with moderate- to low-risk sexual behaviors (Bollinger et al., 2004). With a few exceptions (Medley et al., 2009; Norr et al., 2004; Norr et al., 2007), an extensive literature review has not located published reports of rural community peer group interventions in Malawi or other African countries. To fill this gap, we developed and tested a peer group intervention for rural adults in Malawi that builds on our previous HIV prevention efforts (Kachingwe et al., 2005; Norr et al., 2004; Norr et al., 2006; Norr et al., 2007).

Method

Design

We used a quasi-experimental design and three waves of evaluations with unmatched samples at each time point. We chose two adjacent rural districts in the central region of Malawi and randomly assigned one to the intervention and the other to the delayed control condition. We did not randomly assign at the individual level because the peer groups were designed to

encourage discussion with nonparticipating friends and family. Thus, we expected that the intervention would have a direct impact on participants and also some impact on nonparticipants in the same village through diffusion. Random assignment would have allowed potential contamination of the control group. We carried out no intervention-related activities in the control district until after the 18-month intervention, when we offered the intervention to health workers, who were encouraged to bring the intervention to rural communities.

The study worked closely with the existing strong traditional system of local governance in Malawi. A network of local leaders includes the Traditional Authority (TA), which refers to both the geographic unit and the leadership position, the group-village headmen/women, and village headmen/women. This system actively offers traditional leadership and governance, local dispute resolution, and support for implementation of local development and health program initiatives. In both districts, local leaders facilitated participant recruitment and evaluation, and in the intervention districts they also facilitated and supported the intervention.

Site and Evaluation Sample

Malawi is one of the poorest countries in the world, with an estimated per capita gross domestic product of $900, ranked 218th of 228 countries (Central Intelligence Agency, 2010). Most residents are rural subsistence farmers. There are eight major tribal groups in Malawi. Each is concentrated in one of the three regions: north, central, or south. Districts usually have one majority group and a mix of others. Eighty percent of Malawians are Christian. The largest denomination is Roman Catholic, about 30%. Except for the Yao, who are predominantly Muslim, most tribes include a mix of Christian denominations (NSO, 1998). The study districts both have more than 400,000 residents, most of whom are subsistence farmers. Although the intervention and control districts share many of the same regional economic, political, social, and cultural characteristics, the intervention villages we selected were geographically separate from the control villages (approximately 70-100 km apart) and have few contacts or overlapping sets of social connections.

In both the intervention and control districts, we selected five rural health centers in two TAs per district, in consultation with the TAs and the District Hospital. We then identified the villages served by the health centers as the study sites. There were 16 villages with 50 to 250 households per village in the intervention district and 14 villages with 40 to 230 households in the control district. We explained the nature of the intervention to traditional leaders and received their permission to invite adults in their communities to participate in the study.

To determine the intervention's efficacy at the community level, we surveyed independent random samples from the intervention and control villages at baseline, 6 months and 18 months postintervention. This allowed us to assess the effects of the intervention on the HIV knowledge, attitudes, and behaviors of the overall community, not just among intervention participants. Because the three samples are independent, the same individuals were not followed over time.

To select the random sample, we enumerated and systematically selected households from a random start in each village. At each selected household, we enumerated all adults who met the selection criteria of permanent residence in the village and age 18 or older. Then we randomly selected one adult in each household to be interviewed. At baseline and at the 18-month assessment, we selected every third house. High inflation, especially fuel prices, required that we reduce costs in Years 3 to 5 of the project. We opted to conduct a smaller 6-month evaluation, selecting every 10th household, so we could concentrate our resources on the 18-month assessment. At the baseline survey, we had problems selecting male adults from households because many of them were away from the villages engaged in selling produce or other commodities. We successfully addressed this problem at the later evaluations with the help of community leaders, who announced the days we would survey and asked the men to stay at home that day to participate. At baseline, two selected adults declined to participate because they had obligations outside the village; there were no refusals at the 6-month and 18-month surveys.

