Title
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Who Changes How: Strategies and Motivation for Risk Reduction Behaviors in the Context of an Economic-based HIV Prevention Intervention in Tanzania

By

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Committee in charge:

Professor Ann Keller, Chair
Professor William Dow
Professor Ann Swidler

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Abstract

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The lack of success of traditional, individual-level HIV prevention interventions has contributed to the increase of structural interventions for HIV prevention. One such intervention is the use of conditional cash transfers (CCTs) to motivate sexual behavior change. CCTs have been successful in other areas of health behavior change, but have only recently been used to promote safer sex among populations at risk for HIV infection. Drawing on both quantitative and qualitative data from an HIV prevention trial in Tanzania that used cash awards to create incentives to engage in safer sexual behaviors (the RESPECT study), this dissertation—made up of three papers—explores strategies and motivation for risk reduction behaviors among study participants. The first paper explores anticipated and reported sexual behavior change of participants enrolled in the RESPECT study to understand who changes, how they change, and what factors drive such change or lack of change. The second paper draws on in-depth interviews from participants enrolled in the study and diary entries from village diarists RESPECT study in Tanzania to illustrate difficulties inherent in staying faithful to one of the Abstinence-Be Faithful-Condom Use (A-B-C) strategies and to describe the tools that people use in an attempt to avoid infection. The third paper again draws on qualitative data to explore the possible pathways through which the intervention package implemented as part of the CCT study might work to decrease STI prevalence. The three principal conclusions from the three papers are: (1) within the context of the conditional cash transfer trial in Tanzania, perceived risk is an important driver of sexual behavior change; (2) as the level of perceived risk changes for a participant through receipt of HIV test results and repeated STI test results, so does the risk reduction strategy; and (3) exposure to new and unexpected opportunities in the form of receipt of a positive STI test or being eligible for the cash award influences perceived ability to engage in risk reduction behaviors and thus increases the likelihood of reported behavior change.

Introduction

Despite billions of dollars spent on programs designed to reduce risky sexual behavior, the annual number of incident HIV infections and other sexually transmitted infections (STIs) has not declined. The tragic reality is that many of these new infections could have been prevented. The AIDS epidemic as well as other negative reproductive health outcomes are, at their core, fueled by risky sexual behavior. 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). However, despite isolated – and often, temporary – successes at lowering transmission rates, behavioral change interventions promoting safer sexual practices have proven remarkably ineffective at stemming the tide of the epidemic

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. Social cognitive, economic, and structural theories of health behavior change have been discussed in the literature, and while there is some overlap, the focus of each reflects the discipline from which it was derived. 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 outcomes, social structural factors, and goals/intentions to behavior change (Bandura, 2004). A substantial literature has been dedicated to understanding how to influence these central factors of individual behavior change.

Structural theories of behavior change focus on the influence of institutional, organizational, economic, social, cultural, political, and physical aspects of the environment that contribute to risk of HIV infection (or other health issue) in a given population (Sumartojo, 2000). The public health community has recently moved towards designing and implementing structural interventions for HIV prevention in sub-Saharan Africa, focusing primarily around gender inequities and poverty (Gupta, Parkhurst, Ogden, Aggleton, & Mahal, 2008). The focus on gender and poverty results from research indicating that women are at increased risk for HIV infection largely as a result of economic and sociocultural factors, and that sources of risk for infection and structural barriers to behavior change vary by both gender and marital status.

Appropriately, there has been a recent increase of structural HIV prevention interventions. The move toward structural interventions for HIV prevention includes economic-based interventions. Economic interventions aimed at changing health behaviors are on the increase, and some have had a fair amount of success in bringing about behavior change to improve health. An extensive literature in clinical psychology on a similar type of intervention known as "contingency management" has demonstrated the efficacy of cash transfers and/or vouchers to reinforce abstinence and recovery from drug and substance abuse disorders (Petry, Martin, Cooney, & Kranzler, 2000; Rigsby, Rosen, Beauvais, Cramer, Rainey, O'Malley et al., 2000). Economic incentive interventions have also been tried in other arenas of behavior change including seat belt use (Geller, Paterson, & Talbott, 1982), weight loss (Jeffery, Bjornson-Benson, Rosenthal, Lindquist, & Johnson, 1984), and medication adherence (Claassen, Fakhoury, Ford, & Priebe, 2007), with varying success.

In addition to these incentive interventions targeted at changing unhealthy behaviors, there has also been a trend towards implementing conditional cash transfer (CCT) approaches on a large scale. Such programs have been used successfully for many years in various social policy domains, including public health, to encourage behavior change (Lagarde, Dirk, Puren, Reathe, &

Bertran, 2003). They work in part 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. Perhaps the best known and most thoroughly evaluated example is that of Mexico's Oportunidades, a large-scale poverty alleviation program that makes monthly payments to poor families conditional on their use of preventative and other basic health care and educational services. A randomized controlled trial designed to evaluate the program demonstrated significant impact on a range of health and educational outcomes among enrollees (Gertler & Boyce, 2003).

