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Sexual Behavior Change Intentions and Actions in the Context of a Randomized Trial of a Conditional Cash Transfer for HIV Prevention in Tanzania

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Abstract

Information, education, communication and interventions based on behavioral-change communication have had success in increasing the awareness of HIV. But these strategies alone have been less successful in changing risky sexual behavior. This paper addresses this issue by exploring the link between action and the intention to change behaviors. In Africa, uncertainty in the lives of those at risk for HIV may affect how intentions are formed. Characterize this uncertainty by understanding the reasons for discrepancies between intentions and actions may help improve the design of HIV-prevention interventions. Based on an incentives-based HIV prevention trial in Tanzania, the longitudinal dataset in this paper allows the exploration of intended strategies for changing sexual behaviors and their results. The authors find that gender, intervention groups and new positive diagnoses of sexually transmitted infections can significantly predict the link between intent and action. The paper examines potential mediators of these relationships.

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Produced by the Research Support Team

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Introduction

Over 85 percent of HIV infections occur through sexual contact with an infected partner, and could have been avoided through the adoption of safer sexual practices (Askew & Berer, 2003). While information, education and communication (IEC) as well as behavioral change communication (BCC) interventions have had success in increasing knowledge and awareness of HIV, these strategies alone have been less successful in changing risky sexual behavior (Coates et al., 2008). IEC and BCC may prove more effective in reducing risky sexual behavior if complemented by other types of interventions, such as structural or economic-based interventions. Conditional cash transfer programs have been used successfully in recent years in various social policy domains, including public health, to encourage behavior change (Lagarde et al., 2007; Gertler & Boyce, 2003). The success of these programs has sparked interest in applying these incentive-based interventions to HIV prevention.

This paper explores the determinants of consistency between sexual behavior change intentions and actions in the context of an incentive-based HIV prevention intervention conducted in rural Tanzania, the RESPECT trial (de Walque, et al., 2012). The intervention, implemented as a randomized, controlled trial, is a cash transfer contingent upon testing negative for a panel of curable sexually transmitted infections (STIs). Neoclassical economic theory predicts that the conditional cash transfer (CCT) intervention would raise the perceived price of risky sexual behaviors, since a proximate financial reward would become at risk, and thus would reduce risky sex. In addition, as emphasized by researchers from non-economic traditions (Blanc, 2001; Boerma & Weir, 2005; Gupta, 2008; Krishnan et al., 2008; Price & Hawkins, 2007), incentive-based interventions work by affecting gender relations that shape and constrain sexual behaviors and therefore place certain populations at greater risk of HIV infection than others.

Based on previous research (Poulin, 2007; Smith & Watkins, 2005; Tavory & Swidler, 2009; Watkins, 2004), we know that African men and women are actively trying to reduce their risk of HIV infection, though often in complex and perhaps unexpected ways. Risk-reduction strategies are dynamic,

always adapting to varying levels of uncertainty and opportunity, adding a layer of complexity to understanding the association between behavior change intentions and actions. For African women, Johnson-Hanks (2007) argues that the ability to reproduce is a resource in that it provides opportunities that might otherwise not have arisen, and therefore whether or not a woman has a child is dependent on many more things than simply her intentions to do so. Similarly, sex could be considered such a resource, and uncertainty faced in the daily lives of those at risk for HIV infection may influence how intentions are formed and acted upon and how pursuit of one life goal is selected over pursuit of another. Characterizing this uncertainty by gaining a clearer understanding of the reasons for discrepancies between intentions and actions in a particular cultural context may guide design of interventions that are perhaps more effective in reducing risky sexual behavior.

To better understand what factors might intervene between intent to change risky sexual behavior and actual behavior change, we use panel data from the baseline and 4-month follow-up visits of participants enrolled in the Tanzania RESPECT trial. These data provide an opportunity to explore how a cash incentive might influence the consistency or lack thereof between reported intent to change sexual behavior at baseline and reported actual behavior change at follow-up. To our knowledge, this study is unique in its ability to characterize both stated intention and realized actions in panel data before and after a behavioral change intervention such as this.

Conceptual Framework and Hypotheses

Previous research can lend guidance in developing a conceptual frame and corresponding hypotheses relating to sexual behavior change intentions and actions for study enrollees. To understand factors associated with behavior change, authors have studied the reciprocal relationship between self-efficacy, risk perception and behavior change (Bandura, 1977; Ajzen & Fishbein, 1980; Weinstein & Nicholich, 1993; Smith & Watkins, 2005), the effects of receiving STI and HIV test results on subsequent behavior change (Kamali et al., 2003; Thornton, 2006; Wolitski et al., 1997; Boozer & Phillipson, 2000; Gong, 2010), women's economic dependence on men, transactional sex (Hunter, 2002; Luke, 2003;

Maganja, 2007; Nnko & Pool, 1997; Silberschmidt & Rasch, 2001; Swidler & Watkins, 2007) and lack of agency in negotiating sexual decisions as barriers to behavior change (Blanc, 2001; Boerma & Weir, 2005; Gupta, 2008; Krishnan et al., 2008; Price & Hawkins, 2007), and the constraints that married women may face in changing their behavior or attempting to convince husbands to change their behavior (Watkins, 2004; Smith & Watkins, 2005; Chimbiri, 2007; Reiners, 2008).