The Mzake ndi Mzake Peer Group Intervention for HIV Prevention

We developed an evidence-based peer group intervention guided by three conceptual frameworks. The content and learning strategies, including skill-building and rehearsal with feedback, social support of the group, and discussions to clarify values and change group norms, are based on the behavior change model used effectively in prior HIV prevention interventions (Medley et al., 2009). These learning strategies enhance knowledge, positive attitudes, perceived norms, and self-efficacy to engage in HIV prevention behaviors, which previous studies have identified as mediators of behavior change (for empirical support in Africa, see Heeren, Jemmott, Mandeya, & Tyler, 2007; Hendriksen, Pettifor, Lee, Coates, & Rees, 2007). Contextual tailoring of the content to Malawi's rural villages is based on our formative evaluation using focus groups with community members and interviews with local leaders (McCreary et al., 2008).

An innovative feature is the program implementation model based on the WHO primary health care model of community–health worker collaboration to address local health issues. Primary health care is a model of acceptable, accessible, sustainable, and cost-effective health care and health promotion starting in local communities successfully used to tackle health problems other than HIV (McElmurry & Keeney, 1999). In our intervention, health worker–community collaboration was fostered by early consultation with local clinic administrators, community leaders, and members regarding acceptable content;

cofacilitation of peer groups by volunteer health workers and community members; and participant assignments after each session to encourage discussion with neighbors and family. Building on the local health system using available resources led to enhanced sustainability and cost-effectiveness. An earlier publication (Norr et al., 2006) provides more extensive details of the intervention's theoretical grounding and group facilitation processes.

The intervention's six 2-hour sessions cover the need to increase HIV prevention and decrease stigma and denial; facts about sexuality, sexually transmitted infections, and HIV and AIDS (two sessions); condoms; partner negotiation for safer sex; and community prevention. Each session provides in-depth information, guided discussion about values and social norms, modeling by the peer facilitators and later by group members, performance accomplishment through practice and corrective feedback, and social support for change from leaders and group members. Each peer group included two cofacilitators and 10 to 12 community members. Groups were either all male or all female to reduce gender barriers to open communication. After participating in the six sessions, health workers and community adults who volunteered to become cofacilitators received an additional 2-week training in the peer group content and group facilitation skills, with practice and corrective feedback as well as ongoing support from the research team.

Procedure

We began by receiving ethical approval of the study from University of Malawi and University of Illinois at Chicago and approval from the health system and traditional leaders. Trained and experienced interviewers conducted the baseline surveys. We then provided the peer group intervention to health workers in the intervention district hospital and the local health centers. Some of the district and local health care workers volunteered to be trained and then bring the intervention to other health workers and adults in the community.

After community leaders participated in the peer group sessions, they arranged a meeting with community adults where the researchers explained the intervention and invited any interested adults to participate. To reduce perceived coercion, the leaders did not attend this meeting. All interested adults gave their consent to participate, and the research team then arranged them into single-gender groups of 10 to 12 members living close to each other. After we began offering the intervention to community adults, some of them volunteered as peer group leaders, received training, and cofacilitated peer groups, usually with a health worker. Process evaluation documented the fidelity of the intervention and the effectiveness of these volunteer peer group leaders using structured observations based on the conceptual model of the intervention (McCreary et al., 2010). We also used these observations to strengthen peer group leader training and development. A total of 2,242 rural adults participated in the intervention over a period of 14 months.

At 6 months and 18 months after the intervention was completed, we resurveyed the intervention and control district villages using the same procedures as at baseline. At the 18-month evaluation, 58% of those interviewed in the intervention district said that they had participated in the intervention; 42% attended no sessions but lived in the community, so they might have been influenced by participants' discussions outside of the intervention sessions.

Measures

The measures to assess rural adults' HIV-related knowledge, attitudes and behaviors came from our Malawi primary school teachers study (Norr et al., 2004; Norr et al., 2007) and the Malawi Demographic and Health Survey (NSO, 2005). All measures were translated into the local language, Chichewa, using the modified direct translation method (Behling & Law, 2000) and have been used before in Malawi. Variables, items, and scoring are summarized in Table 1.

