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Changing attitudes and beliefs towards a woman's right to protect against HIV risk in Malawi

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Abstract

Female empowerment and positive attitudes towards women's rights in sexual relationships have been found to be key elements of successful behaviour-based HIV prevention programmes. However, HIV prevention programmes that do not specifically engage with gender issues may also affect attitudes and beliefs towards women's rights within sexual relationships. Using data from the Malawi Longitudinal Study of Families and Health (MLSFH) we compare measures of female empowerment and changing gender norms between intervention participants and non-participants. Results suggest that female intervention participants were more likely than non-participants to believe that (1) women have more rights within sexual relationships in general, and (2) women have the right to protect themselves against HIV risk (indicating possible increases in female self-efficacy in making HIV prevention decisions). Male intervention participants showed no substantial positive change in attitudes towards women's rights. These results highlight an important positive effect of HIV prevention programmes on women's attitudes towards their own rights.

Keywords

HIV prevention; behavioural intervention; women's rights; female self-efficacy; Malawi

Introduction

HIV prevention programmes focusing on behavioural approaches to HIV risk reduction, such as condom use or the avoidance of multiple sex partners, are essential for reducing individual and population level HIV risk, especially in places with generalised epidemics such as Malawi and other areas of sub-Saharan Africa (Kippax and Stephenson 2012; Behrman and Kohler 2012). While the success of such prevention programmes often depends on their ability to change attitudes, beliefs, and social norms regarding sexual behaviour, and convey knowledge about HIV prevention and transmission (Maticka-Tyndale 2012), attitudes and beliefs towards women's rights within sexual relationships also have an important influence on the efficacy of behavioural based HIV prevention programmes (Richardson et al. 2014; Amaro 1995). In particular, HIV prevention

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programmes may be more successful if they are able to influence gender norms and beliefs about women's behaviour in sexual relationships (Richardson et al. 2014; Amaro 1995). Many HIV prevention programmes do aim to 1) empower women to control their own HIV risk and increase their self-efficacy in asserting HIV prevention tactics, and 2) change existing gender norms that may be detrimental to HIV prevention and women's health more broadly (Jewkes, Wood, and Duvvury 2010; Jaganath et al. 2014; Hardee et al. 2014). However, among more general HIV prevention programmes that do not specifically focus on female empowerment and changing gender norms, it is unclear whether prevention information alone also leads to more positive attitudes towards women's rights within sexual relationships and women's rights in making decisions related to HIV prevention. In this study, we seek to address this question by evaluating the outcomes of a general HIV prevention intervention programme with respect to attitudes and beliefs towards women's rights within sexual relationships.

Background

HIV risk is greatly exacerbated by gender inequality (Amaro 1995). Women often lack equal rights within sexual relationships, giving them less control than their male partners over condom use or safe sexual behaviour (Ackermann and de Klerk 2002; Jewkes and Morrell 2012). Gender and power theory outlines norms governing social and sexual relationships between men and women (Connell 1987). It offers a useful guide for clarifying how gender norms and expectations are linked to sexual behaviour and HIV risk (Weine et al. 2013; Hahm et al. 2012; Teitelman et al. 2011; DePadilla et al. 2011; Wingood and DiClemente 2000). Gender and power theory identified three key factors that define and constrain the roles of men and women within relationships: the sexual division of labour, the sexual division of power, and the structure of cathexis. The *sexual division of labour* refers to women's constrained economic position and women's reliance on men for financial support (Connell 1987; Wingood and DiClemente 2000), reducing women's ability to negotiate safer sex or condom use (Hardee et al. 2014; Wingood and DiClemente 1998). The *sexual division of power* refers directly to women's lack of bargaining power within sexual relationships as a result of male control, authority, or coercion (Wingood and DiClemente 2000; Connell 1987), leaving women in a more vulnerable position when it comes to HIV risk (Amaro 1995; Ackermann and de Klerk 2002; Jewkes and Morrell 2012; Raiford, Seth, and DiClemente 2013; VanderDrift et al. 2013; Riley and Baah-Odoom 2012). The *structure of cathexis* refers to broader social conventions governing gender norms and expectations, which often define sexual behaviour for women and outline normal female behaviour within relationships (Connell 1987; Wingood and DiClemente 2000). For example, gender norms may lead to the expectation that women are 'passive' receivers in sexual relationships, that women maintain a certain level of chastity and therefore might not or should not carry condoms, or expectations that women should defer to men in making decisions about sexual behaviour (Connell 1987; Wingood and DiClemente 2000), which leads to greater HIV risk for women (Richardson et al. 2014; Hardee et al. 2014; De Santis and Patsdaugher 2014; Horton and Dworkin 2013).

