Published in final edited form as:

AIDS. 2011 July 31; 25(12): 1535–1541. doi:10.1097/QAD.0b013e328348fb85.

The forgotten half of the equation: randomized controlled trial of a male invitation to attend couple voluntary counselling and testing

Boshishi K.F. Mohlala, Marie-Claude Boily, and Simon Gregson

Department of Infectious Disease Epidemiology, Imperial College London, London, UK.

Abstract

Objective—Increased male participation in antenatal care and uptake of couple voluntary counselling and testing (VCT) for HIV could reduce horizontal and vertical HIV transmission in sub-Saharan Africa.

Methods—Randomized controlled trial to compare pregnant women's acceptance of written invitations for VCT and pregnancy information sessions (PISs) – the control group – for their male sexual partners (MSPs) and uptake of VCT among these pregnancy partners in Khayelitsha, South Africa.

Results—All women in the study accepted the invitation letters and agreed to invite their pregnancy partners to attend for VCT or PIS as requested. Thirty-five percent (175 of 500) pregnant women given VCT invitations for their partners brought their MSPs for antenatal clinic visit compared with 26% (129 of 500) given PIS invitations [relative risk (RR) 1.36, 95% confidence interval (CI) 1.12–1.64, $P = 0.002$]. Thirty-two percent (161 of 500) MSPs in the VCT arm underwent HIV testing compared with 11% (57/500) in the PIS arm (RR 2.82, 95% CI 2.14–3.72, $P < 0.001$). The proportions of women and men reporting unprotected sex during the pregnancy were lower in the MSP VCT arm than in the MSP PIS arm – 25 versus 81% (RR 0.30, 95% CI 0.22–0.42, $P < 0.001$) and 26 versus 76% (RR 0.34, 95% CI 0.25–0.47, $P < 0.001$), respectively. No differences were seen in intimate partner violence.

Conclusion—Providing pregnant women with a written invitation for their partners increased male participation in antenatal care and uptake of couple VCT in a township in Cape Town, South Africa where community sensitization was conducted and antiretroviral therapy was available.

Keywords

couple voluntary counselling and testing; male partner involvement; mother-to-child transmission; parent-to-child transmission of HIV

Introduction

In 2008, around 430 000 (plausibility bounds, 240 000–610 000) infants were infected with HIV mainly through parent-to-child transmission (PTCT), bringing the total number of

© 2011 Wolters Kluwer Health | Lippincott Williams & Wilkins

Correspondence to Dr Boshishi K.F. Mohlala, PhD, Department of Infectious Disease Epidemiology, Imperial College London, Norfolk Place, London W2 1PG, UK. bmohlala@doctors.org.uk.

M.-C.B. and S.G. declare no conflict of interest.

The trial was registered on ClinicalTrials.gov, registration number NCT00405990.

children to 2.1 million (1.2–2.9 million) under the age of 15 years living with HIV [1]. In 2008 alone, 280 000 (150 000–410 000) children under the age of 15 years succumbed to AIDS [1]. Prevention of horizontal and vertical transmission during pregnancy requires communication, agreement and cooperation between couples [2–7]. However, traditionally, prevention of PTCT (PPTCT) programmes focus on pregnant women and the role of men is ignored; men are indeed the forgotten half of this equation.

Male sexual partners (MSPs) often influence the decisions that women make during and following pregnancy in sub-Saharan African communities, such as on mode of delivery and infant feeding [8]. Couple counselling has been promoted as a strategy to improve uptake of PPTCT interventions and to minimize adverse social outcomes associated with disclosure of HIV status [9–13]. In a prospective nonrandomized clinical trial cohort in Kenya, partner participation in voluntary counselling and testing (VCT) was associated with increased uptake of interventions to prevent vertical and sexual transmission of HIV [14]. However, few other scientific studies have been conducted to evaluate strategies for involving male partners in PPTCT programmes in areas of high HIV prevalence.