The majority of these large scale CCT programs have been implemented in Latin America. While future research will reveal the appropriateness of such programs in Africa, the small amount of work done relating to CCT there thus far has had mixed results. A randomized controlled trial in rural Malawi examined the impact of cash incentives on returning to receive HIV test results (R. Thornton, 2006). Study participants were randomized to receive vouchers valued from zero to $3. The cash incentive increased the proportion of persons coming to the clinic to receive test results by a mean of 27%, controlling for distance to the clinic. The author also found a dose-response relationship—the proportion of persons collecting their HIV test results increased by 9% for each additional dollar given as incentive (R. Thornton, 2006).

The same author recently conducted research, also in Malawi, testing the effectiveness of a cash transfer conditional upon maintaining baseline HIV status for 12 months. Participants in the award group who maintained their status (positive or negative) received an award of varying amount 12 months after the baseline HIV test (R. Thornton, Kohler, H.P., 2009). This study showed no difference in HIV incidence between the intervention and control groups. Potential reasons cited by the authors for the failure of the trial included the long interval between baseline testing and receipt of cash-contingent results 12 months later, and targeting a relatively low-risk population of ever-married people, many of whom were in stable, long-term relationships.

Neoclassical economic theory predicts that, in the context of HIV prevention, a conditional cash transfer (CCT) intervention would raise the price of risky sexual behaviors, since a near-time financial reward would become at risk, and thus would reduce risky sex. However, researchers from non-economic traditions (Blanc, 2001; Boerma & Weir, 2005; Gupta, 2008; Krishnan, Dunbar, Minnis, Medlin, Gerdts, & Padian, 2008; Price & Hawkins, 2007) have focused more intensively on the role of cultural and institutional factors, particularly surrounding gender relations that shape and constrain sexual behaviors, and how a CCT intervention might work to overcome such constraints.

This dissertation is based on qualitative and quantitative data collected as part of an economic-based HIV prevention intervention—a CCT study that was recently conducted in rural Tanzania (the RESPECT study). The RESPECT study used monetary incentives to motivate sexual behavior change and prevent HIV infections. The intervention was implemented as a randomized, controlled trial, and the cash transfer was contingent upon testing negative for a panel of curable STIs at four-month intervals over the course of a year. The overarching objectives of the dissertation research were as follows: (1) To understand how men and women in rural Tanzania perceive a cash transfer conditional on negative tests for STIs and the pathways through which the cash incentive and other intervention components might motivate behavior change; (2) To explore who changed their sexual behavior as a result of study enrollment and what strategies men and women in rural Tanzania implemented in an effort to avoid infection with STIs or HIV; (3) To explore how repeated testing and feedback about their STI status in the four waves of the study affected participants' assessments of the risk level of their own behavior.

The dissertation consists of three papers that address the three objectives listed above. The first paper uses quantitative data collected through structured interviews to explore anticipated and reported sexual behavior change of participants enrolled in the RESPECT study. Data on behavior change intentions at baseline and reported behavior change at months four and eight of the study were collected using interviewer administered, structured questionnaires. The purpose of this paper is to explore 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. We already know that HIV risk reduction strategies vary by gender and marital status, and we have some idea why this might be the case. 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. This analysis shows how complex decision-making about behavior change is at the micro level and suggests that single-faceted interventions aimed at a given population are very likely to resonate only with a subsection of that population.

The second paper attempts to assess why some methods for risk reduction that are endorsed by the public health community seem to have little traction in many African settings. To that end, we examine contextual barriers to behavior change as reported by study participants and village diarists and describe reported risk reduction behaviors in order to learn about the most commonly used strategies for avoiding infection in the study population. Drawing on interviews from participants enrolled in an HIV prevention trial in Tanzania that used cash awards to create incentives to engage in safer sexual behaviors, we illustrate why the A-B-C model may be ineffective in its endorsed form in this population. After discussing the barriers that prevent tenacious implementation of risk reduction strategies in their promoted form, we describe what study participants actually did to try to reduce their risk of infection during the course of the study.

The third paper again draws on the qualitative study data to explore the possible pathways through which the intervention package implemented as part of the CCT study might work to decrease STI prevalence. The intervention package included three main pieces: the cash incentive (for the treatment group), the repeat STI testing and associated counseling (for all study participants), and voluntary group counseling sessions (for all study participants). This analysis focuses on the first two intervention components, the cash incentive and the repeat STI testing. Using qualitative data, we draw on the experiences of study participants to highlight potential pathways through which the testing and cash components of the intervention might have worked.

The results from these three papers will help to inform future interventions and to guide policymaking related to the use of conditional cash transfers as an incentive to avoid risky sexual behaviors and to prevent sexually transmitted infections and HIV infection in Africa.

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Paper 1: Strategies for Avoiding Unsafe Sex: Sexual Behavior Change Intentions and Actions in the Context of a Randomized Trial of a Conditional Cash Transfer for HIV Prevention in Tanzania

Abstract

This study explores anticipated and reported sexual behavior change among Tanzanians enrolled in an HIV prevention trial that used cash awards to create incentives for engaging in safer sexual behaviors. The purpose of this paper is to understand who changes, how they change, and what factors drive such change or lack of change. Data on behavior change intentions at baseline and reported behavior change at month four of the study were collected using interviewer administered, structured questionnaires. Two main findings result from this analysis. First, within the context of the conditional cash transfer trial in Tanzania, perceived risk is an important driver of sexual behavior change. As the level of perceived risk changes for a participant through receipt of HIV test results and repeated STI test results, so does the risk reduction strategy. Second exposure to new and unexpected opportunities in the form of receipt of a positive STI test or being eligible for the cash award influences perceived ability to engage in risk reduction behaviors and thus increases the likelihood of reported behavior change. The results from this study have at least two important implications. The first is that if those at highest risk are most likely to change when given the necessary tools to do so (for example in the context of a trial that provides cash incentives, repeat testing and counseling), then perceived level of risk and how this perception is and could be informed becomes an important potential intervention space. Second, if new and unexpected opportunities can alter one's perceived ability to change behavior through the various pathways explored in this paper, attention should be turned to creating such opportunities for those at risk. Structural interventions are one avenue for creating these opportunities. Providing frequent and accessible STI testing may be another.