Cultural beliefs and behaviours in Malawi reflect gender inequality. Men are generally perceived as 'biologically programmed' to need sexual relations with more than one woman,

while women are expected to remain faithful to one partner (Bowie 2007). Approximately 80 percent of married men report having sex outside of marriage, often on a regular basis (Bowie 2007). Women are not entirely powerless in Malawi, but the strategies women are able to employ to protect themselves against HIV-related risk are gendered (Schatz 2005; Smith and Watkins 2005). Women report the ability to protect themselves through locally appropriate strategies such as discussing with their husbands the dangers of having extramarital partners, confronting husbands' girlfriends or even divorcing a cheating spouse (Schatz 2005). In studies documenting how women discuss their ability to protect themselves against HIV in Malawi, women do not often cite direct strategies such as refusing sex with an unfaithful spouse or insisting on condom use when they believe themselves to be at risk. The indirect means by which women are able to navigate risk reflect both the sexual division of power and the structure of cathexis, and highlight the limited ability of women to control their own HIV risk.

The effect of existing gender norms and the sexual division of power on women's ability to make decisions about sexual behaviour and HIV prevention may be mediated by a high degree of female self-efficacy (Bandura 1994; Rosenthal and Levy 2010). As applied to HIV risk, self-efficacy is a woman's belief in her own ability to successfully negotiate safer sexual practices with a partner, such as condom use or monogamy (Wingood and DiClemente 2000; Noar 2007). More self-efficacy enables female empowerment within relationships. There is strong evidence that women who exhibit high levels of self-efficacy are more effective at asserting safer sexual practices. More actual and perceived control within a relationship is associated with fewer HIV risk factors (Hahm et al. 2012, Andersson and Cockcroft 2012, Raiford, Seth, and DiClemente 2013). Riley and Baah-Oddom (2012) and Rimal (2009) have shown that greater self-efficacy leads to intentions to engage in safe sex in Ghana and Malawi, respectively. It has also been clearly shown that greater self-efficacy leads to more condom use among women in several US based studies (Woolf and Maisto 2008; DePadilla et al. 2011; Widman et al. 2013; VanderDrift et al. 2013).

Given the existing evidence for the effect of gender norms and the level of female self-efficacy on sexual behaviour and HIV prevention, female empowerment and equalisation of gender roles are the targets of many HIV prevention programmes. A review by Hardee et al. (2014) of interventions conducted mostly in African countries and focusing specifically on empowering women, found that these programmes led to better HIV prevention. In particular, lower HIV risk for women was observed following interventions that sought to transform gender norms or create more financial independence for women (Hardee et al. 2014). Jaganath et al. (2014) examined a programme in Malawi which created a performance as a means of HIV prevention education and also encouraged community dialogue about HIV and AIDS among college students. Findings from this study show that participants retained information about how trust in a relationship affects women, among other themes (Jaganath et al. 2014). Furthermore, most participants reported greater feelings of empowerment than non-participants (Jaganath et al. 2014). A communication-based HIV prevention programme in Malawi changed HIV prevention knowledge and prevention behaviours, as expected, but also had an impact on self-efficacy related to HIV prevention choices among women (Kaufman et al. 2014).

Although not specifically designed to target gender norms and female self-efficacy, voluntary counselling and testing (VCT) and other HIV prevention programmes might nonetheless influence female empowerment as a route to HIV risk reduction. Evaluations of changes in gender norms and female self-efficacy are usually only conducted in studies specifically designed to increase self-efficacy or reduce gender inequality, as discussed above. However, to our knowledge, changes in self-efficacy beliefs and gender-related attitudes have not been explicitly measured as a possible positive consequence of more general HIV prevention programmes. This study is the first to assess changes in beliefs and attitudes related to women's sexual relationships and HIV prevention empowerment rights as a result of a general HIV prevention programme.

Female empowerment and greater equality in sexual relationships are also important for many other human rights issues (Mann et al. 1994), in addition to their beneficial effect on HIV prevention and risk reduction. Greater gender equality and female empowerment are associated with many aspects of women's health and well-being including reduced risk of intimate partner violence; improved general health, fertility, and mortality outcomes; better access to education; and greater economic security (Ackermann and de Klerk 2002; Jewkes et al. 2010; Caldwell 1986). Empowering women and equalising gender norms through HIV prevention programmes therefore may have many additional external benefits for the health and well-being of women, making women's rights an important outcome in and of itself.