We examined two aspects of HIV knowledge: transmission and prevention strategies. The six-item HIV Transmission Index had low internal reliability. This suggests that different aspects of HIV knowledge are not highly interrelated, which is congruent with the results of our formative evaluation (McCreary et al., 2008). We asked people what would prevent the spread of HIV and counted the number of times the "ABCs" (abstaining, being faithful and condom use) were mentioned.

We examined attitudes that the behavior change model predicted would affect behavior outcomes, including hope about the HIV epidemic, stigma, condoms, and self-efficacy for safer sex and community HIV prevention. A two-item hope index combined the perceived likelihood that the spread of HIV will be stopped in Malawi with the expectation that people will change sexual behaviors to combat the epidemic. We used two measures of stigma, a single item regarding blaming a person living with HIV (PLWH) and two items regarding acceptance of contact with PLWH. These stigma items did not scale as a single factor. A 10-item condom attitudes scale assessing multiple aspects of condom use had high internal reliability. The self-efficacy for community prevention scale comprises two items: confidence in talking about HIV prevention or safer sex with friends and relatives and talking with one's own children. The self-efficacy for safer sex scale rated confidence to engage in six behaviors related to safer sex, and had high internal consistency.

We also examined reported HIV prevention behaviors. We asked about partner communication about safer sex and condom use during the previous two months. We examined three indicators of safer sex behaviors during the previous two months, including the total number of risky practices engaged in, whether abstaining, and (among those who were sexually active only) whether they ever used condoms during that period. We also examined whether a person reported having an HIV test within the last 12 months. Finally, the community

Table 1. Variables and Items From Rural Adults Interview

Variable and items	No. of Items	Range	α[a]
HIV knowledge index: percentage correct, 6 items; e.g., "AIDS caused by virus," "Menstruation washes away" [*false*], "Cured by sex with virgin" [*false*], "Not likely by: giving blood/mosquito bites/using public toilet")	6	0-100	.55
HIV ABCs prevention index: number mentioned when asked how a person can prevent HIV ("Abstain," "Be faithful or reduce partners," "Condoms")	1	0-3	–
Hope index: mean of 2 items (4 = *very likely*, 1 = *not likely*; "How likely: Stop HIV spread in Malawi, People will change sexual behavior")	2	1-4	–
Stigma attitude–blame: A person living with HIV is to blame for being infected (3 = *should be blamed*; 2 = *don't know*; 1 = *not to be blamed*)	1	1-3	–
Stigma attitude–contact acceptance index: mean of 2 items (3 = *permitted*, 2 = *don't know*, 1 = *not permitted*; "Person living with HIV should be permitted: in public places/to cook a family meal")	2	1-3	–
Condom attitudes scale: percentage positive to condoms of 10 items (sexual enjoyment for self and partner, 3 items; indicates promiscuity, 5 items; effective prevention, 2 items)	10	0-100	.81
Self-efficacy for community prevention: mean of 2 items (1 = *not confident*, 2 = *somewhat confident*, 3 = *very confident*; "Can talk about HIV prevention/safer sex with friends and relatives/own children")	2	1-3	–
Self-efficacy for safer sex: mean of 6 items (1 = *not confident*, 2 = *somewhat confident*, 3 = *very confident*; "Can abstain if decide not to have sex," "Talk about safer sex with partner," "Get partner to agree to use condoms," "Refuse sex without a condom," "Get condoms," and "Use condoms correctly")	6	1-3	.82
Partner communication index: sum of 2 items (1 = *yes*, 0 = *no*; "Talk with partner in last 2 months about: safer sex/condoms")	2	0-2	–
Risky sex behaviors index: no. of five risky sex behaviors in past 2 months (unprotected sex, multiple partners, sex at bars, sex for money, STI symptoms)	5	0-5	–
Abstained past 2 months (1 = *yes*, 0 = *no*)	1	0-1	–
Ever used condom past 2 months: sexually active only (1 = *yes*, 0 = *no*)	1	0-1	–
HIV test in past 12 months: (1 = *yes*, 0 = *no*)	1	0-1	–
Community HIV prevention index: no. of six activities reported for past 2 months (led discussion; talked prevention/safer sex with partner, other adults, own children, or other young people; contributed money or time)	6	0-6	.70

a. Internal consistency coefficient, Cronbach's alpha (α).