In this study, we assess the acceptability and feasibility of asking pregnant women to invite their MSPs to attend antenatal clinic (ANC) and to take up VCT in Khayelitsha, Cape Town, South Africa in the context of antiretroviral treatment (ART) provision and a community sensitization programme. Particularly, we report findings from a randomized controlled trial (RCT) of pregnant women's acceptance of written invitations for VCT and pregnancy information sessions (PISs) for their MSPs and uptake of VCT among these pregnancy partners.

Methods

Community sensitization activities to encourage involvement of men in ANC were carried out in the study area from 9 months before the start of the RCT and during recruitment and follow-up. Flyers and posters were distributed and displayed at places frequented by men at the beginning of each phase of the campaign and the distribution was maintained in the subsequent months. Residents meetings, radio shows and church meetings to discuss and encourage male participation in ANC were held every week.

Between November 2006 and December 2007, we screened consecutive pregnant women attending for their ANC booking visit at site B midwife and obstetrician unit (MOU) in Khayelitsha, Cape Town, South Africa for inclusion in this study. This clinic was chosen for the study because it had facilities for interviewing men and provision of ART. The criteria for enrolment were gestational age less than 30 weeks and willingness and ability to give informed consent. The study was approved by University of Cape Town Ethics Review Committee in South Africa (Ethics Committee, REC REF: 297/2006) and was registered with ClinicalTrials.gov (NCT00405990).

At the booking visit, all women were offered antenatal care, HIV group education and individual VCT as usual in the study setting. Women were screened and, if eligible to participate, received a thorough explanation of the study, including the objectives and procedures, and were invited to sign the consent form and enrol into the study. Half of the cohort members were randomly assigned to MSP VCT and the other half to an MSP PIS. The randomization was prepared before the first woman was enrolled using the Access 2003 computer-generated randomization scheme.

Sealed opaque envelopes were prepared containing the details of the study arms to which women would be allocated. Each envelope was used once and was opened only if a pregnant woman gave written consent to participate in the study. The opaque envelopes were labelled

on the outside with sequential study identification numbers. When a new participant was ready to be randomized, clinic staff opened the next envelope in the series, assigned her the corresponding study identification number and allocated her to the group indicated. It was not possible for the clinic staff or the research team to know in advance the treatment allocation. It was only after the opaque envelope had been opened that the treatment allocation became known. The process was monitored by the principal investigator to ensure that women were randomized to the correct arm, that written consent was obtained and that the study numbers and open envelopes corresponded.

Each woman in the MSP VCT arm was given a written invitation to hand to her pregnancy partner, inviting him to attend ANC and VCT with her the following week. In the MSP PIS arm, each woman was given a written invitation to give to her pregnancy partner, inviting him to attend ANC and PIS with her the following week. A pregnancy partner was defined, for a woman, as the male partner who impregnated her in the current pregnancy and, for a man, as the woman he impregnated in the current pregnancy.

The research team recorded the acceptance of the pregnant women to invite their MSP at enrolment. Participants, research team members and clinic staff were not blinded due to the nature of the study: to assess the acceptability of pregnant women to inviting their partners to either VCT or PIS. No financial or other inducements were offered to the women or their partners for accepting the invitations or attending for VCT or PIS.

At the two study/couple visits, 1 and 12 weeks after randomization, pregnant women and their MSPs were interviewed, using a privately administered structured questionnaire and the informal confidential voting interview technique [15] for data on sexual behaviour in the local language, *isiXhosa*, by the principal investigator and a research assistant.

Men in the MSP VCT and MSP PIS arms were offered VCT and PIS, respectively. The PIS procedure consisted of routine pregnancy counselling and discussion on signs of fetomaternal compromise. The counsellor discussed the pregnancy with the participants; using fetal pictures, routine pregnancy charts and ultrasound results were available. The participants were given ample opportunity to ask questions. Thereafter, the counsellor focused the discussion on pregnancy warning signs. Signs such as decreased fetal movement, bleeding during pregnancy, show, breaking of waters, headaches, swelling and abdominal pains were discussed and the necessary action recommended.