Moderators of the consistency between intention and behavior such as perceived behavioral control, competing and conflicting intentions, strength of intention, and past behaviors, have also been explored with varying results (Sheeran, 2002; Armitage & Conner, 2001; Ajzen, 1991; Fishbein & Ajzen, 1975; Sheeran & Orbell 1998). A review by Armitage & Conner (2001) found perceived behavioral control to be the strongest predictor of consistency between intentions and behavior.

Models in behavioral economics add to the psychology-based models of behavior change the notion of discounting - people, and especially adolescents, tend to underweight the future and have preferences inconsistently weighted toward immediate or near-immediate gratification (O'Donoghue & Rabin, 2000). There has also been some research indicating that people with less money are "less patient"; that level of wealth can, in part, determine the degree of time discounting and weight placed on future preferences (Becker & Mulligan, 1997). If this is true, behavior change could in theory be incentivized by providing short-run financial incentives for people to act in their own or society's long-term interest, rather than respond to real or perceived short-term incentives that could be detrimental to their health or well-being.

The conceptual framework adapted here applies this previous research and argues that what drives intent to change is both the ***perceived need to change*** behaviors (risk perception) and the ***perceived ability to change*** behaviors (self-efficacy and perceived behavioral control). These two factors also directly influence actual behavior change. A third factor, that we have termed ***new or unexpected opportunity to change***, may influence perceived ability to change and therefore could also be a driving factor in actual behavior change, regardless of initial intent to change behavior. These three determinants of change are

related to and therefore could be measured by a more proximate set of factors, which we next discuss in turn along with corresponding hypotheses to be tested in this study.

Perceived need for change is likely in large part a measure of perceived risk of infection, and thus could be measured through sexual risk behaviors or partner's sexual risk behaviors (with the assumption that the person engaging in such behaviors knows that they are risky). We can also use the respondent's self-rated probability of currently being infected with HIV as a measure of risk perception.

H1: Those who engage in more risky sexual behavior are more likely to intend to change and to report change than those who report fewer baseline sexual risk behaviors.

H2: Men are more likely to intend to change and to report change than women (because generally they have more risky sexual behaviors than women).

For women, perceived ability to change and agency in sexual decision-making in this context is measured through marital status and self-reported sexual relationship power dynamics.

H3: Women are less likely to intend to change and to report change than men (because they lack agency in sexual decision-making and do not have the necessary leverage to convince partners or husbands to change their behavior).

The relationship between intended behavior change and actual behavior change is mediated by the perceived ability to change. If no intentions to change are reported (either because there is no perceived need to change or no perceived ability to change), but a new or unexpected opportunity arises, this may increase the perceived ability to change and thus bring about unintended behavior change. This new or unexpected opportunity may influence subsequent perceived ability to change behavior.

H4: Participants receiving positive STI or HIV results are more likely to report changing their behavior compared to those receiving negative STI or HIV results, even if they did not intend to change their behavior at baseline.

H5a: Participants in the cash award group are more likely to report having changed their behavior in the 4-month visit of the study even if they did not report intending to do so at baseline.

For women in particular, we argue that these above two components of the RESPECT study (new diagnoses and randomization to cash award group) may provide an opportunity to change by providing leverage for change and discussions for change with sexual partners in the form of money or information that previously did not exist.

H5b: The effect of the cash incentive is stronger for women than it is for men because the promise of the money may provide increased leverage in sexual decision-making with partners.

This study offers an opportunity to observe the introduction of a clear incentive for behavior change and examine how individuals respond to that incentive given the constraints they might face in reducing their personal risk. The analysis that follows explores reported intended sexual behavior change strategies and their corresponding behavior change actions implemented to avoid unsafe sex among participants enrolled in a structural HIV prevention intervention trial taking place in rural Tanzania.

Methods

Trial design

This study is a parallel group randomized trial. It has three separate arms – a control arm with an allocation ratio of 50% and two intervention arms (low-value cash award and high-value cash award) with an allocation ratio of 25% each. No important changes to methods were implemented after trial

commencement. The trial began in early 2008 and lasted one year, with STI testing at baseline, 4, 8, and 12 months.

Participants

Inclusion criteria consisted of males and females, aged 18-30 (and spouses ages 16 or over), residing in one of 10 study villages within the Kilombero/Ulanga districts of the Ifakara Health and Demographic Surveillance System (IHDSS) in south-west Tanzania (Schellenberg et al., 2002). The villages consisted of 8 rural villages and 2 semi-urban neighborhoods in Ifakara town, with participants evenly distributed across the villages. On average across the 10 villages approximately 20% of the 18-30 old residents were enrolled in the study. There were three exclusion criteria: being pregnant at the time of registration, having the intention to permanently migrate out of the IHDSS area within the next year, and unwillingness to participate if assigned to the control arm. Participants testing HIV-positive at baseline were eligible for enrollment.