Introduction

Despite billions of dollars spent on programs designed to reduce risky sexual behavior, the annual number of incident HIV infections and other sexually transmitted infections (STIs) has not declined. The tragic reality is that many of these new infections could have been prevented. The AIDS epidemic as well as other negative reproductive health outcomes are, at their core, fueled by risky sexual behavior. 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). However, despite isolated – and often, temporary – successes at lowering transmission rates, behavioral change interventions promoting safer sexual practices have proven remarkably ineffective at stemming the tide of the epidemic. In the following analysis, I explore the question of who engages in sexual behavior change and why some are more likely to change than others in the context of a structural, incentive-based HIV prevention intervention in Tanzania.

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. Social cognitive, economic, and structural theories of health behavior change have been discussed in the literature, and while there is some overlap, the focus of each reflects the discipline from which it was derived. 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 con-

tributions of self-efficacy, perception of outcomes, social structural factors, and goals/intentions to behavior change (Bandura, 2004). A substantial literature has been dedicated to understanding how to influence these central factors of individual behavior change.

Structural theories of behavior change focus on the influence of institutional, organizational, economic, social, cultural, political, and physical aspects of the environment that contribute to risk of HIV infection (or other health issue) in a given population (Sumartojo, 2000). The public health community has recently moved towards designing and implementing structural interventions for HIV prevention in sub-Saharan Africa, focusing primarily around gender inequities and poverty (Gupta, Parkhurst, Ogden, Aggleton, & Mahal, 2008). The focus on gender and poverty results from research indicating that women are at increased risk for HIV infection largely as a result of economic and sociocultural factors, and that sources of risk for infection and structural barriers to behavior change vary by both gender and marital status.

Across sub-Saharan Africa, women are disproportionately affected by HIV, especially young women (UNAIDS, 2008). In Tanzania specifically, national prevalence is estimated to be 7.9% among women age 25-29 and 6.7% among men of the same age (Tanzania Commission for AIDS, 2008). Several authors (Blanc, 2001; Boerma & Weir, 2005; Gupta, 2008; Krishnan, Dunbar, Minnis, Medlin, Gerdts, & Padian, 2008; Price & Hawkins, 2007) examine the role of cultural and institutional factors, particularly surrounding gender relations that shape and constrain sexual behaviors and therefore place certain populations at greater risk of HIV infection than others. While the specifics of the conceptual frameworks underlying increased risk for women vary, generally they argue that women are more vulnerable to HIV infection as a result of gender inequality that results in women's economic dependence on men, violence against women, and the consequential inability of women to negotiate sexual relationships. These gender/power inequities are rooted culturally and legally in societies--inequities are sometimes bolstered by laws that favor the economic advancement of men over women. The salient point here is that structural factors, rather than individual characteristics and behaviors, are major drivers of the disproportionate distribution of risk across populations in Africa, and as a result, women face greater constraints in avoiding risk and are thus more vulnerable to infection than men.

Married women may face even greater constraints in avoiding risk and protecting themselves against HIV infection. Several authors have found that for African women, marriage is an independent risk factor for HIV infection (Bongaarts, 2007; Carpenter, Kamali, Ruberantwari, Malamba, & Whitworth, 1999; Clark, 2004; Glynn, CaraÎl, Buve, Musonda, & Kahindo, 2003). The mechanism for this increased risk is thought to be through several pathways, including increased frequency of intercourse, infrequent condom use coupled with risky sexual behavior of the male partner, decreased control over type and frequency of sex, and an increased likelihood of having an HIV-infected partner (Clark, 2004, Glynn et al 2003). Married women are also at increased risk through having their own extramarital partners (DeWalque, 2007). Married women may be motivated to have external partners as revenge against their unfaithful husbands, or as a way to bring in some extra money to help with daily expenses (Tawfik & Watkins, 2007). Authors have also noted an association between a woman's age at first marriage with risk for HIV infection--women who marry at a younger age are at greater risk for HIV infection (Clark 2004, Bongaarts 2007, Boileau 2009).