The VCT procedure consisted of confidential counselling and voluntary HIV testing. The counsellor discussed HIV risk behaviour, risk assessment, coping with test results, serodisclosure, risk reduction strategies and the benefits of testing. The participants were allowed ample time to ask questions. Thereafter, the HIV testing procedure and the limitations of HIV testing were discussed. The counsellor ensured that the participants understood the procedure and requested informed consent. If the participant agreed to take the test, he was asked to sign an HIV testing consent form.

Those who consented to HIV testing underwent rapid HIV testing and posttest counselling at the same sitting. Men in the MSP PIS arm whose pregnant partner tested positive for HIV were also offered VCT and HIV testing at this first couple visit. VCT was also provided if requested by any study participant at any stage of the study irrespective of study arm (because it was considered unethical not to offer VCT on request). The remainder of the male partners in the MSP PIS arm were offered VCT at the second study/couple visit late in pregnancy (12 weeks after the first visit).

All laboratory blood tests were conducted by the clinic nursing staff in a routine manner following pre-existing local protocols. HIV testing was performed using HIV TRI LINE

Rapid test and, when the result was positive, was repeated with InstantScreen Rapid HIV-1/2 assay for confirmation. If the initial results were indeterminate (discordant), a standard HIV ELISA antibody test (Abbott AxSYM, Chicago, Illinois, USA) was performed to determine the HIV status. For all HIV-positive individuals, blood was taken for full blood counts, differential white cell counts and CD4⁺ and CD8⁺ T-cell counts. All tests were performed using standard analysis in the laboratories routinely used for ANC clients at site B MOU. HIV results were provided by the clinic's lay counsellors in a routine manner as part of posttest counselling. Individuals who tested positive for HIV with a CD4⁺ T-cell count less than 200 cells/ μ l were referred for HAART assessment and followed up in the ART clinic. All women received their antenatal care as usual from the ANC and were referred appropriately as required. Women and men were each offered ART if appropriate and formula feeding (or exclusive breastfeeding) was recommended. All HIV-positive individuals were given information about local HIV support groups and ART clinic.

Statistical analysis

On the basis of the available estimates of male partner ANC participation and HIV testing [14], a sample size of 1000 was estimated to be required to detect a 5% difference in these proportions between the study arms at the first study/couple visit, with 90% power.

Data were double entered into a database using Stata software (800-STATA-PC, College Station, Texas, USA; copyright 1984–2003). The analysis proceeded according to a detailed preprepared data analysis plan. The primary analysis was conducted on an intention-to-treat basis and included all randomized participants. The proportions of women bringing MSPs to attend ANC and VCT were calculated separately for each study arm and compared statistically across the study arms using Fisher's exact test, with tests for significance being two tailed ($P < 0.05$).

Univariate and multivariate logistic regression analyses were conducted to identify factors associated with male partner attendance adjusted for age, partner's age, education, employment, living arrangement, relationship status, HIV status and partner's HIV status.

The following variables were used to assess sexual behaviour: overall sexual activity, defined as sexual intercourse, with and without condoms, and unprotected sex, defined as sexual intercourse without condoms in the last 2 weeks before the couple visits. Intimate partner violence was defined as physical and/or sexual violence and/or psychological abuse among men and women who attended couple visits in each study arm at both visits. Variables considered as violence included occurrences of different types of physical (slap or punch, kick, push, etc.), psychological (threats, insults, humiliating remarks, abnormal jealousy, fear, etc.) and sexual abuse (nonconsensual sex) with the participant's partner.

Results

Figure 1 outlines the conduct of the clinical trial. Of the 1122 pregnant women screened, 122 did not meet the eligibility requirements; all had pregnancies with gestational age of more than 30 weeks. At enrolment (before the invitation letter) no MSP attended ANC with their pregnant woman. No woman declined to participate. Of the 1000 women enrolled, 500 were randomly allocated to a partner's PIS invitation letter and the other 500 were allocated a partner's VCT invitation letter. Although all enrolled pregnant women accepted the invitation letter and agreed to invite their current pregnancy partner at the booking visit (enrolment), overall 30% (304) brought their MSP to the ANC at both couple visits. One woman invited her current pregnancy partner and also her other two regular partners. The pregnant women's sociodemographic characteristics at baseline (booking visit) were comparable between the two study arms (Table 1).

