# A combined microfinance and training intervention can reduce HIV risk behaviour in young female participants

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**Objective:** To assess effects of a combined microfinance and training intervention on HIV risk behavior among young female participants in rural South Africa.

**Design:** Secondary analysis of quantitative and qualitative data from a cluster randomized trial, the Intervention with Microfinance for AIDS and Gender Equity study.

**Methods:** Eight villages were pair-matched and randomly allocated to receive the intervention. At baseline and after 2 years, HIV risk behavior was assessed among female participants aged 14–35 years. Their responses were compared with women of the same age and poverty group from control villages. Intervention effects were calculated using adjusted risk ratios employing village level summaries. Qualitative data collected during the study explored participants' responses to the intervention including HIV risk behavior.

**Results:** After 2 years of follow-up, when compared with controls, young participants had higher levels of HIV-related communication (adjusted risk ratio 1.46, 95% confidence interval 1.01–2.12), were more likely to have accessed voluntary counseling and testing (adjusted risk ratio 1.64, 95% confidence interval 1.06–2.56), and less likely to have had unprotected sex at last intercourse with a nonspousal partner (adjusted risk ratio 0.76, 95% confidence interval 0.60–0.96). Qualitative data suggest a greater acceptance of intrahousehold communication about HIV and sexuality. Although women noted challenges associated with acceptance of condoms by men, increased confidence and skills associated with participation in the intervention supported their introduction in sexual relationships.

**Conclusions:** In addition to impacts on economic well being, women's empowerment and intimate partner violence, interventions addressing the economic and social vulnerability of women may contribute to reductions in HIV risk behavior.

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# Introduction

In sub-Saharan Africa, HIV infection rates remain disproportionately high among young women [1]. In 2006, HIV prevalence was nearly 30% among women attending public antenatal clinics in South Africa, with 90% of all infections in those less than 35-years old [2]. Although conditions of poverty and gender inequality continue to pose major challenges to HIV prevention efforts [3–8], there has been limited experience in the design and testing of interventions that ask whether and in what contexts poverty reduction and gender empowerment programs might contribute to HIV risk reduction.

We recently conducted the Intervention with Microfinance for AIDS and Gender Equity (IMAGE) study, a cluster-randomized trial which assessed the effect of a structural intervention combining group-based microfinance with a gender and HIV training curriculum on HIV risk behavior and intimate partner violence (IPV). Over a 2-year period, we observed improvements in economic well being and multiple dimensions of empowerment among program participants [9]. Furthermore, levels of IPV were reduced by 55% [10].

Intervention effects on HIV risk were more complex to evaluate, as microfinance participants were generally older women (median age 42 years) and outside the high-risk age group for HIV infection. For statistical reasons, a previous per-protocol analysis reported only indirect intervention effects on HIV risk behavior among young people (aged 14–35 years) residing in the households and communities where the program was offered. In these groups, we observed only modest improvements in household communication, and no effect on sexual behavior or HIV incidence [10].

The question remains as to whether the intervention might have influenced HIV risk among intervention participants themselves. To address this, we analyzed quantitative data on HIV risk behavior collected from young women who were direct participants in the IMAGE intervention. To help contextualize our findings we also assessed complementary qualitative data from this group.

# Methods

The study was conducted in a densely settled rural area of South Africa's Limpopo Province. Villages were between 2 and 20 km from a main trading center and major sources of income included government grants, local public sector employment, and migrant remittances. Subsistence agriculture is not a viable option for most households in the area.

Key components of the intervention and the study design are described elsewhere [9–11]. The IMAGE intervention consisted of two components. The first was group-based microfinance, in which groups of five women received loans to establish small businesses. Further credit was offered when all women in these 'solidarity groups' repaid their loans. The second component consisted of a gender and HIV training curriculum, which was integrated into established meetings of 40 women that took place every 2 weeks for approximately 1 year.