This study assesses the effectiveness of a general HIV prevention intervention programme in improving women's self-efficacy and changing unequal or harmful gender norms, goals that are important for HIV prevention as well as the health and well-being of women in general (Mann et al. 1994; Amaro 1995). We focused on two important measures of changes in gender norms related to sexual relationships: 1) beliefs related to a woman's right to make decisions about HIV prevention behaviour within sexual relationships, and 2) more general attitudes towards women's rights within sexual relationships. We conducted separate analysis for men and women. This allowed us to assess whether women in the intervention exhibited greater self-efficacy than women who were not part of the intervention, meaning higher scores among participants for agreement that women should have rights within sexual relationships and rights in making HIV prevention decisions. We examined how these attitudes and beliefs changed in response to participation in an intervention that used payments to incentivise safer sexual behaviour for HIV prevention.

A behavioural intervention programme conducted from 2006 to 2008, called the Sex Diaries Project (SDP) (also known as the Malawi Incentives Project), provided HIV testing and counselling and offered financial incentives to encourage participants to stay HIV-negative (see Kohler and Thornton 2012 for analysis of behavioural change in the SDP). We predicted that these intervention components, although they did not specifically target sexual rights of women, may have led to shifts in beliefs regarding a woman's right to protect against HIV risk, or women's rights within sexual relationships more broadly. In other words, they may have produced secondary changes in gender norms or increases in female self-efficacy, based on women's beliefs and attitudes about their own rights. We hypothesised that both male and female SDP intervention participants would be more likely than non-participants to agree with more egalitarian gender norms, as measured through

beliefs pertaining to a woman's right to make decisions in sexual relationships and her right to make decisions about HIV prevention. Furthermore, we expected that female SDP participants would be more likely to exhibit a higher degree of self-efficacy in sexual relationships and with regard to HIV prevention, as measured through women's perspectives about their own rights.

Data and Methods

Survey Data

The Sex Diaries Project (SDP) was a subcomponent of the Malawi Longitudinal Study of Families and Health (MLSFH), a larger longitudinal study of men and women in Malawi. The MLSFH began in 1998 when ever-married women and their husbands were selected to be interviewed from among randomly chosen households in three rural regions of Malawi: Rumphi in the north, Balaka in the south, and Mchinji in the central region. The survey was repeated in 2001, 2004, 2006, 2008 and 2010. After the 2006 wave of the MLSFH, 1,402 MLSFH participants were randomly selected to also participate in an additional study, the SDP intervention. Any MLSFH respondents who participated in the 2006 survey and agreed to an HIV test as part of the 2006 survey were eligible for random selection. Of those who were offered participation in the SDP, 93% (1,307) accepted. An additional 1,615 comparable men and women, who participated in the main 2006 MLSFH study, were not offered participation in the SDP project. After the SDP intervention project, both SDP participants and non-participants were re-interviewed in 2008 as part of the larger MLSFH project. The 2008 MLSFH survey data, comprised of both SDP participants and non-participants, is the primary data source used in this analysis. Our main analysis compared individual SDP participants and non-participants to examine the effects of SDP participation on the outcomes of interest, *ex post facto*. Complete details about MLSFH sampling, attrition, and representativeness are reported elsewhere (Kohler et al. 2014).

SDP Intervention

One to two months after the 2006 MLSFH survey and HIV testing, the SDP intervention participants were offered financial incentives to maintain their HIV status for approximately one year and also received comprehensive HIV prevention counselling to assist them in meeting this goal. During the intervention study year, the SDP participants were also interviewed up to four times, in addition to completing regular MLSFH surveys, answering detailed questions about recent sexual activity, condom use, and other factors related to HIV risk and prevention. For the purposes of this study, participation in the SDP was defined as participating in at least one of the four possible SDP intervention interviews, thereby giving participants the opportunity to benefit from the additional counselling offered as part of the SDP intervention. Approximately 88 percent participated in all four interviews, nine percent in three, three percent in two and less than one percent in only one interview. The SDP incentives were offered randomly in the amounts of 0, 500 or 2,000 Kwacha for each individual (\$0, \$4, or \$16 US dollars, respectively), given once during the third set of interviews. The latter two incentive amounts represented a substantial amount of money for most survey participants at the time: the GNI per capita in Malawi in 2007 was \$250 per year (WorldBank 2014). We thus incorporated 'incentive' versus 'no incentive' in defining

the intervention groups in order to model the effects of receiving an incentive. Members of sero-discordant couples were oversampled in the SDP project and are therefore excluded from the current analysis to ensure comparability with the non-SDP participants in the main analysis. Kohler and Thornton (2012) have reported full details of the SDP project, and the effect of the intervention and the financial incentives on the primary study outcomes of risky sexual behaviour.