Women's economic dependence on men is frequently mentioned as one factor that lies along the causal pathway for the increased vulnerability of women to HIV. If women are financially dependent on men, a structural intervention in the form of a cash incentive, if large enough, would allow them to leave some sexual partners or would give them some leverage to

negotiate safe sex with these partners. This assumes, however, that given enough money, women would *want* to leave such partnerships. Extensive research on transactional sex and its contribution to the vulnerability of women to HIV infection has been conducted in Africa, and the conclusions from this work do not necessarily lead us to this assumption (Hunter, 2002; Luke, 2003; Maganja, 2007; Nnko & Pool, 1997; Silberschmidt & Rasch, 2001; Swidler & Watkins, 2007). The exchange of sex for material goods in this context often has little to do with prostitution, rather it is an integral part of the majority of sexual relationships throughout much of Africa—what Hunter terms "the materiality of everyday sex" (Hunter, 2002; Maganja, 2007; Swidler & Watkins, 2007). Therefore, to intimately link poverty and the exchange of material goods for sex is to miss at least some of what is likely underlying these relationships (Swidler & Watkins, 2007). From their work in Malawi, Swidler and Watkins recognize that these exchange relationships are part of social fabric in much of Africa, a fabric into which patron-client relationships are deeply entrenched (Swidler & Watkins, 2007). The authors argue that transactional sexual relationships are best interpreted within the context of "an embedded system of interdependence" and that it is essential that efforts to alter or intervene to change such ties do so within this interdependence, patron-client framework.

Several authors have found that women engaging in these material exchange relationships are not necessarily passive, but that they do have some agency and decision-making power in certain aspects of the relationship (Hunter, 2002; Luke, 2003; Maganja, 2007; Silberschmidt & Rasch, 2001; Swidler & Watkins, 2007). For example, young women seem to have discretion in terms of their sexual partner choice, the duration of the relationship, and the decision to terminate the relationship. However, the women frequently lack any negotiating power when it comes to the type of sex and the use of condoms, and that this lack of power increases their vulnerability to HIV infection. This research points to the importance for women of being able to accurately identify non-risky partners and to recognize when, during the course of a sexual partnership, they are at increased risk as a result of their partner's behavior. One advantage that removal of economic dependence on men might provide to women engaged in material exchange relationships is a new form of leverage to negotiate the type of sex and the use of condoms with their partners. Thus, women may be able to maintain these important social ties without exposing themselves to risk of infection.

Given that women, and to a greater extent, married women face an increased risk of HIV infection, it is not surprising that strategies used to avoid risk would vary by gender and by marital status--that what married women do to avoid HIV infection differs markedly from strategies that men or single women might use to avoid risk. There is empirical evidence from Malawi that for married women, their main source of concern in becoming HIV-infected centers around their husbands, while for men, concern about HIV is focused on primarily on extramarital partners (Smith & Watkins, 2005; Watkins, 2004). In this longitudinal, mixed methods research conducted in Malawi, the authors found that for women, the degree of worry about HIV/AIDS is strongly associated with marital characteristics. Specifically, these characteristics included being married and suspecting a husband of infidelity. Worry about HIV/AIDS among women increased over time if they went from being single to being married, and decreased over time if they went from being married to being divorced. None of these factors was found to be correlated with worry about HIV among men.

These authors, as well as others, have found that divorce is becoming a more common and accepted strategy for managing HIV risk among women in Malawi (Reniers, 2008; Smith & Watkins, 2005), and that marital decision-making in general is a strategy for avoiding HIV infec-

tion for both men and women (Reniers, 2008). Marital decision-making can include avoiding widows and widowers and divorcing unfaithful spouses; however, the decreased risk achieved by leaving an adulterous spouse may be offset for both men and women by having to find a new partner among the pool of available partners, depending on the level of risk of eligible partners. For women, leaving a spouse may have an added element of risk. If they were financially dependent on their husband, they may have less ability to be selective in partner choice.

Single women also employ strategies that are tailored to their situation and that address their particular sources of risk. Poulin studied pre-marital partnerships in Malawi using both in-depth interviews and survey data from MDICP (Poulin, 2007). While her main focus was on transactional sex, she also examined strategies that young people in pre-marital relationships use in choosing partners. She found that young women often enquire about the sexual histories of potential partners from friends and relatives, and that they will often end relationships based on the perceived loyalty of the partner and their own understanding of risk of infection based on this loyalty. This risk perception often comes from discussions with friends and relatives rather than discussions directly with the partner.

Based on this previous research, we know that African men and women are actively trying to reduce their risk of HIV infection, just not in a manner we might expect. Instead, it appears that 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. Johnson-Hanks has looked at the correlation between intentions and actions in the context of fertility desires and fertility decision-making in Africa (Johnson-Hanks, 2007). Her research is relevant here because much of what she uncovers through her work on fertility decision-making could be applied to sexual decision-making in the African context. Johnson-Hanks compares self-reported intentions of females as regards fertility to what is inferred as their intention from demographic fertility modeling and finds these to be in disagreement. The author uses this as a context to examine the validity of inferring preferences from outcomes, and concludes that such inference is valid only in the circumstance in which there is an unequivocal understanding of the cultural context and how the context might shape what comes between intentions and actions. For African women, Johnson-Hanks argues that the ability to reproduce is a resource in that it provides opportunities that might otherwise have not arisen, and therefore whether or not a woman has a child is dependent on many more things than simply her intentions to do so. This is relevant here because sex could also 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 how pursuit of one life goal is selected over pursuit of another. Characterizing this uncertainty by gaining a more clear understanding of the reasons for discrepancies between intentions and actions in a particular cultural context may guide design of interventions that can alleviate some uncertainty or help people come up with strategies for managing the uncertainty, and specifically, avoiding HIV infection.

The purpose of this paper is to explore 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. We already know that HIV risk reduction strategies vary by gender and marital status, and we have some idea why this might be the case. 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. This analysis shows how complex decision-making about behavior change is at the micro level and suggests

that single-faceted interventions aimed at a given population are very likely to resonate only with a subsection of that population.