A cluster-randomized design was used to assess intervention effects. Briefly, eight villages were pair matched by size and accessibility, with one from each pair randomly selected to receive the microfinance and training intervention. For each woman joining the intervention, a woman of similar age and poverty status was randomly selected from comparison villages into the control group. All intervention participants were women. The trial was registered with Clinical Trials.gov (number NCT00242957) and received ethical approval at the London School of Hygiene and Tropical Medicine and the University of the Witwatersrand.

Surveys were conducted at baseline and after 2 years of follow-up. This analysis compared HIV risk behavior reported by the subgroup of women aged 14–35 years who were direct intervention participants with women of the same age and poverty status from comparison villages. In this paper, we examine the same set of indicators previously assessed among young people in the households and communities of intervention participants as part of a per-protocol analysis strategy [10].

Intervention effects were assessed using a cluster level analysis to compare the intervention group to the comparison group. Crude measures of effect (prevalence or risk ratios, identified as RR) were calculated by entering log village level summaries, weighted by village denominator, into an analysis of variance model that included terms for intervention and village pair. In order to control for possible baseline imbalances between groups, adjusted measures of effect [adjusted risk ratio (aRR)] were calculated using a two-stage process. First, using a logistic regression model fitted to individual level data from control villages, expected outcomes were derived for each village based on the age, marital status, and baseline measure of the outcome indicator of each respondent [12]. Standardized village level summaries of the ratio of observed to expected outcomes were then entered into an analysis of variance model as described above. All statistical analyses were performed using Stata version 9.0 (StataCorp, College Station, Texas, USA).

Thematic content analysis of qualitative data collected during the study allowed further assessment of intervention effects on young women. One hundred and five transcripts from multiple sources were analyzed, including nonparticipant observation of microfinance loan center meetings (160 women followed over 1 year); focus group discussions (FGD) (conducted at two points in time with eight loan groups, each consisting of five participants); key informant interviews (conducted with eight loan recipients over a 3-year period); and, diaries of IMAGE training facilitators kept over the duration of the study. All data were translated, transcribed, and entered into a qualitative database (Nud\*ist version 6.0, QSR International, Doncaster, Australia).

A total of 262 women were under 35 years at study onset and eligible for surveys on HIV risk behaviors. Of these, 83% (108/130) of the intervention group and 85% (112/132) of the control group were successfully interviewed. Two-year follow-up rates among those interviewed at baseline were 92 and 79%, respectively. There were no significant differences in baseline characteristics between the groups, or between those retained and lost to follow-up, and the mean age of respondents was 29 years. Summary of quantitative and qualitative results are presented in Tables 1 and 2, respectively.

# **Results**

The intervention reached 10% of poor households in the study villages in line with program targets and standard microfinance practice in sub-Saharan Africa [21]. A detailed process evaluation conducted alongside the trial suggested high levels of participation and program retention among loan recipients [10].

# Effects on HIV-related knowledge and communication

At follow-up, both intervention and control groups demonstrated an increase in HIV-related knowledge. There was some evidence to suggest that women participating in the intervention felt more comfortable discussing sexual matters at home, although this was not statistically significant.

Table 1. Baseline characteristics and effect estimates (risk ratios: RR) for outcome indicators among under 35-year-old participants in the Intervention with Microfinance for AIDS and Gender Equity intervention and matched controls after 2 years of follow-up.