Study Sample

The sub-sample of the MLSFH data used in this analysis is restricted to individuals who participated in the 2008 MLSFH survey, and in 2006 tested negative for HIV and were not a member of a sero-discordant couple. The final sample of 2008 MLSFH participants used in this analysis was comprised of 941 SDP participants and 1,164 non-participants (see supplemental table S1 for details). We compare the outcomes of interest for these individual SDP participants and non-participants. Extensive analysis was undertaken to confirm comparability between participant and non-participant groups, meaning that we ensured that the SDP participant selection was random or at least non-random in knowable and correctable ways (see supplemental material).

Measures

The primary independent variable is SDP participation group, a categorical variable constructed to indicate respondents' non-participation in the SDP, participation with zero financial incentive, or participation with a financial incentive. We separated SDP participants according to their financial incentive to distinguish between the potential effects of participation alone versus participation with an incentive on motivation to change beliefs and attitudes.

Two outcome variables were examined: (1) beliefs regarding a woman's right to protect against HIV risk, and (2) attitude towards gender norms within sexual relationships. Higher scores, as compared to lower scores, on these outcomes indicate a higher level of female self-efficacy. For each of these outcomes, principal components analysis (PCA) was used to construct a composite variable from a set of questions relevant to each concept. These composite variables are easier to interpret than a series of individual variables, and comprise more information relevant to the concepts being measured. The constructed variables from PCA for both concepts are essentially a set of weighted linear combinations of the individual responses to questions (i.e., items) used to define each concept, based on the correlations among the individual items in each set. In this way, each item contributes to the composite variable proportional to its correlation with the other items in the set.

The composite variable measuring beliefs pertaining to a woman's right to protect against HIV risk was derived from three separate questions: (1) Do you think it is proper for a wife to leave her husband if she thinks he might be infected with HIV? (2) Does a woman have the right to refuse unprotected sex with her husband when she thinks her husband may have HIV/AIDS? and (3) Does a woman have the right to refuse unprotected sex with her husband when she thinks she may have HIV/AIDS? Because all three items in the composite variable for belief in a woman's right to protect against HIV risk were binary we used a

tetrachoric correlation matrix based on the frequency of cases in each combination of responses (cross-classified proportions) to assess correlation for use in the PCA (Joreskog 2004, 1994). Only the first component of the PCA was retained, with an eigenvalue of 2.13 and component loadings of 0.58, 0.95, and 0.95 for each of questions one through three, respectively. The retained first component, used to create the composite variable, was generated using regression-based predicted values of varimax rotated component loadings. For ease of interpretation, the composite variable for beliefs regarding a woman's right to protect against HIV risk was rescaled so that values ranged between zero and one, with higher score values reflecting more agreement with women's rights.

The composite variable measuring attitude towards gender norms in sexual relationships was derived from five separate questions: (1) Do you think it is proper for a wife to leave her husband if he is sexually unfaithful? (2) Do you think it is proper for a wife to leave her husband if he does not allow her to use family planning? (3) Do you think it is proper for a wife to leave her husband if he doesn't satisfy her sexually? (4) If a woman often refuses sex with her husband, is it acceptable for the husband to sleep with another sexual partner? and (5) If a woman often refuses sex with her husband, is it acceptable for the husband to sleep with her by force? The first component of the PCA was again the only component retained, with an eigenvalue of 1.66. The component loadings for questions one through five were 0.62, 0.69, 0.75, -0.48, and -0.06, respectively. For ease of interpretation, the variable for attitude towards gender norms in sexual relationships was also rescaled so that values ranged between zero and one, with higher score values reflecting more agreement with women's rights.

All regression results controlled for the following covariates: age in years, region of residence, marital status, and level of schooling. Region of residence includes north (Rumphi), south (Balaka), or central region (Mchinji). Marital status categories include currently married/living together, divorced, widowed, or never married. Level of schooling is measured as no formal education, some/any primary school, and some secondary school or higher.

Statistical Analysis

Ordinary least squares regressions with chow tests for SDP participation group were used to analyse the two outcomes, as well as to generate marginal effects of SDP participation on the outcomes (with all other covariates centered around within-group means). A Chow test refers to the inclusion of interaction terms between SDP participation groups (non-participant, participant without incentive, participant with incentive) and all other covariates in the model. These interaction terms allowed all coefficients to freely differ across SDP participant groups, which better controls for variables that may differentially affect the outcomes for SDP participants (Wooldridge 2009, 245-248). Chow tests allow for formal comparisons between SDP participant groups and are assessed through F-statistics for pairwise differences between (1) SDP participants with incentives and non-participants, and (2) between SDP participants without incentives and non-participants. Chow test F-statistics are also shown for the overall difference in SDP participation, which tests the hypothesis of no difference across SDP participation groups on the outcomes (that is, the overall

significance of the main effect and interaction effects combined for SDP participation on the outcomes). We focus our interpretation on the differences in the (marginal) means among SDP intervention group for each of the two outcomes. Marginal means are easiest to interpret because inclusion of interaction terms in the model obscures the meaning of the main regression coefficients (see supplemental material for full regressions). All regression analyses were conducted separately for men and women, using STATA version 12.