The intervention, implemented as a randomized, controlled trial, is a cash transfer contingent upon testing negative for a panel of curable STIs. Neoclassical economic theory predicts that the conditional cash transfer (CCT) intervention would raise the price of risky sexual behaviors, since a near-time financial reward would become at risk, and thus would reduce risky sex. However, researchers from non-economic traditions (Blanc, 2001; Boerma & Weir, 2005; Gupta, 2008; Krishnan, Dunbar, Minnis, Medlin, Gerdts, & Padian, 2008; Price & Hawkins, 2007) have focused more intensively on the role of cultural and institutional factors, particularly surrounding gender relations, that shape and constrain sexual behaviors, and how a CCT intervention might work to overcome such constraints. Notably, a recent CCT study conducted in Malawi with HIV incidence as the outcome at 12-months found no effect of a cash award contingent upon HIV results (Thornton & Kohler, 2009). This negative result emphasizes the importance of understanding why participants enrolled in the current CCT study in Tanzania did or did not change their behavior in response to an incentive. To that end, this paper focuses on anticipated and reported sexual behavior change as a result of being enrolled in the CCT, and attempts to understand who changes, how they change, and what factors drive such change or lack of change. Having the answers to these questions will ultimately help us to understand why the trial fails or succeeds, and who might most benefit from this type of HIV prevention intervention going forward.

After describing the study methodology, the paper proceeds as follows: first, I present a conceptual framework that illustrates some possible pathways to sexual behavior change, and then articulate several corresponding hypotheses to be tested through the analysis that follows. Second, I briefly present the predictors of intentions to change as reported at the baseline study visit and actual behavior change as reported at Round 2 of the study, four months later. Following this, I examine how these stated intentions squared with actual change reported at Round 2 of the study. Intentions and their consistency with reported actions are evaluated through exploring the characteristics associated with five categories of change consistency between intentions and actions as they relate to behavior change. This section moves systematically through each hypothesis exploring why actions may not have matched intentions, and ultimately describing how pre-existing life situations or "priors," in the form of perceived need to change, perceived ability to change, and exposure to new and unexpected opportunities, shed light on a typology of likelihood of behavior change (intentions compared to actions) in the context of the CCT trial. I argue that this typology brings with it a more thorough understanding of the variety and complexity of sexual behavior change that exist in this setting.

Methods

Setting

The study took place in the Morogoro Region of Tanzania in the Kilombero and Ulanga Districts. Ten villages centered around the main town in the region, Ifakara, were selected for participation in the study. The region has an HIV prevalence of 5%, just below the national prevalence of 6% (Tanzania Commission for AIDS, 2008). The region is for the most part, very rural. In Tanzania, rural regions tend to perform lower on several health and development indicators such as literacy rates, total fertility rates, schooling rates, and rates of unemployment. The Morogoro region generally fits this picture; for example the illiteracy rate in Morogoro among women is 32.5% compared to 15% among urban women and 10.7% among males in Morogoro compared to 8% among males living in urban areas. The Ifakara Health Institute administers the

Demographic Surveillance Survey (DSS) and provided the sampling frame for the selection of residents to participate in the CCT study.

Sampling and Recruitment

The results reported in this manuscript originate from data collected from the first two rounds of a randomized, controlled trial (the RESPECT study) of a cash transfer conditional on negative STI tests at 4-month intervals over 12 months in all. The purpose of the RESPECT study is to understand the effectiveness of cash rewards, conditional on having negative tests for STIs, on prevention of risky sexual behaviors among young men and women in rural Tanzania. The idea is that the promise of a cash reward conditional on negative STI tests will make the decision to engage in risky sexual behavior more "costly" thereby preventing such behavior among those eligible for the reward.

The study methodology for the CCT trial is described in detail elsewhere, but briefly, the Kilombero and Ulanga districts of Tanzania fall in the DSS catchment area for the Morogoro region of the country. Study participants age 18 to 30 residing in ten villages within these two districts were randomly selected from the DSS database that exists within the Ifkara Health Institute, the DSS implementing institution. The study recruited approximately 2400 participants, approximately 240 in each of the 10 study villages. Households of randomly selected potential participants were visited, and recruits and their live-in spouses (eligible at any age) were given a participation slip and information about where and when to show up for study enrollment.

Upon enrollment, all participants were randomized into either the intervention or control arm. All participants in both arms received free STI testing and counseling, and free STI treatment if needed at baseline, and at months 4, 8 and 12 and 24 of the study. In addition, all participants were tested for HIV at baseline and again at 12 months. Persons testing HIV-positive were referred for care and treatment, but retained in the study.

Those in the intervention group received the conditional cash transfer upon receiving negative test results for selected curable STIs at months 4, 8, and 12. Those testing negative in the intervention arm were also eligible to win a prize of approximately $100 USD through periodic lottery drawings. The control arm was not eligible to receive the cash award at any of the visits, but was eligible for parallel lottery drawings. Eligibility for the lottery for those in the control group was not dependent on STI test results.