At the first couple visit, 1 week after randomization, 35% (175 of 500) pregnant women brought their MSPs in the MSP VCT arm, compared with 26% (129 of 500) in the MSP PIS arm [relative risk (RR) 1.36, 95% confidence interval (CI) 1.12–1.64, $P = 0.002$]. In the MSP VCT arm, 32% (161 of 500) of pregnant women's MSPs underwent HIV testing compared with 11% (57 of 500) in the MSP PIS arm (RR 2.82, 95% CI 2.14–3.72, $P < 0.0001$).

In the 175 couples in the MSP VCT arm, 161 men accepted HIV testing and 14 men declined, stating that they were not ready for a test. Of the 129 men in the MSP PIS arm, 72 were offered PIS only, 52 were offered VCT in addition because their pregnant partners tested HIV positive and only five men requested HIV testing in addition to PIS on their own initiative. All the 304 pregnant women tested at booking (11 women knew their HIV status from previous ANC testing and were retested); 218 (72%) men tested at the first couple visit and a further 81 (26%) tested at the second couple visit as per study protocol. Among those tested, 183 women (60%) and 160 men (53%) tested HIV positive.

Before adjustment, the following variables at first couple visit were significantly associated with MSP attendance for ANC: VCT invitation letter, age, partner's age, gestational age (negative association), living together, partner's tertiary education (negative association), woman's HIV infection status and planned pregnancy (Table 2). After adjustment, only VCT invitation letter, gestational age, partner's education and woman's HIV status remained associated. These results suggest that VCT invitation letter compared with PIS invitation letter was associated with increased MSP ANC attendance.

The proportions of women and men reporting sexual intercourse (in the last 2 months) and unprotected sex (in the last 2 weeks) prior to the first couple visit were similar in the two study arms (Table 3). The proportions of women and men reporting unprotected sex over the 2 weeks prior to the second couple visit was lower in the MSP VCT arm than in the MSP PIS arm – 25 versus 81% (RR 0.30, 95% CI 0.22–0.42, $P < 0.001$) and 26 versus 76% (RR 0.34, 95% CI 0.25–0.47, $P < 0.001$), respectively.

Adverse events

Intimate partner violence was the only adverse event reported by the participants during the trial – 17 pregnant women and five male pregnancy partners. There were no reports of separation, divorce or death. When the reports given by all study participants were considered, self-reported intimate partner violence at second couple visit did not differ ($P < 0.05$) between the two study arms for either women or men – for women: 4% (seven) in the MSP VCT versus 7% (10) in the MSP PIS arm ($P = 0.207$); and for men: 0.5% (one) MSP VCT versus 3% (four) in the MSP PIS arm ($P = 0.167$).

Discussion

The use of the MSP VCT invitation letter significantly increased the number of MSPs attending ANC and HIV testing compared with the use of a MSP PIS invitation letter. These findings suggest that in Khayelitsha – and perhaps in other similar settings in sub-Saharan Africa – it is possible to increase the number of MSPs attending HIV testing in ANC by inviting them. This is important because VCT may promote safer behaviour particularly among HIV-positive individuals [16,17]; it may reduce numbers of men having extramarital partners and may help to support HIV-positive women in taking up PPTCT interventions [14]. Other potential secondary benefits of male partner attendance include earlier diagnosis and better treatment outcomes for men, viral load suppression and less transmission to female partners and referral for circumcision for HIV-negative men.

One of the strengths of this study is that it was conducted in a high HIV prevalence area. Furthermore, the women invited their partners after they had had an HIV test at ANC and had knowledge of their own HIV status; thus, programmes may add this intervention without changing their current practice of testing women at booking. Women can invite their MSPs to attend ANC with them on their second visit and this will increase male uptake of VCT.