Results

Descriptive Results

Descriptive statistics for the sample according to SDP participant group are reported in Table 1. Results are separated by region due to slight oversampling of SDP participants in the southern region. SDP participants were quite similar to non-SDP participants on most sociodemographic characteristics, with the exception that SDP participants are slightly more likely to be married as compared to non-participants. See supplemental material for thorough analysis confirming the comparability of SDP participants and non-participants. All regression models control for region, marital status, and other sociodemographic characteristics to reduce bias in the results.

Women's Right to Protect against HIV

Among women, the overall effect of SDP participation was a higher likelihood (marginally significant) of agreement that women should have the right to protect against HIV, an effect driven by participants who received an incentive. We found that female SDP participants with incentives were more likely than non-participants to agree that a woman has a right to take protective measures against HIV risk (Table 2a and Figure 1a). Although the Chow test assessing this pairwise difference was only marginally significant ($F = 1.78$, $p = 0.09$), the marginal means showed an average score for beliefs in a woman's right to protect against HIV risk of 0.51 for female SDP participants who received an incentive, which is significantly higher than the marginal mean score for non-participants of approximately 0.46 ($p = 0.05$ for difference). The marginal mean score is 0.45 for female SDP participants without an incentive, which was not significantly different from non-participants ($p = 0.88$ for difference). The Chow test also did not give evidence of a difference between non-participants and SDP participants without an incentive. Recalling that outcome scores range from zero to one, with one meaning more agreement with women's rights, these results indicate that on average female SDP participants who received an incentive had a twelve percent higher mean score in agreement that women should have the right to protect against HIV risk, as compared to non-participants.

Among men (Table 2b and Figure 2a), the chow test assessing pairwise differences between SDP participants with no incentive and non-participants was significant ($p=0.01$), while the chow test measuring the pairwise difference between SDP participants with an incentive and non-participants was not significant. Marginal means results showed no significant differences in the average score for beliefs pertaining to a woman's right to protect against HIV risk between male non-participants and male SDP participants, with or without an incentive, although the point estimates were in a positive direction for SDP participants

relative to non-participants. These mixed results did not yield conclusive evidence of an effect of SDP participation on men's beliefs about women's rights to protect against HIV. The level of approval for men was lower than for women across the board. Marginal mean scores for women ranged between 0.45 and 0.51, while marginal mean scores for men ranged between 0.41 and 0.43.

Women's Rights in Sexual Relationships

The overall effect of SDP participation was also a higher likelihood (marginally significant) of agreement that women should have rights in sexual relationships, but this time the effect was driven by participants who did not receive an incentive (Table 2a and Figure 1b). Female SDP participants with no incentive were more likely than non-participants to hold more positive attitudes towards gender norms related to women's rights within sexual relationships. SDP participants with no incentive had a marginal mean score of 0.48, an eleven percent higher score than the 0.44 average non-participant score ($p = 0.04$ for difference). Chow tests confirmed that SDP participation, compared to non-participation, resulted in more positive attitudes towards women's rights among non-incentive recipients ($F = 2.91$, $p = 0.01$). However, female SPD participants with an incentive on average were not significantly likely to hold more positive attitudes towards women's rights within sexual relationships.

Results for men were quite different (Table 2b Figure 2b). Chow tests gave no evidence of a significant difference between SDP participants and non-participants in attitudes towards women's rights within sexual relationships. Furthermore, we could not reject the null hypothesis of no difference in attitudes towards women's rights within sexual relationships for male SDP participants with no incentive vs. non-participants. There was a marginally significant difference in the marginal mean scores between male SDP participants with an incentive and non-participants in attitudes towards women's rights within sexual relationships. On average, male SDP participants with an incentive may be *less* likely to hold a positive attitude towards gender norms within sexual relationships, with a marginal mean score of 0.37, a nine percent lower score than 0.41 for non-participant men ($p=0.052$). The level of approval for men was again lower than for women. Marginal mean scores for women ranged between 0.44 and 0.48, while marginal mean scores for men ranged between 0.37 and 0.41.