All participants in both arms received a psychosocial intervention, comprised of regular group counseling. Half of the participants in the intervention arm received approximately $10 per award cycle, and half received approximately $20 per award cycle if they remained negative, allowing the assessment of the impact of the level of reward on behavior change. Over the year, these amounts are substantial in local terms, equal to 15-25% of typical annual earnings. Quantitative questionnaires were administered at all study visits.

Data Collection, Management and Analysis

In March 2009, 2420 participants were enrolled in the CCT trial, and were interviewed using a closed-ended, structured questionnaire. In June and July of 2009, 1943 of these 2420 participants returned for Round 2 of the study, and were again interviewed using a closed-ended structured questionnaire. Those who were in the control arm, the low-value treatment arm and those testing positive for STI and HIV at baseline were all more likely to drop out of the study after the first visit.

The quantitative questionnaire that was administered to all participants at baseline and Round 2 of the study covered a wide range of topics. For the purposes of the analyses presented in this paper, we focused on demographic information (gender, marital status, education level, religion), perception of risk of currently having HIV, HIV testing history, agency in sexual decision-making, monetary exchange for sex, and intended and reported behavior change as a result of study enrollment. Data were analyzed using STATA version 10 (StataCorp, 2007). Bivariate analyses were run exploring associations between demographic and other characteristics and intention to change, reported change, and five change consistency categories between intention and action. Multivariate logistic regression models were then run for intended and reported change to examine these relationships while adjusting for other factors. Models were also run with specific types of behavior change as the dependent variable and demographic and other characteristics as the independent variables. For the change consistency category analysis, multinomial logistic regression models were used, with either no change at all as the baseline comparison group, or change differently as the baseline comparison group.

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

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: *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 Round 2: Similarly, at the Round 2 structured interview, the following question was asked of all study participants, again before receiving their Round 2 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. At Round 2, participants were not asked how they intended to change their behavior going forward, from Round 2 to Round 3.

Independent Variables

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.

Agency in sexual decision-making: participants were asked who usually has more say about whether you have sex. Possible responses were your partner, both of you equally, or you.

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

Drinking: Participants were asked at baseline if they drink alcohol, with possible responses "Yes" or "No".

Other independent variables included in the analysis were as follows: demographics (age, gender, marital status, religion, education level) condom use at first sex, age at first sex, lifetime number of sexual partners, number of sex partners in the past four months and weeks spent away over the previous 12 months.

Conceptual Framework and Hypotheses

As mentioned in the introduction, several authors (Blanc, 2001; Boerma & Weir, 2005; Gupta, 2008; Krishnan, Dunbar, Minnis, Medlin, Gerdts, & Padian, 2008; Price & Hawkins, 2007) have focused their work on the role of cultural and institutional factors, particularly surrounding gender relations that shape and constrain sexual behaviors and therefore place certain populations at greater risk of HIV infection than others. While the specifics of the conceptual frameworks underlying increased risk for women put forth by these authors vary, generally they argue that women are more vulnerable to HIV infection as a result of gender inequality that results in women's economic dependence on men, violence against women, and the consequential inability of women to negotiate sexual relationships.

Other relevant research can also help to guide a conceptual frame and corresponding hypotheses relating to who is most likely to report change as a result of enrollment in the study. Specifically, authors have studied the effects of receiving HIV test results on subsequent behavior change, economic dependence and transactional sex as a barrier to behavior change, and the constraints that married women may face in changing their behavior or attempting to convince husbands to change their behavior. There has been little research conducted on the effects of receiving STI results on sexual risk behavior. However a community randomized trial of STI management conducted in Uganda showed no significant differences in reported sexual behavior among those receiving STI care and treatment and those who received only education and counseling (Kamali, Quigley, Nakiyingi, Kinsman, Kengeya-Kayondo, Gopal, et al, 2003). More commonly, scholars have examined the effects of receiving HIV test results on subsequent sexual behavior. Such work has shown that receipt of positive test results typically leads to significant sexual behavior change, while receipt of negative results does not (Thornton, 2006; Wolitski, MacGowan, Higgins, & Jorgensen, 1997).

Previous research on the underlying reasons that women engage in transactional sex lead us in two potentially divergent directions in terms of hypothesis formulation. If some women truly are financially dependent on men, and engage in such partnerships solely to help with day to day expenses, then these women in the cash award group would be more likely to change than women in the control group. However, if for some women the reasons for transactional sex are more complex and deep-rooted than simply needing money for survival, the cash award may not have any effect. It is likely that the reasons for engaging in transactional sex are a combination of both of these and therefore it may be difficult to tease out who the cash award provides incentive to and who it does not.

Finally, previous work has shown that in Africa, married women are at increased risk for HIV infection compared to single women because of increased frequency of sex, the increased likelihood of having and HIV-infected partner, and the disinclination to use condoms within marriage (Clark, 2004, Glynn et al 2003).

The conceptual framework applied here is derived from the frameworks and previous research discussed above, and is depicted in Figure 1. The framework illustrates the pathways leading to intended behavior change and actual behavior change. I argue that what drives intent to change is both the ***perceived need to change*** sexual behaviors and the ***perceived ability to change*** sexual behaviors. These two factors also directly influence actual sexual behavior change. A third factor, what I have termed ***new or unexpected opportunity to change***, may influence perceived ability to change and therefore could also be a driving factor in actual sexual 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. 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). Arguably, self-reported probability of current HIV infection could be an indicator of risk as well. This is a measure of past risk, and thus behavior change may have already occurred such that people ranking themselves high on probability of HIV infection may be engaged in less risky behavior than when the infection occurred. However, this may not be true for everyone who ranks themselves as having a high probability of infection. We explore this question further in the analysis that follows. Marital status among women could also be used as a method to measure risk as other authors have demonstrated the increased risk that married women face (Clark, 2004, Glynn et al 2003).