Interventions

The intervention arm was divided into two sub-arms – a low-value cash award arm eligible for up to $30 over the course of the study (Tsh 10,000 or approximately $10 at each of the three 4-month testing intervals testing round), and a high-value CCT arm eligible for up to $60 (Tsh 20,000 or approximately $20 per testing round). Those amounts were determined based on focus-group discussions in neighboring villages conducted before the intervention started, balancing sufficient incentive levels against concerns about scalability and potential coercion. All participants were tested for STIs at baseline and then every 4 months for one year. Participants in the two intervention arms were eligible to receive cash award incentive payments if they tested negative for curable STIs (excluding mycoplasma genitalium) at the 4, 8, and 12-month testing rounds. STIs tested at all of these incentivized rounds were Chlamydia trachomatis, Neisseria gonorrhea, Trichomonas vaginalis, and Mycoplasma genitalium; at the 12-month round syphilis and HSV2 (among baseline negatives) were also tested. Individuals in the CCT arms were

not eligible for the cash award at the 4, 8, and 12-month testing rounds if they tested positive for any of the following: Chlamydia trachomatis, Neisseria gonorrhea, Trichomonas vaginalis. HIV testing was conducted at baseline and month 12, but payments were not conditioned on those results because of local ethical sensitivities. Individuals in the intervention arms testing positive for any of the conditioned curable STIs did not receive the cash award payment, but were eligible to continue as a study participant in subsequent rounds after having been treated. Individuals in the control arm were not eligible for cash award payments, but all other study procedures were identical between the control and intervention arms. Anyone testing positive for an STI (regardless of arm) was offered counseling and free STI treatment (for self and partners) through public health facilities of the Ministry of Health and Social Welfare located in the research communities. Individual pre-test and post-test counseling was provided to study enrollees at each testing interval, following Tanzania national testing guidelines. In addition, monthly group counseling sessions emphasizing relationship-skills training adapted from a sub-set of the Stepping Stones curriculum (Jewkes, 2008), were also made available to all study participants in all villages, but were not mandatory.

Data Collection, Management and Analysis

In February-April 2009, 2,399 participants were enrolled in the RESPECT study, and were interviewed using a closed-ended, structured questionnaire. Participants were interviewed before being randomized into one of the three intervention arms, so during the baseline interview they did not know if they would be eligible to receive the cash award. In June and July of 2009, 1,943 of the 2,399 participants returned for the 4-month visit of the study, and were again interviewed using a closed-ended structured questionnaire. This analysis drops a small number of observations due to missing data (56 participants did not respond to the question about intended behavior change).

Data were analyzed using STATA version 10 (StataCorp, 2007). Analyses were conducted exploring associations between demographic and other characteristics and intention to change as well as reported change; then reported change analyses were stratified by baseline change intention. Additional

models (not reported) were also run with specific types of behavior change as the dependent variable and demographic and other characteristics as the independent variables.

The study was approved by the Institutional Review Boards of the Ifakara Health Institute, the University of California at Berkeley, and by the Tanzania National Institute for Medical Research. All participants provided written informed consent.

Outcome Measures

This analysis is based on self-reported baseline intentions to change sexual behavior and self-reported actual change over the first 4-months of the trial, in addition to baseline self-reported risky sexual behaviors. As with any study that involves self-reported sexual behavior, there is the possibility that unsafe sexual behaviors were under-reported and behavior change was over-reported. Plummer (2004) reports on the validity of the collection of sexual behavior data using five different methods from a study done in Northern Tanzania. While this study was conducted amongst adolescents, and results among adults may be slightly more congruous across the five methods, they find striking inconsistencies in reports of sexual behavior from self-administered surveys, face-to-face surveys, in-depth interviews, participant observation and biological markers. The authors do find that in-depth interviews may be better at eliciting true responses (as measured by biological markers) than face-to-face questionnaires or self-administered questionnaires, but still inconsistencies were common. Social desirability bias is common in these types of studies, and in this case may have been exacerbated by the extended counseling on safer sex practices that participants were receiving throughout the study.

The primary outcomes used in this analysis were as follows:

Anticipated behavior change at Baseline: The following question was asked of all study participants at the first study visit at baseline, before participants had received STI or HIV test results and before they had been randomized into one of the three study groups: *Do you anticipate that your enrollment in this study will change your sexual behavior?* Participants could answer yes, no or don't know. All those who answered *yes* to the above question were then asked, *In what way?* Possible responses included: abstain,

fewer sexual partners, less risky sexual partners, increase condom use, more likely to treat sexual infections. Participants were not limited to choosing one option for behavior change.

Reported behavior change at 4-month visit: Similarly, at the 4-month visit structured interview, the following question was asked of all study participants, again before receiving their 4-month visit STI results: *Since you have been enrolled in the study have you changed your sexual behavior? If yes, in what way?* Respondents were given the same set of possible responses as at baseline.