Discussion

Although some HIV risk reduction interventions specifically target women's self-efficacy and gender norm perceptions with empowerment as a goal, even HIV interventions that do not specifically target these constructs may nonetheless have an effect. In the current study, we hypothesised that a consequence of participation in an HIV intervention focusing on behavioural risk reduction (i.e., the SDP intervention) would have the added benefit of increasing positive beliefs and attitudes towards women's rights within sexual relationships, especially women's rights to protect against HIV risk. Overall, our results supported this expectation among women but not men. These results suggest that among women, beliefs and attitudes may become more supportive of women's rights in making decisions related to

sexual behaviour after participation in an HIV prevention programme. However, the size of this effect was fairly small, with increased average agreement score in the magnitude of 11 to 12 percent. Furthermore, the ambiguous role of financial incentives adds an element of inconsistency to the results. Nonetheless, given that changing participants' attitudes towards women's rights was not a goal of the SDP intervention, nor is it a set of beliefs easily amenable to change, the level of effect is non-trivial and may indicate a meaningful shift in women's critical beliefs and attitudes.

The gender specific results suggest that one of the unmeasured benefits of HIV prevention programmes (such as voluntary HIV counselling and testing) may be to increase women's beliefs in their own right to adopt protective measures against HIV risk, reflecting some measurable increase in female self-efficacy. Previous research has highlighted the role of the HIV epidemic in affecting women's ability to make demands in their relationships, or even end relationships, in order to reduce HIV risk (Schatz 2005; Smith and Watkins 2005; Montgomery et al. 2012). However, some HIV prevention programmes specifically target female empowerment as an important means of reducing HIV risk (Hardee et al. 2014). The current study reveals evidence in support of another potential channel through which shifts in beliefs and attitudes towards women may be enabled, within HIV prevention programmes that do not specifically target female empowerment or changes in gender norms. Identifying how and where these changes in attitudes towards women's rights in sexual relationships occur is an important step because of the well-documented impact of increasing women's rights on reducing HIV risk behaviours (DePadilla et al. 2011; VanderDrift et al. 2013; Widman et al. 2013; Richardson et al. 2014; Ackermann and de Klerk 2002). In addition, a higher degree of female self-efficacy and more positive attitudes towards women's rights is an important benefit in its own right. More egalitarian views towards women improve many aspects of health and well-being for women (Caldwell 1986; Ackermann and de Klerk 2002; Jewkes, Wood, and Duvvury 2010).

Separate analyses for men alone gave no indication of a positive effect of SDP participation on beliefs towards women's rights to protect against HIV risk. There was also no indication of a positive effect of SDP participation on positive attitudes towards women's rights within sexual relationships in general. In fact, men who received a financial incentive may have been *less* likely to have positive attitudes towards women's rights within sexual relationships than men who received no incentive or did not participate in the SDP, although evidence for this conclusion is weak. If the constrained economic resources of women increased their reliance on men for financial support (Connell 1987; Wingood and DiClemente 2000), then HIV interventions that provide monetary incentives to men might serve to reinforce gender norms that give men greater control than women in sexual relationships, leading to a more negative attitude towards the rights of women in these relationships. In general, interventions focused on changing men's attitudes towards women's rights are necessary and important, in addition to programmes designed to increase female empowerment, in order to make real progress towards gender equality and to improve the health of both partners (Rosenthal and Levy 2010; Jewkes, Wood, and Duvvury 2010).

The role of receiving a financial incentive in the SDP seems to be rather ambiguous, particularly among women. In the case of beliefs about a woman's right to protect against HIV risk, incentives amplified the positive effect of the programme for female participants. It is possible that receiving a financial incentive partially alleviates financial dependence on men for these women, at least temporarily. Perhaps with even a nominal amount of money women can 'afford' to agree with a broader set of rights. This interpretation is consistent with the notion of a sexual division of labour (Connell 1987; Wingood and DiClemente 2000), as well as with studies finding that economic independence for women lowers their likelihood of engaging in risky sexual behaviour (Hardee et al. 2014; Wingood and DiClemente 1998). A more simplistic explanation is also possible: those receiving an incentive could be more likely to report socially desirable responses to questions as compared to participants not receiving incentives. However, those receiving an incentive were also slightly more likely to participate in a greater number of the four possible SDP interviews as compared to participants who did not receive an incentive (see Kohler and Thornton 2012), possibly indicating that receipt of an incentive motivates participants in the intervention to engage more fully, to adhere to recommendations, and to consider more seriously the implications of risk reducing behaviours. Future research examining programme effects on attitudes towards gender norms and women's rights is needed to clarify the suggestive results found in this analysis. Future qualitative research may be particularly useful in illuminating the relationship between HIV prevention programme participation and changes in gender attitudes.