For women, perceived ability to change in this context can be measured through marital status given that married women generally have less agency in sexual decision-making. Ability to change could also be measured through economic dependence of women on men--in this context, women who engage in transactional sex. This is not to assume that all women who depend on men for money engage in transactional sex, but this could be a measure of the intensity of the dependence. Perceived ability to change may also be influenced by opportunity to change. If an opportunity arises through receipt of new information, for example, this newly opened opportunity will likely influence the perceived ability to change, even if temporarily. Opportunity for change, specifically in the context of this study, is influenced and measured by receipt of positive STI test results, and by being the group eligible for the cash incentive. I argue that these two pieces of the CCT study may provide an opportunity for women 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. This new or unexpected opportunity may influence perceived ability to change behavior. For men, the cash might provide a new opportunity for behavior change because it serves as an incentive for change where previously there may have been no incentive to change. With this new incentive, men may alter their perceived ability to change their behavior (it seems easier now that there is a more concrete reason to change), and thus become more likely to change even if they had not intended to do so previously.

The relationship between intended behavior change and actual behavior change is mediated by the perceived ability to change[1]. If no intentions to change are reported (either because there is no perceived need to change or no perceived ability to change), if a new or unexpected opportunity arises, this may increase the perceived ability to change and thus bring about unintended behavior change. Conclusions from previous research and the conceptual framework developed

[1] It should be noted that this is a nuance not depicted in the Figure 1 model. Figure 1 presents what could be considered a baseline framework; however, after receiving test results there are additional mechanisms such as effect of intended on actual behavior change mediated by newly revised perceptions.

from the work of the authors described above lead to the following hypotheses on how enrollment in the CCT study might result in sexual behavior change among some groups but not among others:

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.

H2a: Men are more likely to intend to change and to report change than women because generally they have more risky sexual behaviors than women.

H2b: Women are less likely to intend to change and to report change than men because they do not consider themselves to be at risk or their current behaviors to be risky.

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.

H4: Although married women are at greater risk for HIV infection than single women, they are less likely to intend to change and to report change than single women because they generally have less agency in sexual decision-making with their husbands.

H5: Participants receiving positive STI results are more likely to report changing their behavior compared to those receiving negative STI results, even if they did not intend to change their behavior at baseline.

H6a: Participants in the cash award group are more likely to report having changed their behavior in Round 2 of the study even if they did not report intending to do so at baseline.

H6b: 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.

Findings

Study Population - Demographics

A total of 2420 participants were enrolled in the CCT trial at baseline. Table 1 shows the demographic and other characteristics of this population. 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%). More men were single compared to women (28% and 14%, respectively). The mean annual income was equivalent to about $200 USD. Annual income was significantly greater for males at $250, compared to females at $140 ($p<0.01$). 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. (15.2% and 6.7%, respectively, $p<0.05$). 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 round 2 of the study. Attriters 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).

At Round 2 of the study, 1943 (80.3%) of the original 2420 participants returned. Those who were in the control and low-value treatment arms were more likely to drop out of the study after the first visit (Table 1a)-- 22% of those in the control group and 20% of those in the low-value treatment group did not return, compared to 13% in the high-value treatment group ($p<0.01$) Those testing positive for STI and/or HIV at baseline were also more likely to drop out of the study after the first visit; 26% of those testing positive for STIs dropped out compared to 18% of those testing negative ($p<0.01$), and 40% of those testing HIV positive dropped out compared to 19% of those testing HIV negative ($p<0.01$). Notably, younger participants and unmarried participants were also less likely to return for Round 2 of the study compared to their counterparts.

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 the "low-hanging fruit" and the groups most 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 2 shows the means and proportions of reported sexual risk behaviors at baseline by gender. 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. Regression models with each of the sexual risk behaviors listed in Table 2 as the dependent variable are shown in Table 3. These models show 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. Participants of non-Catholic Christian religion (the choices presented were Muslim, Catholic, Other Christian) were much less likely to report sexual risk behaviors compared to Muslim participants. This group also reported lower probabilities of currently being infected with HIV than Muslims.

Those reporting less risky behavior at baseline are potentially less likely to report intending to change or actual change throughout the duration of the study simply because they likely believe their current behaviors to be safe, and are therefore not in need of changing. Participants who report a high perceived risk of HIV infection or report paying for or receiving payment for sex may be more likely to report changing as a result of enrollment in the CCT study. Participants reporting that they have little control over sexual decision-making in their relationships may not report intending to change because they understand that their intentions cannot be met with corresponding actions as a result of their lack of agency. However, enrollment in the CCT trial and exposure to the interventions that come with enrollment (repeat STI testing, free treatment if infected, and for the treatment group, a cash award contingent on negative STI results) may provide new information that reconstructs perception of risk as reported at baseline. For those reporting a lack of agency in sexual decision-making, the intervention in the form of cash or test results, may provide an opportunity for increased leverage and a corresponding increase in agency.