The male partner ANC attendance rate of 30% seen in this study was higher than that achieved in the only previous similar study in Kenya, where only 15% of women's MSPs attended ANC and HIV couple counselling [14]. In our study, 92% of the MSPs who attended ANC as a result of the MSP VCT invitation underwent HIV couple testing compared with 44% of those who attended PIS. In the Kenyan study, only 38% of the MSPs who attended ANC participated in couple testing (posttest counselled as a couple). The community sensitization activities and availability of ART (not available in Kenyan study) might have increased the number of MSPs attending ANC and HIV testing in our study. In the multivariate analysis, the VCT invitation letter and woman's positive HIV infection status were positive predictors of MSP attendance, whereas partners' age and gestational age were negative predictors of MSPs' attendance. The VCT invitation letter and woman's positive HIV status may have encouraged women to motivate their partners to attend; on the contrary, MSPs might have been motivated by the opportunity to know their HIV status given the availability of ART. In the PIS arm, offering information about the health of the unborn baby does not seem to have provided sufficient motivation to persuade MSPs to attend ANC VCT. Although the results suggest that male partners will attend ANC and VCT in these circumstances, it is not clear whether MSP attendance would be sustained in future pregnancies or whether, after attendance of the first pregnancy, men would lose interest and not attend ANC in subsequent pregnancies. These questions need to be addressed in future studies.

There was no evidence that inviting male partners to attend ANC and VCT increased the risk of self-reported intimate partner violence in either women or men compared with inviting male partners for PIS in the study setting in Khayelitsha, South Africa. The proportion of self-reported intimate partner violence was comparable between the two study arms at first and second couple visits for both men and women. As in a study done in Kenya in 2006 [18], the proportions of respondents reporting intimate partner violence for the first time after MSP ANC, VCT and PIS at the second couple visit were very small and did not differ between the two study arms; however, this may have been due to under-reporting. The small numbers may also have limited the power to detect differences in this study.

Conclusion

In this RCT, we demonstrated that inviting MSPs to attend ANC and HIV VCT using a letter delivered by their pregnant partners can increase the number of male partners attending counselling and testing in ANC in a high HIV prevalence setting in which ART services are available and community sensitization activities are conducted. However, more studies are needed to assess if our results can be generalized to a broader context.

Acknowledgments

This study was funded by the Wellcome Trust.

The authors thank Wellcome Trust, colleagues at Khayelitsha MOU, University of Cape Town and Imperial College.

The study was conceived by B.K.F.M., M.-C.B. and S.G. Data were collected and analysed by B.K.F.M. All authors participated in data interpretation and in the writing of the manuscript.

After the study, B.K.F.M. was employed by Roche as Drug Surveillance Physician (2008) and by MSD and GSK as Medical Adviser (2010/11).