HIV prevention index measured the total number of six different community prevention activities each person reported having done in the past 2 months.

Results

Demographics

We used two-tailed *t* tests for differences of means or proportions to examine differences in demographics between the intervention and control communities. Any such differences would need to be controlled in evaluating intervention effects. The intervention and control communities did not differ in mean age or gender at any of the three surveys (Table 2). However, at baseline only around one third of those interviewed were males. Education was significantly higher in the intervention district at the 6- and 18-month surveys. At the 18-month evaluation only, the intervention district sample more often reported having adequate food. The 18-month evaluation occurred during a severe drought that affected the control district more than the intervention district. At each time period, the two districts differed significantly in distributions of tribe and religion. Malawi districts typically have one majority tribe and a mix of others, so this difference between the two districts was not unusual.

Outcomes at Baseline

We expected the intervention district to show more knowledge, more positive attitudes, and a greater number of safer sex behaviors compared to the control district after the intervention. To assess the comparability of the intervention and control districts on these outcome variables at baseline, we used one-tailed tests of differences between means or proportions. The *t*-test comparisons (not shown) yielded no significant knowledge differences at baseline between adults in the control and intervention districts, and most attitudes and behaviors did not differ significantly. However, adults in the intervention district were less likely to blame a person with HIV for past behavior ($t = -2.41$, $p < .05$) and had higher self-efficacy for

Table 2. Demographic Characteristics of Rural Adult Survey Participants

	Baseline		6-month evaluation		18-month evaluation	
	Control (n = 523)	Intervention (n = 629)	Control (n = 176)	Intervention (n = 180)	Control (n = 419)	Intervention (n = 415)
Age (years), *M* (*SD*)	41.3 (16.0)	41.1 (16.9)	37.2 (13.6)	34.8 (12.6)	35.1 (13.2)	35.2 (14.3)
Gender (% male)	34.4	31.3	48.9	53.9	49.9	50.6
Educational level (%)						
Primary or less	67.9	69.0	69.7	55.6	65.1	50.6
Some secondary school	32.1	31.1	30.3	44.4	34.9	49.4
			t = –2.78**, df = 333		t = –4.28**, df = 824	
Food security (%)						
Struggles to provide	68.5	65.6	56.3	50.3	63.0	49.5
Enough or adequate	31.5	34.4	43.7	49.7	37.0	50.5
					t = –3.93**, df = 824	
Tribe (%)						
Ngoni	39.3	94.9	38.1	92.2	27.1	93.2
Chewa and others	60.7	5.1	61.9	7.8	72.9	6.8
	t = 24.06**, df = 694		t = 12.95**, df = 271		t = 26.25**, df = 652	
Religion (%)						
Catholic and others	54.8	22.7	54.5	22.8	58.3	20.6
Protestant	45.2	77.3	45.5	77.2	41.7	79.4
	t = –11.67**, df = 1021		t = –6.33**, df = 333		t = –12.03**, df = 794	

**p < .01 (t test, two-tailed).

community prevention (t = 2.05, p < .05). More intervention district adults also reported ever using condoms in the past 2 months, although condom use was very low in both districts (7.4% ever used in the control district vs. 12.7% in the intervention district, t = 2.33, p < .05). We used multiple regression analyses (not shown) to repeat these comparisons controlling for age (if under 30 years, if 50 years or older, with those aged 30 to 49 years as the reference group), gender (if male), education (if some secondary school or more), food security (if adequate food), tribe (if Ngoni), and religion (if Catholic). Controlling for these demographics, there were no significant differences in knowledge, attitudes, or reported behaviors between the intervention and control districts on any HIV-related variables. Thus, differences between the intervention and control districts in knowledge, attitudes, and reported behaviors at baseline were attributable to these demographic factors.