						Baseline			
			Interve	ntion		Control			
Socio-demographic characteristics									
Age (years) - Mean (SD)			29.	.9 (3.7)		29.2 (4.2)			
Never married (%)			65/108 (60)			67/112 (60)			
Currently married (%)			36/108 (33)			41/112 (37)			
Divorced/separated/widowed (%)			7/108 (6)			4/112 (4)			
Student (%)			2/108 (2)			7/112 (6)			
Above primary education (%)			91/108 (84)			92/112 (82)			
Female headed household (%)			52/108 (48)			53/111 (48)			
Had to beg for food or money in last year (%)			70/108 (65)			70/112 (63)			
Sexually active (%)			108/108 (100)			111/112 (99)			
HIV prevalence (%)			16/8	32 (20)		12/79 (15)			
Outcome indicators			Follow-up						
	Baseline		Intervention	Control	Unadjusted RR	Adjusted RR <sup>a</sup>			
HIV-related knowledge and communication	ation								
Knowledge that a healthy looking person can be HIV+	72/108 (67%)	74/112 (66%)	88/97 (91%)	74/90 (82%)	1.09 (0.73–1.64)	1.09 (0.73–1.62)			
Comfortable discussing sex/sexuality	63/108 (58%)	64/112 (57%)	81/97 (84%)	61/90 (68%)	1.23 (0.53-2.81)	1.22 (0.53-2.80)			
in the home									
Communication with household	56/107 (52%)	55/107 (51%)	72/97 (74%)	45/90 (50%)	1.51 (1.15–1.96)	1.46 (1.01-2.12)			
members about sex/sexuality in the past 12 months									
Access to HIV testing									
Having gone for voluntary counseling and testing	13/108 (12%)	11/112 (10%)	28/97 (29%)	16/90 (18%)	1.65 (1.26–2.16)	1.64 (1.06–2.56)			
Sexual behavior									
More than one sexual partner in	4/108 (4%)	3/112 (3%)	4/97 (4%)	3/90 (3%)	1.20 (0.55-2.63)	0.95 (0.40-2.27)			
the past 12 months Unprotected sex during last	40/60 (67%)	47/59 (80%)	28/51 (55%)	35/45 (78%)	0.70 (0.59-0.84)	0.76 (0.60-0.96)			
intercourse at last occurrence with a nonspousal partner in	40/00 (07 /8)	47/39 (60 %)	20/31 (33/6)	33/43 (70%)	0.70 (0.39-0.84)	0.76 (0.60-0.96)			
the past 12 months									

RR, risk ratio

<sup>&</sup>lt;sup>a</sup>Adjusted for village pair, age, marital status (except in case of sexual behavior with spousal partner), and baseline measure of indicator. Primary outcome is shown in bold.

## Table 2. Qualitative changes in HIV risk behavior among Intervention with Microfinance for AIDS and Gender Equity (IMAGE) participants.

Thematic Areas	Examples			
HIV-related knowledge and communication  1. Knowledge and communication about sex and HIV	'It is our culture - we do not talk about such issues in public or to our childrenby talking about such matters to children, you encourage them to do sex.'b  'Material life should go hand in hand with knowledge. I am not only selling my vegetables but I have also taken upon myself to talk to my children about sexuality and life in general.'a  'We do talk to our children about it (HIV). It is difficult but we have to if we want to save them.'b  'I have a partner and health talks gave me knowledge on how to tell m			
Access to HIV testing 1. Fear of HIV testing	partner to use condoms without fighting."  'I have realised that many people do not want to go for testing.  They say that they are afraid of being stigmatised. They also mentioned that knowing one's status could cause stress,			
2. Overcoming fear and motivating self and others to go for HIV testing	particularly when the results come back positive.'b  'I learnt that it is important to encourage our family members to go for HIV/AIDS test. I must admit though that I am personally scared to go for one. But I think it is important to go for it.'a  'I have also learnt about the importance of going for a HIV test. I have encouraged many people to do it.'b  'I have decided to continue using condoms until I find the right man whom I will encourage to go for an HIV test. Only after getting negative results will we then stop using condoms.'c			
Sexual Behavior 1. Multiple partnerships	'Monna ke thaka wa naba' – it is culturally accepted that a man can			
2. Challenges to the use of condoms	have more than one partner simultaneously."  'My experience has taught me that when there is no money, women are likely to throw themselves to all sorts of men for money. Women run after money but we do not realize that it is the very same money that kills us because we have to surrender our bodies to men.'b  'I am trying to encourage my husband to use a condom, but he always says he cannot use it.'a  'Outside they are having girlfriends who still have right to say no (to se without condoms)Unlike here at home where he will say 'I have married you and you are my wife you have to do what I say'.'a  'The husband will say he was not born wrapped in plastic - he will want flesh to flesh.'a			
3. Strategies to encourage condom use with partners	'When my man comes from work what I will do is to welcome him with love and happiness. I believe if I do that it will lay the good foundation so that when I say my husband please use a condon he will be tamed and willing to do so. You have to find a way that works for you.'c  'In the beginning I was also scared to ask him to use condomsWhen he asked me why we should use condoms I told him that there are diseases around and I do not know what he does when I am not around. He agreed to use condoms and we are now using them.'b  'I have a migrant husband and each time he comes home, I am scared When he is home, I tell him to use condoms. I work hard for my children and I do not want to leave themIt is important that we protect each other and using a condom is unavoidable.'b  'We have partners and we did not how deal with negotiating safe sex. I am now able to negotiate with my partner on condom use.'b  'I used to hate using condoms but after persistent teachings about HIV/AIDS in the sessions I began to use them. I still hate using them but I use them as I know that this is the only way I can protect myself from this disease.'c			