Independent Variables

Key covariates of interest include age, gender, marital status, religion, education level, socio-economic status ranking, relationship power dynamics, risky sexual behavior, HIV risk perception, and STI/HIV test results.

Index variables for relationship power dynamics: Two variables were created from three questions asking about decision-making power and overall power in sexual partnerships. The three questions asked first about who has more say about sexual decision-making, the second asked about who has more say in deciding whether to use a condom, and the third question was in general, who has more power in the relationship. Possible responses to these questions were: my partner; both of us together; me. The first created variable represents the respondent having more power and this is scored from 0-3, with 3 indicating that the participant has the power in all three areas. The second created variable represents the respondent and his or her partner having equal decision-making power and is also scored from 0-3.

Index variable for risky sex: Participants were categorized as sexually risky if they reported having had sex without a condom with a non-marital partner within the past four months.

Probability of currently being HIV-infected: At baseline participants were asked to rank their likelihood of currently being infected with HIV on a scale of one to ten, with ten meaning that they are certain they are infected.

Money exchange for sex: Participants were asked at baseline if they had ever either received payment for sex (women) or paid for sex (men).

Other independent variables included in the analysis were as follows: socio-demographics (age, gender, marital status, religion, education level), intervention group, alcohol use, economic status (self-reported on a scale of 1-7 with 7 representing the highest status) and having had any positive test result for HIV or one of the following STIs at baseline: Syphilis, Chlamydia, Gonorrhea, Trichomonas.

Findings

Study Population - Demographics

Table 1 shows the demographic and other characteristics of the 2,399 study enrollees. The mean age was 26.5 years. Enrolled men were on average slightly older than enrolled women (mean ages 27.6 and 24.4, respectively, $p<0.01$). The majority of the study population was married (63.1%), but more men were single compared to women (28% and 14%, respectively). Nearly 80% of those enrolled had attended at least some primary school, and females were more likely to have had no education compared to males. The majority of the study enrollees were either Muslim (38.4%) or Catholic (43.6%). There were some differences in those who decided to return for the 4-month visit of the study (n=1943). Those not returning for the 4-month visit were significantly more likely to be young, single, have tested positive for a curable STI or HIV at baseline, and were more likely to be in the control group or low-value cash incentive group (data not shown, but reported in de Walque et al., 2012).

[Insert Table 1]

Study Population - Baseline Sexual Risk Behaviors

Those who report engaging in sexual risk behaviors and those who understand themselves to currently be at risk for infection may be those most likely to be influenced by the intervention. Those who consider themselves to be not at risk have little reason to intend to change or to report changing, unless new information given as part of the CCT intervention convinces them otherwise. Table 1 shows the means and proportions of reported sexual risk behaviors at baseline of the 2343 participants reporting on intended change at baseline, by gender. As self-reported sexual risk behaviors, these measures are subject

to reporting bias. Generally, men were more likely to report engaging in sexual risk behaviors at baseline, and women were more likely to report having less control over sexual decision-making in their relationships. We ran regression models with each of the sexual risk behaviors listed in Table 1 (data not shown). These models showed that participants who were never married (single or cohabiting) were generally more likely to report sexual risk behaviors compared to their married counterparts; however, single participants reported having more control over sexual decision-making compared to married participants, and had a lower self-reported probability of current HIV infection than married participants.

Intended Behavior Change

Of the 2,399 participants enrolled at baseline, 1,830 (75.6%) stated at their baseline structured interview that they anticipated that being part of the RESPECT study would motivate them to change their sexual behavior. Females were less likely than males to report that they intended to change their sexual behavior as a result of study enrollment (72.9% compared to 81.6%, $p<0.05$). Figure 1 shows what types of behavior changes participants anticipated making at baseline, by gender. Males were significantly more likely than females to anticipate abstaining and having sexual partners who were less risky. Females were significantly more likely than males to anticipate increasing their condom use as a result of study enrollment.

[Insert Figure 1]

We ran a multivariate regression model with any reported intent to change behavior at baseline as the outcome (Table 2, model a). The results of the model revealed that anticipation of behavior change at baseline was generally correlated with self-reported baseline levels of risk behavior as measured by the risky sex index variable, having exchanged money for sex, and chance of currently being infected with HIV among respondents. Male participants were more likely than females to anticipate changing their behavior.

Respondents reporting that they had more power in their sexual partnerships were more likely to report anticipating change, while those reporting equal power were less likely to report anticipating change. One potential explanation for this result is for those who have equal power, they may have less need to change than those in partnerships with unequal power. In fact, those who reported having equal power were significantly less likely to have had risky sex in the past 4 months (data not shown). Participants of non-Catholic Christian religion (a group with generally much lower levels of risk behaviors) were less likely to anticipate change. Single participants were more likely to anticipate change compared to married participants while those living with their partners were less likely to report anticipated change compared to married participants.