Postintervention Effects

To evaluate the effects of the intervention on knowledge, attitudes, and safer sex behaviors, we first compared differences in outcome variable means or proportions between the intervention and control groups at 6 and 18 months postintervention using one-tailed t tests of independent samples.

Next we considered whether measurement errors in the outcome variables at 6 and 18 months were clustered within villages. Because we found no such clustering, we used nonhierarchical regression analyses to evaluate intervention effects. To control for initial differences between the intervention and control communities, we examined the coefficients for intervention–control on each outcome variable in multiple regression equations (ordinary least squares or logistic) that include controls for age, gender, education, food security, tribe, and religion.

Six-month effects. The t tests showed significant differences between the intervention and control districts on HIV-related knowledge, attitudes, and reported behaviors at 6 months postintervention (Table 3). Both the HIV knowledge index and the ABCs prevention index scores were significantly higher in the intervention group at 6 months postintervention. The hope index mean was significantly higher in the intervention district than in the control. The two measures of stigma attitudes both showed more acceptance of PLWH among the intervention district than in the control community. The intervention community had substantially more positive attitudes toward condoms than the control district. Self-efficacy for community prevention was significantly higher in the intervention group at 6 months postintervention. Although self-efficacy for community prevention was also higher in the intervention district at baseline, the difference between the means was greater at the 6-month postintervention survey. Self-efficacy for safer sex was significantly higher in the intervention district than the control district. The intervention district had significantly more favorable scores than the control district for four reported behaviors in the past 2 months: partner communication, risky sex, if ever used a condom, and community HIV prevention activities. There was no significant difference for the other two reported behavior variables, abstained in the past 2 months and HIV test in past 12 months.

Table 3. Six-Month Evaluation: Intervention and Control District HIV Knowledge, Attitudes and Behaviors

	Comparison of *M* (*SD*) or %				Multiple regression coefficient (OLS or logistic) for intervention vs. control groups[a]			
	Control (*n* = 176)	Intervention (*n* = 180)	*t*	*df*	*B*	*SE*	*t*	*df*
HIV knowledge index (%)	73.14	87.50	6.75**	305	10.503	2.635	3.99**	325
HIV ABCs prevention index	1.88 (0.76)	2.17 (0.74)	3.61**	354	0.295	0.101	2.91**	326
Hope index	1.86 (1.00)	2.37 (0.87)	5.11**	345	0.376	0.124	3.03**	326
Stigma attitude—blame	1.17 (0.56)	1.08 (0.39)	−1.81*	311	−0.122	0.066	−1.84*	326
Stigma attitude—contact acceptance index	2.82 (0.52)	2.97 (0.18)	3.63**	215	0.031	0.053	0.58	325
Condom attitudes scale (%)	43.69	68.66	8.34**	353	21.754	3.588	6.06**	325
Self-efficacy for community prevention	2.54 (0.63)	2.80 (0.41)	4.52**	299	0.253	0.073	3.47**	325
Self-efficacy for safer sex	2.07 (0.59)	2.65 (0.48)	10.17**	337	0.463	0.069	6.70**	324
Partner communication index	0.80 (0.63)	1.03 (0.79)	2.99**	341	0.213	0.096	2.22*	326
Risky sex behaviors index	0.91 (0.65)	0.78 (52)	−1.93*	342	−0.057	0.081	−0.70	316
Abstained past 2 months (%)	23.43	26.40	0.645	351	−0.017	0.327	−0.05	342
Ever used condom past 2 months[b] (%)	7.63	20.16	2.95**	222	0.822	0.527	2.43**	236
HIV test in past 12 months (%)	8.57	10.00	0.46	353	0.036	0.487	0.005	325
Community HIV prevention index	2.97 (1.60)	3.76 (1.35)	5.00**	342	0.550	0.198	2.78**	326

Note: OLS = ordinary least squares.
a. Controlling for age, gender, education, food security, tribe, and religion.
b. Among sexually active only.
*$p < .05$. **$p < .01$ (*t* test of significance, one-tailed).