<sup>&</sup>lt;sup>a</sup>Nonparticipant observation of loan center meetings; <sup>b</sup>Focus group discussions with loan groups; <sup>c</sup>KI interviews.

Qualitative data suggested that open discussions about sexuality and HIV were initially taboo in many households, and that women struggled to find ways to raise these issues with family members. Attempts to communicate with children rather than sexual partners appeared more frequently in the data, suggesting that these were easier to initiate. However, over time, as participants internalized the real threat that HIV posed to their families, women began to overcome this discomfort, and tried to communicate in concrete ways about the importance of condom use and voluntary counseling and testing for HIV (VCT). Quantitative data note significant increases in communication about sex or HIV within the homes of IMAGE participants compared

with controls [aRR 1.46 95% confidence interval (CI) 1.01–2.12].

# Effects on uptake of voluntary counseling and testing for HIV

Between both the intervention and comparison groups, VCTuptake at baseline was low (11%) despite widespread availability of rapid testing at the primary healthcare level. At follow-up, quantitative findings documented a significantly higher proportion of intervention participants reporting they had undergone VCT relative to those in the comparison group (aRR 1.64, 95% CI 1.06–2.56).

Qualitative data reflected the general fear surrounding VCT, which often centered upon the social stigma and emotional distress associated with a positive result. Although there was little evidence that this fear diminished over time, findings suggest that participants nonetheless began to find ways to motivate both themselves and others to go for VCT.

# Effects on sexual behavior

At baseline, only 77/220 (35%) women were married, and few women (3%) in either group reported having had more than one sexual partner in the last year. There was no difference in numbers of reported partnerships between intervention and comparison groups at follow-up. Qualitative data suggested that whereas multiple partnerships for both men and women might be part of the broader social context, few personal accounts of changes in such relationships emerged.

However, though levels of unprotected sex at last intercourse with a nonspousal partner were overall high, they were significantly lower among young women in the intervention group relative to the comparison group at follow-up (aRR 0.76, 95% CI 0.60-0.96). Qualitative data collected during loan center meetings suggested women readily acknowledged the challenges they faced when using condoms with sexual partners. Typical reasons for resistance to their use included the association of condoms with mistrust between partners, questions regarding their effectiveness, and complaints of reduced sexual pleasure and intimacy. Despite these challenges, data from focus group discussions and key informant interviews (Table 2) indicated a sense of enhanced bargaining power among intervention participants, which in a number of instances was expressed as increased confidence in negotiating safer sex and the successful introduction of condom use with male partners.

## Discussion

Previous research has suggested that an intervention combining microfinance with a gender and HIV training curriculum can lead to improvements in household economic well being, women's empowerment, and to reductions in levels of IPV [9,10]. This analysis provides further evidence that the intervention may also have influenced HIV risk behavior among younger women who received the intervention, in whom we observed increases in HIV-related communication and VCT uptake alongside reductions in levels of unprotected sex.