Model (a) in Table 2 lends support to hypotheses H1 and in part, H2. Those engaging in risky behaviors are more likely to report anticipated change, and men are more likely to report anticipated change than women. However, in comparing the more restricted model excluding risky sexual behaviors (not shown) with the full model (model a), we found that adding risky sexual behavior to the model does not change the magnitude of the association between gender and anticipated behavior change (the explanation for males being more likely to anticipate change is not that men are engaging in more risky sexual behaviors). H3 predicts that women are less likely to anticipate changing because they lack agency in their sexual partnerships. Again, in comparing the restricted model to the full model (model a) we find that adding the relationship power index variables to the model does not change the magnitude of the association between female gender and anticipated change. Men are more likely to anticipate change than women, but lack of decision-making power among women and increased risky behaviors among men do not explain this result.

[Insert Table 2]

Reported Behavior Change

At the 4-month structured interview, 1123 (57.8%) of the 1943 returning study participants indicated that they had changed their behavior over the past four months as a result of being enrolled in the study. Of the 1123 participants reporting that they had changed their behavior over the previous four months as a result of study enrollment, 93 (8.3%) said that they had abstained, 491 (43.7%) reported having fewer sexual partners, 139 (12.4%) reported having less risky sexual partners, and 333 (29.6%) said they had increased their condom use. Significantly more males than females reported changing behavior (69.6% and 46.3%, respectively, $p<0.05$). Significantly more males than females reported abstaining and having partners who were less risky over the 4-month period. There were no differences in reported type of change at 4-month visit by intervention group (Figure 2), however, among women, those in the cash award groups were more likely to report any type of sexual behavior change at the 4-month visit compared to those in the control group ($p=0.03$, data not shown).

[Insert Figure 2]

We ran a multivariate regression model with any reported behavior change at 4-month visit as the outcome (Table 2, Model b). In this model (b), men were more likely than women to report changing sexual behavior from baseline to 4-months visit of the study than women, as were participants who were unmarried and had at least a primary school education. Non-Catholic Christians were less likely to change compared to Muslims. Participants in the low-value cash award group were more likely to report having changed than those in the control group; however, this was not the case for participants in the high-value cash award group. In comparing the full model (model b) with a more restricted model (not shown) we again find that adding the risk behaviors, STI test results and relationship power variables to the model does not change the association between gender and reported change at 4 months.

Those who had ever paid for or received pay for sex were more likely to report having changed as were those in the low-value cash award group ($p<0.1$), however the coefficient for receiving a positive

STI test result at baseline was not significant. The interaction term between female gender and low-value cash award group was of marginal significance in this model (p=0.09, data not shown). The interaction term between female gender and STI test result was significant (p=0.05, data not shown), indicating that for women, testing positive for an STI was a significant predictor of reported change, but this was not the case for men. Upon gender stratification of the models (data not shown), we find that being in the low-value cash award group was significantly associated with reported change among women but not among men. This should be interpreted with caution, however, as the two point estimates for men and women were not significantly different. Among women, receipt of a positive STI test was only marginally significantly associated with reported change at the 4-month visit (p=0.07). These results lend limited support to H4, H5a, and H5b.

Behavior Change Intentions and Behavior Change Actions

Of the 1,934 participants who returned for 4-month visit of the study, 1,469 (75.6%) said at baseline that they anticipated changing their sexual behavior as a result of being enrolled in the study. Of the 1,469 intending to change their behavior, 908 (61.8%) reported actually doing so at the first follow-up visit of the study. For both men and women, having fewer partners was the behavior change with the most consistency between reported intentions and reported actions—33.2% of males and 21.5% of females intending to reduce the number of partners they had reported having done so at 4 months (data not shown).

In an effort to better understand the responses of participants relating to intentions of changing sexual behavior and reported changing of behavior, we ran regression models with reported change as the outcome, first among those reporting that they anticipated changing at baseline, and second, among those reporting that they did not anticipate changing at baseline. We used these analyses to test H4, H5a and H5b—to understand if the introduction of new information in the form of being in one of the cash award groups or receipt of STI and HIV test results is associated with consistency in behavior change intentions and actions.

Table 2, model (c) shows reported behavior change at 4 months among those who did not anticipate changing at baseline. We find no significant association between receipt of a positive STI test at baseline and reported change at the 4-month visit among those who did not anticipate changing at baseline. Additionally, upon stratifying the models by gender, we found no significant differences between men and women in the association between receipt of a positive STI test and reported change. Interestingly, we did find that receiving a positive HIV test result at baseline was significantly associated with unintended change ($p<0.05$), however this is based on only a total of 8 people (5 women and 3 men) in this model having tested positive for HIV.

In terms of the influence of the cash incentive, we found that being in the high-value cash award group is significantly associated with reporting unanticipated change at the 4-month visit ($p=0.06$). Stratifying the model by gender, we find no gender differences in the effect of intervention group on unanticipated change. We also found no evidence that the cash award had more of an effect on married women than it did on single women. Being in the cash award group does not appear to be more important for women in changing their behavior regardless of marital status. Both men and women are equally influenced by the cash award group.