We then examined the effects of the intervention using regression to control for demographic factors (Table 3, last four columns). The intervention effects remained significant at 6 months when controlling for demographics for 10 outcomes: the knowledge index, ABCs knowledge, hope, stigma–blame, condom attitudes, self-efficacy for community prevention, self-efficacy for safer sex, partner communication, ever used condoms in the past 2 months, and community prevention behaviors. The stigma attitude of acceptance of contact with PLWH and the reported risky sex behaviors index did not remain significant when controlling for demographic factors.

Eighteen-month effects. The pattern of differences between the control and intervention communities on HIV-related knowledge, attitude, and behavior outcome variable means and percentages at 18 months postintervention is similar to the results at the 6-month evaluation (Table 4). There were statistically significant mean differences between the intervention and control districts for both knowledge measures, condom attitudes, self-efficacy for community prevention, and self-efficacy for safer sex. The two districts did not differ significantly on hope or the two stigma measures. For the knowledge index, hope, and the stigma measures, the mean score in the control district increased whereas the mean score in the intervention district remained stable. Reported behavioral outcome variables continued to be more favorable in the intervention district than the control district at the 18-month postintervention evaluation. Compared to the control district, adults in the intervention district reported higher rates of partner communication, lower rates of risky sexual behaviors, and higher rates of abstaining, and more of those who were sexually active reported ever using a condom in the past 2 months. More intervention district adults reported that they had an HIV test within the past 12 months, and they had higher levels of community HIV prevention activities in the past 2 months. The extent of the difference between intervention and control districts at the 18-month evaluation was greater than at the 6-month evaluation for partner communication, risky sex behaviors, and community HIV prevention indices. Although condom use increased from the 6-month level in both districts, the percentage of sexually active adults reporting ever using condoms in the past 2 months was twice as high in the intervention district as the control district (24.5% vs. 12.3%).

When the demographic factors were included in multivariate regression equations (Table 4, last four columns), intervention effects were no longer significant for the two knowledge measures. The effect of the intervention remained significant for condom attitudes, self-efficacy for community prevention, and self-efficacy for safer sex. Two behavioral outcomes—the sexual risk behaviors index and abstaining—no longer had significant intervention effects. However, there were intervention effects for the other four reported behavioral outcomes during the past 2 months: partner communication, ever using condoms, having an HIV test, and community prevention behaviors.

Because more than 90% of the intervention district participants were from a single tribe, the Ngoni, we were concerned that the multivariate regression analysis would not completely address whether differences found were due to tribe or the intervention. The 18-month survey included more than 100 Ngoni

Table 4. Eighteen-Month Evaluation: Intervention and Control District HIV Knowledge, Attitudes and Behavior

	Comparison of *M* (*SD*) or %				Multiple regression coefficient (OLS or logistic) for intervention vs. control groups[a]			
	Control (*n* = 413)	Intervention (*n* = 415)	*t*	*df*	*B*	*SE*	*t*	*df*
HIV knowledge index (%)	80.46	85.51	3.59**	824	1.379	1.923	0.72	810
HIV ABCs prevention index	1.61 (0.68)	1.72 (0.64)	2.35**	822	–0.083	0.063	–1.31	812
Hope index	2.46 (1.11)	2.56 (1.08)	1.25	824	–0.019	0.105	–0.18	810
Stigma attitude—blame	1.10 (0.43)	1.06 (0.34)	–1.54	777	–0.025	0.038	–0.65	812
Stigma attitude—contact acceptance index	2.89 (0.39)	2.91 (0.31)	1.10	778	–0.007	0.034	–0.22	811
Condom attitudes scale (%)	50.48	57.79	3.79**	817	6.950	2.562	2.71**	807
Self-efficacy for community prevention	2.76 (0.49)	2.89 (0.37)	4.27**	764	0.140	0.042	3.34**	811
Self-efficacy for safer sex	2.23 (0.63)	2.51 (0.57)	6.51**	815	0.232	0.054	4.31**	808
Partner communication index	0.76 (0.69)	1.03 (0.74)	5.49**	826	0.263	0.067	3.95**	812
Risky sex behaviors index	0.78 (0.52)	0.68 (0.60)	–2.36**	807	–0.029	0.054	–0.54	808
Abstained past 2 months (%)	25.73	31.48	1.83*	820	0.155	0.225	0.689	809
Ever used condom past 2 months[b] (%)	12.29	24.54	3.78**	499	0.910	0.329	7.65**	555
HIV test in past 12 months (%)	9.71	18.45	3.63**	769	0.717	0.302	5.63**	808
Community HIV prevention index	2.38 (1.79)	3.22 (1.66)	6.97**	821	0.787	0.160	4.91**	812