A number of factors are important to consider in interpreting these results. Although we cannot exclude response bias in the context of an intervention, qualitative data suggest participants openly admitted to realistic obstacles as well as opportunities for behavior change, providing plausible narratives that complement quantitative measures of intervention effect. We also note the encouraging potential for synergy between several of the outcomes assessed, as previous research has highlighted the protective effect of VCT on sexual risk behavior in some settings [13–16], and the importance of greater communication about sex in facilitating behavior change [17–19].

The analysis was also subject to several limitations. Although we attempted to ensure women in the two arms were similar in terms of age and poverty, there may have been important unmeasured differences affecting both the response to the intervention and the generalizability of the findings. There was also a higher level of nonresponse among the comparison group at follow-up, which could potentially bias the results, though there were no significant differences between this group and those retained in the study. Finally, though data on HIV infection was collected as part of the main study, it was not possible to examine differences in HIV incidence due to low numbers of new infections (n = 8) in this sub-group.

These findings suggesting promising effects on HIV risk behavior among young program participants contrast with prior analyses in which more modest indirect effects were observed among young people living in the households or communities when the intervention was offered. There are a number of potential reasons for this. First, indirect effects in the latter group would have to occur through diffusion from those receiving the intervention to the wider community via mentorship, education, or participation in community activities. Because the time for recruitment and for participants to receive the full intervention package was on an average 18 months, the opportunity for such diffusion to take place over the 2-3 year study duration was limited. Second, though the intervention reached 10% of eligible households, this may have been insufficient to generate wider effects. Third, as the program targeted the poorest, it may not have reached key opinion leaders in target communities. Finally, though the intervention effects may have been evident among direct intervention participants, social mobilization may have been insufficiently robust to stimulate wider community level effects on HIV risk behavior.

The present research highlights the potential for structural interventions that address the economic and social vulnerability of women to contribute to measurable health gains, including reductions in levels of IPV and high-risk sexual behavior. Although the relative contributions of the economic and educational dimensions of our intervention remain the subject of further study, it is clear that addressing women's immediate financial needs provided an important incentive for maintaining sustained contact with a gender-focused HIV prevention program in an area where few such opportunities exist.

However, how to best deliver integrated health and development interventions is not always straightforward. Recent research from southern Africa where microfinance-based programs target exclusively younger clients as a means of addressing HIV risk have met with mixed success [20]. Young women are often more mobile, less socially rooted, and less experienced in establishing income-generating enterprises than the usual profile of older microfinance clients. The economic viability of these pilot initiatives has suffered, and in such settings, integrating health components can be a tremendous challenge [21]. When viewed alongside the results of our study, addressing HIV risk behaviors may be better achieved as a result of partnerships with well established microfinance programs working with diverse age groups in vulnerable communities, rather than specifically tailoring novel interventions to reach high-risk groups.

Finally, though microfinance may be one strategic entry point for integrating economic and health interventions, there are likely many others – from schools and workplace programs, to incentive-based initiatives linking cash transfers to participation in health programs [22–24]. Our findings raise intriguing questions about the potential synergy of such combined approaches and highlight the need for further innovation and operational research.

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P.M.P. was the principal investigator of the study and project leader in South Africa, led the drafting of this manuscript and contributed to all aspects of the study. J.C.K. was responsible for the development and implementation of the training component of the intervention, the design and validation of survey instruments for gender violence, and contributed to the analysis. T.A. performed the statistical analysis. G.P. was the team leader in South Africa for the qualitative component of the study and conducted the qualitative analysis for this study. J.R.H. was responsible for the study design, field management of survey teams, data management, overall quantitative analysis, and assessment of process indicators. L.A.M. contributed to the overall

design of the study and provided major support for the statistical analysis. C.W. provided support to the training intervention, the design of survey tools, and the analysis. J.B. provided technical support to the qualitative research team. J.D.H.P. participated in the initial conceptualization of the intervention, the trial design, and advised on most aspects of the study. All authors contributed to the drafting of this manuscript.

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We declare that we have no conflict of interest.

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