Table 2, model (d) shows reported behavior change at 4 months among those who did anticipate changing at baseline and thus explores characteristics associated with following through with anticipated change. Men were more likely to follow through with anticipated change, as were the unmarried. Participants reporting exchanging money for sex, those reporting alcohol use, and those in the low-value cash award group were all more likely to follow through with anticipated change. Participants who received a positive test for HIV at baseline were significantly less likely to anticipate change at baseline and then follow through with anticipated change. This finding could be explained by the possibility that those testing HIV positive already knew they were HIV-positive, had previously adopted safer sexual behaviors, and thus had no need to change their sexual behavior. The gender stratified models (not shown) reveal that the relationship between being in the low-value group and following through with change is sustained only among women, while for men, the risk behavior variables, alcohol use and

exchanging sex for money, remain at least marginally significant. However, the interaction terms between gender and intervention group, exchanging sex for money and alcohol use were not significant so we cannot say there are significant differences between men and women in predictors of following through with anticipated change (data not shown).

Summary of Support for Hypotheses

Results from this analysis point strongly toward the notion that change among the study enrollees between baseline and 4-month visit was motivated by the baseline level of risk behaviors and the corresponding perceived level of risk. *Perceived need for change* as measured by baseline self-reported risky sexual behavior does in fact predict levels of intended and reported change in this study. Additionally, groups that generally reported less risky behavior, for example women and those of the non-Catholic Christian religion, were less likely than their counterparts to report any type of change.

In terms of *ability to engage in sexual behavior change*, we find only some evidence to support the notion that women report less change than men because they face constraints to behavior change. We cannot say with confidence that the cash award had significantly differential effects on men and women in motivating change because the point estimates are not significantly different. However, being in the low-value cash award group was marginally associated with reported change in the previous 4-month period only among women. Finally, although we did not find interactive effects of agency and marital status in relation to reported change, we did find that married women, who perceive themselves to be at greater risk of currently being infected with HIV compared to single women, were overall less likely to report most types of change compared to unmarried women. Similarly, participants reporting having more power in their sexual relationships were more likely to report intending to change their sexual behavior. At best, our data merely hint at the effect that constraints faced by women, and in particular, married women, may have on self-reported behavior change in the context of the this study. It should be noted, however, that social desirability bias might have made it less likely for respondents to report that they had not actually changed their behavior over the previous 4 months.

In relation to the effect of *new and unexpected opportunities for change*, we found that receipt of a positive STI test at baseline was marginally associated with reporting change at the 4-month visit, and that receipt of a positive HIV test was significantly associated with unintended change. We did find some support for the contention that the effect of the positive STI test is stronger among women because it could be used as another potential leverage to convince husbands or partners to change. Similarly, being in the high-value cash award group was significantly associated with reporting unanticipated change at the 4-month visit, supporting the idea that this new opportunity revised the perceived ability to change, resulting in unintended behavior change. We find little support for the contention that the cash incentive might provide additional leverage for women in convincing partners to change-- the relationship between being in the cash award group and changing unexpectedly does not differ by gender.

Discussion

Two main findings result from this analysis. First, within the context of the RESPECT trial in Tanzania, perceived risk is an important driver of sexual behavior change. There are three possible reasons why: (a) the counseling sessions may have brought out the fact some participants are engaging in particularly risky behaviors, thus elevating the perceived need for change, and driving the reported behavior change; (b) as part of being enrolled in the study, participants may have on their own connected their reported risky behaviors with risk of infection (perhaps through receipt of STI or HIV test results) and therefore realized that they needed to change and did so; and (c) this group of risk-takers represents the low-hanging fruit. These participants were significantly more likely to report changing simply because they had more to change compared to those already engaging in safe sexual behavior, and the study provided them with an opportunity to engage in that change.

The second main finding is that we see some supporting evidence that exposure to new and unexpected opportunities in the form of receipt of STI test results or being eligible for the cash award was associated with overall change. However, we did not find evidence that the effects of these new opportunities were stronger for women than for men in terms of reported behavior change.

A significant amount of research across a range of disciplines has been devoted to understanding what motivates behavior change and how behavior change occurs both at an individual level and at a population level. Theories of health behavior change that have emerged from social cognitive models such as the health belief model and the theory of reasoned action and planned behavior, are primarily concerned with the varying degree of the contributions of self-efficacy, perception of risk, perception of outcomes, social structural factors, and goals/intentions to behavior change (Bandura, 1977; Porchaska et al., 1994; Strecther & Rosenstock, 1997; Ajzen & Fishbein, 1980). Previous research on perception of risk of HIV as a driver of behavior change has shown mixed results (Gregson et al., 1998; Lindan et al, 1991; Tyndall et al., 1994), while empirical work done on self-efficacy and perceived control has shown a more consistent relationship with behavior change (Albarracin et al., 2005). Our results suggest that perceived risk of infection as measured by self-reported sexual risk behaviors does influence both intent to change behavior and reported behavior change. Additionally, exposure to new and unexpected information or opportunity in the form of receipt of STI test results and being in the cash award group is also associated with intent to change behavior and reported change, perhaps because these events influence both risk perception and perceived self-efficacy or perceived control.