Female SDP participants with an incentive were not significantly more likely to approve of positive gender norms within sexual relationships as compared to female SDP participants without an incentive. This result may seem counter intuitive, given the stronger effect of SDP participation *with* an incentive on beliefs related to a woman's rights to protect against HIV. Several explanations are possible. The outcome for a woman's right to protect against HIV risk is clearly tied to the focus of the intervention. If social desirability bias was indeed affecting that outcome, it is less likely to be affecting the outcome for gender norms within sexual relationships more generally. The questions addressing general gender norms and women's rights outcomes were not necessarily tied to the focus of the intervention in the minds of the female respondents and therefore may have been less subject to reporting bias. If women with an incentive are more likely to give the perceived 'correct' answers to questions related to HIV, more general questions about gender norms and women's rights may not be subject to such bias. Again, future research, both quantitative and qualitative, examining programme effects on attitudes towards gender norms and women's rights would help clarify these results.

A possible limitation of this study might be contamination between incentive and control groups, which could have reduced the observed effect. In particular, SDP participants and non-participants are from the same villages and most likely share information, particularly if they find information about HIV prevention useful or important. Therefore, the observed effects of the SDP intervention on participants' beliefs and attitudes concerning women's rights in sexual relationships may be conservative. Future research continuing to monitor not only programme effects, but changes in attitudes over time may clarify how attitudes and

beliefs towards HIV prevention and gender norms are changing in HIV endemic communities.

In conclusion, although there are many direct positive effects of behavioural interventions and education programmes to prevent HIV, we have found evidence that an HIV prevention programme may also strengthen women's attitudes toward their right to protect against HIV risk, and assert their rights within sexual relationships. Changes in gender norms and attitudes towards women's rights are important psychosocial determinants of behavioural change and may play a key role in relationship dynamics linked to dyadic risk behaviour, as well as being important in their own right. The results of this study indicate that even an HIV prevention intervention not specifically targeting gender norms and self-efficacy can potentially have an influence on these factors, particularly for women. HIV prevention intervention research needs to understand this potential impact and apply conceptual frameworks that incorporate these factors to better understand the role and contribution of these factors on outcomes.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Figure 1. Women - Marginal mean scores of outcomes with CIs and differences in group means with CIs, by SDP participation group

Note: Values range from 0 to 1. Marginal means calculated based on pooled regression estimates as used for Chow tests

Figure 2. Men - Marginal mean scores of outcomes with CIs and differences in group means with CIs, by SDP participation group

Note: Values range from 0 to 1. Marginal means calculated based on pooled regression estimates as used for Chow tests

Table 1

2008 Descriptive statistics by region, according to SDP participation

	SDP Participant		Non SDP Participant		<i>chi-2 (t-test for age)</i>	<i>p-value</i>
	Mean/%	Std Dev	Mean/%	Std Dev		
<u>Panel A: Balaka (south):</u>						
Male	0.41	0.49	0.40	0.49	0.02	0.89
Age (in years)	39.57	14.40	37.55	14.69	-1.74	0.08
Marital Status:					4.03	0.13
Married	0.85	0.35	0.81	0.39		
Divorced	0.05	0.23	0.07	0.25		
Widowed	0.03	0.18	0.07	0.25		
Never Married	0.06	0.23	0.05	0.22		
Education:					0.30	0.86
No Education	0.44	0.50	0.43	0.50		
Primary	0.53	0.50	0.53	0.50		
Secondary or more	0.04	0.19	0.05	0.21		
Religion:					2.09	0.35
Christian	0.27	0.44	0.22	0.42		
Muslim	0.70	0.46	0.74	0.44		
Other/None	0.03	0.17	0.04	0.19		
Sample Size	382		263			
<u>Panel B: Mchinji (central):</u>						
Male	0.46	0.50	0.44	0.50	0.19	0.67
Age	36.14	11.78	37.10	13.15	0.99	0.32
Marital Status:					9.16	0.01
Married	0.92	0.27	0.86	0.34		
Divorced	0.02	0.12	0.05	0.22		
Widowed	0.01	0.09	0.02	0.15		
Never Married	0.05	0.22	0.06	0.24		
Education:					2.50	0.29
No Education	0.18	0.38	0.20	0.40		
Primary	0.71	0.46	0.72	0.45		
Secondary or more	0.11	0.32	0.08	0.27		
Religion:					1.04	0.59
Christian	0.91	0.29	0.89	0.31		
Muslim	0.01	0.11	0.01	0.09		
Other/None	0.08	0.27	0.10	0.30		
Sample Size	264		455			
<u>Panel C: Rumphi (north):</u>						