References

1. UNAIDS. Global report: UNAIDS report on the global AIDS epidemic. UNAIDS; Geneva, Switzerland: 2010. <http://www.unaids.org/en/AboutUNAIDS/AboutTheWebsite/SiteIndex.asp>
2. Chama CM, Audu BM, Kyari O. Prevention of mother-to-child transmission of HIV at Maiduguri, Nigeria. *J Obstet Gynaecol.* 2004; 24:266–269. [PubMed: 15203622]
3. Baiden F, Remes P, Baiden R, Williams J, Hodgson A, Boelaert M, et al. Voluntary counseling and HIV testing for pregnant women in the Kassena-Nankana district of northern Ghana: is couple counseling the way forward? *AIDS Care.* 2005; 17:648–657. [PubMed: 16036251]
4. M'Pele, P.; Lallemand-Le Coeur, S.; Lallemand, MJ.; Mboup, S. AIDS counseling in Africa. In: Kanki, PJ.; Kalengayi, MR., editors. *AIDS in Africa.* Raven Press; New York: 1994. p. 463–472.
5. Ulin PR. African women and AIDS: negotiating behavioural change. *Soc Sci Med.* 1992; 34:63–73. [PubMed: 1738858]
6. Bajos N. Social factors and the process of risk construction in HIV sexual transmission. *AIDS Care.* 1997; 9:227–237. [PubMed: 9135636]
7. Edgar T, Freimuth VS, Hammond SL, McDonald DA, Fink EL. Strategic sexual communication: condom use resistance and response. *Health Commun.* 1992; 4:83–104.
8. Pool R, Nyanzi S, Whitworth JA. Breastfeeding practices and attitudes relevant to the vertical transmission of HIV in rural south-west Uganda. *Ann Trop Paediatr.* 2001; 21:119–125. [PubMed: 11471254]
9. Painter TM. Voluntary counseling and testing for couples: a high-leverage intervention for HIV/AIDS prevention in sub-Saharan Africa. *Soc Sci Med.* 2001; 53:1397–1411. [PubMed: 11710416]
10. Grinstead OA, Gregorich SE, Choi KH, Coates T, for the Voluntary HIV-1 Counselling and Testing Efficacy Study Group. Positive and negative life events after counselling and testing: the Voluntary HIV-1 Counselling and Testing Efficacy Study. *AIDS.* 2001; 15:1045–1052. [PubMed: 11399987]
11. Pool R, Nyanzi S, Whitworth JA. Attitudes to voluntary counselling and testing for HIV among pregnant women in rural south-west Uganda. *AIDS Care.* 2001; 13:605–615. [PubMed: 11571007]
12. Maman S, Mbwapo J, Hogan NM, Kilonzo GP, Sweat M. Women's barriers to HIV-1 testing and disclosure: challenges for HIV-1 voluntary counselling and testing. *AIDS Care.* 2001; 13:595–603. [PubMed: 11571006]
13. Semrau K, Kuhn L, Vwalika C, Kasonde P, Sinkala M, Kankasa C, et al. Women in couples antenatal HIV counseling and testing are not more likely to report adverse social events. *AIDS.* 2005; 19:603–609. [PubMed: 15802979]
14. Farquhar C, Kiarie JN, Richardson BA, Kabura MN, John FN, Nduati RW, et al. Antenatal couple counseling increases uptake of interventions to prevent HIV-1 transmission. *J Acquir Immune Defic Syndr.* 2004; 37:1620–1626. [PubMed: 15577420]
15. Gregson S, Mushati P, White P, Mlilo M, Mundandi C, Nyamukapa C. Informal confidential voting interview methods and temporal changes in reporting sexual risk behaviour for HIV transmission in sub-Saharan Africa. *Sex Transm Infect.* 2004; 80:36–42.
16. Baingana G, Choi KH, Barrett DC, Bayansi R, Hearst N. Female partners of AIDS patients in Uganda: reported knowledge, perceptions and plans. *AIDS.* 1995; 9:S15–S19. [PubMed: 8561996]
17. O'Reilly KR, Piot P. International perspectives on individual and community approaches to the prevention of sexually transmitted diseases and human immunodeficiency virus infection. *J Infect Dis.* 1996; 174:S214–S222. [PubMed: 8843251]
18. Kiarie JN, Farquhar C, Richardson BA, Kabura MN, John FN, Nduati RW, John-Stewart GC. Domestic violence and prevention of mother-to-child transmission of HIV-1. *AIDS.* 2006; 20:1763–1769. [PubMed: 16931941]

Fig. 1. Flowchart showing recruitment details

Compares male sexual partner attendance at antenatal clinic (ANC) and uptake of voluntary counselling and testing (VCT) in the VCT and pregnancy information session (PIS) arms of the trial. GA, gestational age; MSP, male sexual partner.

Table 1

Sociodemographic characteristics of female participants by study arm at baseline.