Note: OLS = ordinary least squares.
a. Controlling for age, gender, education, food security, tribe, and religion.
b. Among sexually active only.
*$p < .05$. **$p < .01$ (*t* test of significance, one-tailed).

in the control district, so we explored this concern by comparing 18-month outcomes between the two districts for only Ngonis. The differences observed were more positive for the intervention district, and all but two were statistically significant despite the much smaller number of cases. The only exception was HIV ABCs prevention, which also did not differ for the total sample at 18 months.

Discussion

The Mzake ndi Mzake peer group intervention for HIV prevention had positive effects on adults' reports of knowledge, attitudes, and safer sex behaviors. These results are consistent with short-term effects of the same intervention with primary school teachers (Kachingwe et al., 2005; Norr et al., 2007) and with hospital workers in Malawi (Chimango et al., 2009; Kaponda et al., 2009). The intervention district's higher levels of positive condom attitudes at 6 and 18 months after the intervention are important, given the persistent negative attitudes toward condoms and difficulty discussing sexual issues with partners identified in other studies of adults in Malawi (Chimbiri, 2007; Kohler, Berhrman, & Watkins, 2007; McCreary et al., 2008). In addition, the higher self-efficacy for both safer sex and community prevention in the intervention district than the control district, accompanied by higher proportions of sexually active adults reporting they had ever used condoms in the past 2 months and higher levels of community prevention activities, are consistent with the peer group intervention's underlying behavioral change theory that self-efficacy supports behavior change (Norr et al., 2006).

Risky sex index scores (number of risky behaviors reported, including unprotected sex, multiple partners, sex for money or after drinking, and STI symptoms) did not differ after controlling for demographic factors. Having ever used condoms in the past 2 months among sexually active adults was higher in the intervention district than the control district at both evaluation periods. These results differ from a Ugandan trial that showed a reduction of multiple sexual partners and increased abstinence but no increase in condom use among adults (Green et al., 2006). The lack of an increase in abstinence in our study is congruent with previous research that identifies strong cultural values supporting sexual activity and disparaging abstinence for adults in Malawi (Ghosh & Kalipeni, 2005; Kalipeni & Ghosh, 2007; McCreary et al., 2008). Divorce and remarriage may limit the effectiveness of faithfulness. Coates et al. (2008) recommend that interventions support a range of behavioral changes that allow individuals and couples to select those changes that they feel are most suitable for themselves.

Several of our results also point to possible successes in the overall HIV prevention efforts of Malawi. Knowledge, hope, and blaming of a person with HIV were all more favorable in the intervention district than the control district at 6 months but not at 18 months postintervention. These results reflect increasingly favorable knowledge and attitude scores in the control district at the 18-month evaluation, rather than decreased scores at 18 months in the intervention district. It is likely that

the national media campaign, which was implemented in the same way in all districts including the two in our study, increased HIV knowledge and hope about the epidemic and decreased stigma for many rural adults. This is in contrast to the lack of hope and fatalistic views toward HIV prevention documented in previous studies in rural Malawi (Ghosh & Kalipeni, 2005; Kaler, 2003; Kalipeni & Ghosh, 2007; Watkins, 2004).

We anticipated that there would be diffusion from participants in the peer group intervention to other adults in the community. We found more positive outcomes in the intervention district for a random sample of adults in villages where the intervention took place. About 40% of these adults said that they did not attend peer group sessions, providing some support for diffusion. Additional support for diffusion comes from the willingness of community adults to volunteer as peer group cofacilitators. An unpublished master's thesis interviewing peer group leaders found that most of them said that they talked extensively with their neighbors about HIV prevention and AIDS testing and treatment (Kalengamaliro, 2005). These results are consistent with the idea that there was diffusion of the intervention.