	SDP Participant		Non SDP Participant		<i>chi-2</i> (<i>t-test</i> for age)	<i>p-value</i>
	Mean/%	Std Dev	Mean/%	Std Dev		
Male	0.46	0.50	0.45	0.50	0.09	0.77
Age	38.17	13.09	36.90	12.69	-1.31	0.19
Marital Status:					10.12	0.01
Married	0.89	0.31	0.81	0.39		
Divorced	0.02	0.15	0.06	0.24		
Widowed	0.03	0.16	0.04	0.20		
Never Married	0.05	0.23	0.09	0.29		
Education:					3.49	0.18
No Education	0.03	0.17	0.02	0.12		
Primary	0.73	0.45	0.70	0.46		
Secondary or more	0.24	0.43	0.29	0.45		
Religion:					2.20	0.33
Christian	0.85	0.36	0.89	0.32		
Muslim	0.01	0.08	0.00	0.07		
Other/None	0.14	0.35	0.11	0.31		
<i>Sample Size</i>	295		446			

Table 2a

Women's 2008 OLS regressions predicting women's rights outcomes, separated by SDP participation group with Chow tests for formal comparisons across SDP participation groups

Chow tests for differences between SDP participant groups:	Women's Rights to Protect Against HIV			Women's Rights in Sexual Relationships		
	Overall effect of SDP participation	Difference b/w non-participants & participants NO incentive	Difference b/w non-participants & participants with incentive	Overall effect of SDP participation	Difference b/w non-participants & participants NO incentive	Difference b/w non-participants & participants with incentive
F-statistic	1.62	1.27	1.78	1.67	2.91	0.41
p-value	[0.074]	[0.261]	[0.088]	[0.062]	[0.005]	[0.899]
Sample Size	1,127			1,124		
Marginal Mean Scores:	Marginal Means (95% C.I.)	Difference with non-participant (95% C.I.)	p-value	Marginal Means (95% C.I.)	Difference with non-participant (95% C.I.)	p-value
Non-participant	0.458 (0.428, 0.488)	—	—	0.436 (0.416, 0.456)	—	—
SDP Participant - no incentive	0.453 (0.394, 0.512)	-0.005 (-0.072, 0.061)	0.875	0.484 (0.444, 0.523)	0.048 (0.003, 0.092)	0.036
SDP Participant - with incentive	0.511 (0.468, 0.554)	0.053 (0.001, 0.105)	0.047	0.452 (0.423, 0.480)	0.016 (-0.019, 0.051)	0.374
Sample Size	1,127			1,124		

Notes: All Chow test models include first order controls for and interactions with: age, region, marital status, and education. Marginal means calculated based on regression estimates for Chow tests, allowing levels (intercepts) to vary as well as effect of participant characteristics (slopes) to vary according to SDP group. *** p<0.001, ** p<0.01, * p<0.05, † p<0.1

Table 2b

Men's 2008 OLS regressions predicting women's rights outcomes, separated by SDP participation group with Chow tests for formal comparisons across SDP participation groups

Chow tests for differences between SDP participant groups:	Women's Rights to Protect Against HIV			Women's Rights in Sexual Relationships		
	Overall effect of SDP participation	Difference b/w non-participants & participants NO incentive	Difference b/w non-participants & participants with incentive	Overall effect of SDP participation	Difference b/w non-participants & participants NO incentive	Difference b/w non-participants & participants with incentive
F-statistic probability > F	2.09 [0.013]	2.92 [0.005]	1.49 [0.167]	1.25 [0.240]	0.96 [0.459]	1.20 [0.302]
Sample Size	881			874		
Marginal Mean Scores:	Marginal Means (95% C.I.)	Difference with non-participant (95% C.I.)	p-value	Marginal Means (95% C.I.)	Difference with non-participant (95% C.I.)	p-value
Non-participant	0.407 (0.373, 0.441)	—	—	0.409 (0.388, 0.430)	—	—
SDP Participant - no incentive	0.427 (0.360, 0.494)	0.020 (−0.055, 0.095)	0.605	0.412 (0.371, 0.453)	0.003 (−0.043, 0.049)	0.907
SDP Participant - with incentive	0.434 (0.386, 0.481)	0.027 (−0.032, 0.085)	0.375	0.374 (0.345, 0.403)	−0.035 (−0.071, 0.0003)	0.052
Sample Size	881			874		

Notes: All Chow test models include first order controls for and interactions with: age, region, marital status, and education. Marginal means calculated based on regression estimates for Chow tests, allowing levels (intercepts) to vary as well as effect of participant characteristics (slopes) to vary according to SDP group. *** p<0.001, ** p<0.01, * p<0.05, † p<0.1