This study has several limitations. As discussed above, with any study that involves self-reported sexual behavior, there is the possibility that unsafe sexual behaviors were under-reported and behavior change was over-reported. Social desirability bias is common in these types of studies, and in this case may have been exacerbated by the extended counseling on safer sex practices that participants were receiving throughout the study.

Another limitation is that those in the control and low-value treatment groups were more likely to drop out of the study after the first study visit, as were those testing positive for HIV or STIs at baseline. This has the potential to bias the results of the study, to dilute the potential effect of the intervention, and to restrict this analysis to people who have been more likely to change, face fewer barriers to changing, or who did not need to change their sexual behavior. But since 88% of respondents did return, the overall results are relatively generalizable.

The results from this study have at least two important implications. The first is that those at highest risk are more likely to change than those reporting lower levels of risk. One can guess that the trial itself is providing this group with tools (cash incentives, repeat testing, free treatment and counseling) that increase either their awareness of their risk or help them think about how to limit their risk or both. This suggests that a promising approach for reducing risk among those engaging in risky behaviors will be to understand how self-assessments of risk are informed, and find novel ways to increase understanding of risk and strategies for reducing risk. Second, if new and unexpected opportunities revise perceived ability to change behavior through the various pathways explored in this paper, attention should be focused on creating such opportunities for those at risk. Structural interventions are one avenue to creating these opportunities; providing frequent and accessible STI testing may be another. In a context where less than half of the population believes that condoms are almost always effective in preventing HIV infection, and condom use within marriage is rare, regular testing for sexual infections may provide assurance of safety or motivation for change that is otherwise lacking.

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Table 1: Characteristics of Baseline Study Population, by Sex

Variable	All (N=2343)	Men (N=1162)	Women (N=1181)	p-value
Age (mean)	26.6 (sd: 8.4)	28.5 (sd: 10.1)	24.7 (sd: 5.8)	<0.01
Marital Status				
Single	21.0	28.2	13.9	<0.01
Married	63.5	57.9	68.9	
Living Together	11.7	11.3	12.1	
Divorced	4.1	3.4	4.7	
Widowed	0.2	0.0	0.3	
Mean on SES Ladder (1-7)	2.56 (sd: 1.19)	2.54 (sd: 1.16)	2.57 (sd:1.23)	0.50
Education Level				
No Education	11.1	6.8	15.3	
Some Primary School	78.4	79.7	77.1	
Some Secondary School	10.5	13.4	7.6	<0.05
Religion				
Muslim	38.2	39.3	37.1	
Catholic	43.7	42.8	44.5	
Non-Catholic Christian	17.3	16.8	17.8	0.48
Intervention Group				
Treatment-High Value	25.7	25.3	26.1	
Treatment - Low Value	27.5	27.8	27.3	
Control	46.8	46.9	46.7	0.90
Risk Behaviors				
Risky Sex[a]	0.198 (sd: 0.40)	0.190 (sd: 0.39)	0.155 (sd: 0.36)	0.04
Lifetime Number of Sexual Partners	5.72 (sd: 9.19)	7.96 (sd:11.18)	3.57 (sd: 6.04)	<0.01
Sex Partners in past 4 months	1.04 (sd: 0.62)	1.15 (sd: 0.77)	0.94 (sd: 0.40)	<0.01
Drink Alcohol	0.09 (sd: 0.29)	0.15 (sd: 0.35)	0.03 (0.18)	<0.01
Chances of having HIV (mean score 1-10)[b]	2.17 (sd: 1.82)	2.14 (sd: 1.78)	2.2 (sd: 1.86)	0.40
Relationship Power				
Equal power (scale 0-3)	0.71 (sd:0.93)	0.72 (sd: 0.94)	0.70 (sd: 0.91)	0.747
Respondent has power (scale 0-3)	0.94 (sd: 1.10)	1.55 (sd: 1.16)	0.34 (sd: 0.62)	<0.01

[a]See text for variable definitions

p-value tests for equality between men and women.