Characteristic	MSP VCT arm (n = 500)	MSP PIS arm (n = 500)
Age (years), mean (SEM)	26 (0.27)	25 (0.27)
Age for MSPs (years), mean (SEM)	31 (0.32)	30 (0.34)
Education (tertiary) (%)	26	24
Unemployed (%)	52	57
Literacy (able to read a newspaper) (%)	98	99
Media exposure (listens to radio every day) (%)	96	96
Media exposure (watches television every week) (%)	96	97
Nulliparous (%)	39	41
Coresidence with MSP (%)		
Live separately	33	32
Live together sometimes	20	24
Live together all the time	47	45

MSP, male sexual partner; PIS, pregnancy information session; VCT, voluntary counselling and testing.

Table 2

Correlates of male sexual partner attendance at antenatal clinics in Khayelitsha, South Africa at first couple visit.

Correlate	Odds ratio (95% CI)	P value	Adjusted odds ratio ^a (95% CI)	P value
Intervention				
PIS	1		1	
VCT	1.55 (1.17–2.03)	0.002	1.52 (1.15–2.01)	0.003
Age of woman (years)	1.04 (1.02–1.06)	0.001	1.02 (0.98–1.07)	0.279
HIV infection status				
Uninfected	1		1	
Infected	1.53 (1.16–2.03)	0.003	1.50 (1.11–2.02)	0.007
Parity				
Nulliparous	1		1	
Multiparous	1.20 (0.91–1.59)	0.192	0.86 (0.60–1.24)	0.434
Pregnancy planning				
Unplanned	1		1	
Planned	1.46 (1.03–2.08)	0.034	1.26 (0.87–1.83)	0.224
Gestational age (weeks)	0.96 (0.93–0.98)	0.001	0.96 (0.93–0.98)	0.003
Education				
Secondary or below	1		1	
Tertiary	0.92 (0.67–1.26)	0.6	0.91 (0.65–1.28)	0.586
Employment				
Unemployed	1		1	
Employed	1.03 (0.78–1.36)	0.807	1.15 (0.86–1.54)	0.344
Age of male sexual partner (years)	1.03 (1.01–1.04)	0.004	1.00 (0.97–1.03)	0.85
Relationship status				
Finished	1		1	
Ongoing	0.87 (0.47–1.61)	0.651	0.82 (0.43–1.57)	0.55
Relationship duration (months)	1.00 (1.00–1.01)	0.033	1.00 (1.00–1.01)	0.385
Coresidence status				
Live separately	1		1	
Live together	1.41 (1.05–1.90)	0.023	1.15 (0.81–1.60)	0.427

Correlate	Odds ratio (95% CI)	P value	Adjusted odds ratio ^a (95% CI)	P value
Partner's education				
Secondary or below	1		1	
Tertiary	0.70 (0.53–0.93)	0.014	0.72 (0.53–0.97)	0.031
Partner's employment				
Unemployed	1		1	
Employed	1.32 (0.77–2.25)	0.323	1.37 (0.79–2.40)	0.264

CI, confidence interval; PIS, pregnancy information session; VCT, voluntary counselling and testing.

^a Adjusted for form of intervention, age, HIV status, pregnancy planning, gestational age (negative association), partner's age, coresidence and partner's education (negative association).

Table 3

Sexual behaviour and intimate partner violence after male sexual partner attendance of attend antenatal clinic by study arm.

Characteristic	MSP VCT % (n/N)	MSP PIS % (n/N)	RR	95% CI	P value
Women					
Overall sexual activity	77 (134/175)	61 (79/129)	1.25	1.07–1.47	0.005*
Unprotected sex ^a	25 (33/134)	81 (64/79)	0.30	0.22–0.42	<0.001*
Intimate partner violence	4 (7/175)	8 (10/129)	0.52	0.20–1.32	0.207
Men					
Overall sexual activity	79 (138/175)	64 (83/129)	1.23	1.05–1.42	0.006*
Unprotected sex ^a	26 (36/138)	76 (63/83)	0.34	0.25–0.47	<0.001*
Intimate partner violence	0.6 (1/175)	3 (4/129)	0.18	0.02–1.63	0.167

CI, confidence interval; MSP, male sexual partner; PIS, pregnancy information session; RR, relative risk; VCT, voluntary counselling and testing.

^a Among those reporting intercourse.* Statistically significant $P < 0.05$.