There were several limitations in this study. Individuals were not randomly assigned to the intervention and control group. We used a quasi-experimental design because potential contamination of the control group made randomization at the individual level unfeasible. The intervention and control district differed at baseline on several demographic characteristics. We partially addressed this problem through multivariate analyses to examine intervention effects statistically controlling for these factors. However, the quasi-experimental design used in this study cannot provide as clear causal inference as an experiment, because some alternative explanations for the differences between the intervention and control districts cannot be ruled out.

Even individual random assignment cannot completely eliminate some outside effects. As discussed above, nationwide media campaigns may have reduced some knowledge and attitude differences. National HIV testing weeks and scaling-up testing at hospitals occurred between the 6- and 18-month evaluation. This low availability of HIV test at 6 months helps explain why the intervention could have an effect on HIV testing at 18 months but not at 6 months.

The use of only self-reports is another limitation, because self-reports are subject to social desirability bias, especially for sensitive behaviors such as risky sex. Compared to biomarkers, self-reports underestimate socially disapproved behaviors such as multiple partners in Malawi (Smith & Watkins, 2005). However, HIV and STI biomarkers are costly, require extremely large samples, and add complexity to community-based studies. HIV and STI incidence rates may not be highly discriminatory in a low-risk community sample (Plummer et al., 2004; Ross et al., 2007). Previous methodological reviews have concluded that self-reported sexual behavior provides useful information despite systematic underreporting (Holtgrave & Pinkerton, 2000; Plummer et al., 2004). This is especially the case in studies such as ours that employ a control group, because social desirability is likely to affect intervention and control participants equally. Strategies employed to minimize reporting bias included having interviewers not associated with the intervention and conducting the survey privately.

Implications for HIV Prevention Programs

This community-based peer group model, facilitated by trained local health workers and community members, had positive impacts on HIV prevention attitudes and behaviors for rural adults in Malawi. Several unique features of the intervention may be important elements of its success and should be included in any future replication. The intervention built on the existing traditional community leadership and local primary health care system, fostering community-wide mobilization to deliver the intervention in a cost-effective and potentially sustainable way. The peer group process enabled the same small groups to meet repeatedly and support each other, reinforcing the intervention messages within and outside the sessions. Peer groups were facilitated by trained volunteer community members and health workers who remained in the community and became trusted local resources that villagers frequently contacted for information and advice. The high participation rate we achieved (58% of adults) was also an important factor in achieving community change.

The Mzake ndi Mzake community-based approach is consistent with the call for interventions that collaborate with communities for sustainable HIV prevention (Coates et al., 2008; Potts et al., 2008). Rural adults traditionally provide role models and socialize youth into adult roles in keeping with traditional values and practices. Thus, an HIV prevention intervention for rural adults not only helps them protect themselves but also helps them to be more effective role models and leaders for HIV prevention in their communities, as demonstrated by their volunteering as peer group leaders and in their influence on nonparticipants. As one of the few evidence-based HIV prevention programs tested in rural communities in Malawi, the Mzake ndi Mzake intervention should be scaled-up for Malawi as part of a multisectoral response to HIV prevention and may offer a model that can be adapted for other high-prevalence countries in the African region and beyond.

Acknowledgments

We especially thank the many people who have supported this project in the National AIDS Commission; the Malawi Ministry of Health and Population; the Nursing, Midwifery and Health Sciences Research Centre at Kamuzu College of Nursing and faculty and administrators at both universities; the district health care system; traditional authorities; and the participating community leaders and members.

Declaration of Conflicting Interests

The authors declared no conflicts of interests with respect to the authorship and/or publication of this article.

Funding

The authors disclosed receipt of the following financial support for the research and/or authorship of this article:

This research was funded by the National Institute for Nursing Research; National Institutes of Health; Grant NR08058. Its contents are solely the responsibility of the authors and do not necessarily represent the official views of the National Institute of Nursing Research.

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