Table 2: Logistic Regression Models: Intended Change, Reported Change and Change Consistency

	Intended Change Baseline (a)	Reported Change 4 –month (b)	Reported change among those not intending to change at baseline (c)	Reported change among those intending to change at baseline (d)
Female	-0.435***	-0.815***	-0.407	-0.955***
	(0.147)	(0.138)	(0.319)	(0.157)
Marital Status				
Married	Reference	--	--	--
Living together	-0.844***	0.441**	0.163	0.634***
	(0.177)	(0.178)	(0.364)	(0.219)
Single	0.293	0.565***	0.526	0.588***
	(0.194)	(0.168)	(0.404)	(0.190)
Divorced	0.188	0.481*	-0.096	0.592*
	(0.322)	(0.279)	(0.702)	(0.311)
Religion				
Muslim	Reference	--	--	--
Catholic	-0.137	-0.0268	0.115	-0.054
	(0.126)	(0.114)	(0.095)	(0.129)
Other Christian	-0.663***	-0.633***	-1.172***	-0.368**
	(0.149)	(0.147)	(0.314)	(0.176)
No religion	-1.560***	-1.018	-0.971	-0.712
	(0.507)	(0.682)	(0.931)	(1.073)
Relationship Power[a]				
Respondent power	0.237***	0.122*	0.0252	0.093
	(0.073)	(0.0638)	(0.162)	(0.072)
Equal power	-0.144**	0.0265	0.062	-0.012
	(0.062)	(0.060)	(0.126)	(0.071)
Risk Behaviors				
Risky Sex[a]	0.620***	0.123	0.265	0.095
	(0.186)	(0.158)	(0.415)	(0.176)
Chance of HIV[a]	0.103***	0.0582**	0.0701	0.055*
	(0.035)	(0.029)	(0.0759)	(0.032)
Exchange money/sex	0.603***	0.246**	0.0932	0.224*
	(0.112)	(0.104)	(0.235)	(0.119)
Alcohol Use	0.050	0.376*	-0.142	0.574**
	(0.206)	(0.194)	(0.418)	(0.231)
Intervention Group				
Control Group		Reference	--	--
High-value Cash		0.0950	0.586**	-0.050
		(0.122)	(0.264)	(0.140)
Low-value Cash		0.314**	0.330	0.321**
		(0.124)	(0.273)	(0.144)
Baseline HIV/STI				
STI Positive - Baseline		0.139	0.0914	0.184
		(0.141)	(0.305)	(0.163)
HIV Positive - Baseline		-0.320	2.341**	-0.883**
		(0.312)	(1.131)	(0.353)
Observations	**2,250**	**1,821**	**391**	**1,430**

Note: Standard errors (not robust) in parentheses, educational level, economic status controlled for in all models, analysis excludes those with missing responses, mostly for behavior change and exchange of money for sex

[a]See text for variable definitions

*** p<0.01, ** p<0.05, * p<0.1

Figure 1: Change and Type of Change Intended at Baseline, by Gender

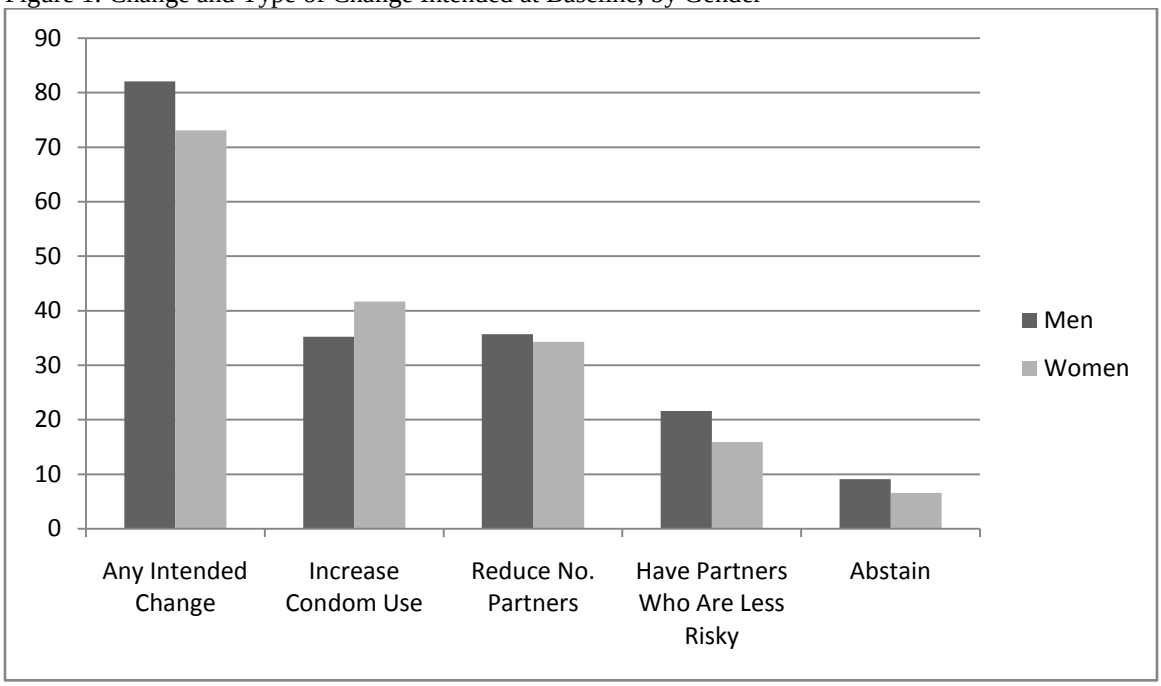


Figure 2: Type of Change Reported at 4-month visit, by Gender and Intervention Group