Intended Behavior Change

Of the 2420 participants enrolled at baseline, 1830 (75.6%) stated at their baseline structured interview that they anticipated that being part of the CCT trial 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 2 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.

We ran a multivariate regression model with any reported behavior change at Round 2 as the outcome (Table 4). The results of the model revealed that anticipation of behavior change at baseline was generally correlated with self-reported baseline levels of risk behavior and perceived risk of HIV among respondents--male participants were more likely than females to anticipate changing their behavior, and those with a self-reported higher probability of currently being infected with HIV were more likely to anticipate change (although the magnitude of this association was small). This result lends some support to the contention that those ranking themselves as having a high probability of current HIV infection have not necessarily adopted less risky behaviors. If those reporting high probability of HIV infection had already adopted less risky strategies, we would expect them to have less room to improve and, therefore, be less likely to report intending to change behavior.

Participants who had ever paid for or received pay for sex were more likely to anticipate change, and those of non-Catholic Christian religion (a group with generally much lower levels of risk behaviors) were less likely to anticipate change. Single and divorced participants were more likely to anticipate change compared to married participants. Divorced participants tended to report higher levels of risk behaviors compared to married participants. However, single participants generally reported fewer risk behaviors, but were more likely to anticipate changing.

Reported Behavior Change

At the Round 2 structured interview, 1122 (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 (Table 5). Of the 1122 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, 332 (29.5%) said they had increased their condom use, and 32 (2.9%) reported treating their sexual infections. Significantly more males than females reported changing behavior (69.6% and 46.4%, respectively, $p<0.05$). Significantly more males than females reported abstaining and having less risky partners over the 4-month period, while more females than males reported treating their sexual infections (4.4% and 1.8%, respectively, $p=0.01$). There were no differences in reported type of change at Round 2 by intervention group (Figure 3).

We ran a multivariate regression model with any reported behavior change at Round 2 as the outcome (Table 6). Men were more likely to report changing from baseline to Round 2 of the study than women. Those who had ever paid for sex were more likely to report having changed, as were participants who were unmarried and had at least a primary school education. Those with a positive STI test at baseline were more likely to report change, but this relationship was of marginal significance ($p=0.07$). Non-Catholic Christians were less likely to change compared to Muslims. Being in the cash award group was not associated with reporting change at Round 2 of the study. The interaction term between gender and cash award group was of mar-

ginal significance in this model (p=0.06, data not shown). Upon gender stratification of the models (Table 6), we find that being in the 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.

Behavior Change Intentions and Behavior Change Actions

Of the 1943 participants who returned for Round 2 of the study, 1469 (75.6%) said at baseline that they anticipated changing their sexual behavior as a result of being enrolled in the study (Table 7). Of the 1469 intending to change their behavior, 908 (61.8%) reported actually doing so at Round 2 of the study. Having fewer partners was the behavior change with the most consistency between reported intentions and reported actions--45.6% of those intending to reduce the number of partners they had reported having done so at Round 2. Thirty-five percent of those intending to increase condom use reporting doing so at Round 2, 20.5% of those intending to abstain at baseline did so, 8.6% had consistency of responses for having less risky partners, and only 4% had consistency of responses in treating sexual infections between the two rounds.

Intentions to abstain were most frequently met by reported reduction in the number of sexual partners, perhaps indicating the difficulty of maintaining abstinence over time. Intentions to have partners that are less risky were followed up most frequently by reported reduction in sexual partners or increasing condom use at Round 2. The move away from the intention of having partners that are less risky could be a function of the difficulty often involved in assessing the risk of a potential or current partner. The majority of participants indicating that they would increase their condom use at baseline reported reducing the number of partners at Round 2--again this could be an indication of the difficulty that arises in trying to convince a partner to use condoms, or attempting to use condoms within a marriage. Having fewer sexual partners appeared to be the easiest type of change to follow through with stated intentions. It is important to note, however, that actions may not match intentions for several reasons, one of which is the new information participants received between the baseline and Round 2 interviews--baseline HIV status, baseline STI status, and knowledge of their eligibility to receive a cash award contingent upon their test results.

In an effort to better understand the responses of participants relating to intentions of changing sexual behavior and reported changing of behavior, participant responses were grouped into five categories. Those five categories are as follows: people who said they would change and did change by doing what they intended to do (Change as Intended); people who said they would not change but then reported changing at Round 2 (Unexpected Change); people who said they would change and did change by doing something different than they had intended to do (Change Differently); people who said they intended to change and did not report changing (Unexpected Lack of Change); people who said they did not intended to change and did not report change (Expected Lack of Change). The coding for these categories is not straightforward as participants could choose more than one type of behavior change at each visit. For example, a participant might have reported intending to increase condom use and have fewer sexual partners at baseline, while at Round 2 he may have reported only increasing condom use over the previous four months. Specifically, the categories were defined as follows:

<u>Change as Intended:</u> The same type(s) of behavior change were selected as intentions at baseline and actions at Round 2. If a participant chose two types of change at baseline, these same two types had to have been reported at Round 2 to fall into the Change as Intended category. Addi-

tionally, there were some participants who indicated that they would change but did not select a type of change at baseline (16.0%) and at Round 2 (21.9%). If these participants did not report a type of change at baseline or Round 2, they were categorized in the Change as Intended Category. If they did not choose a type of change at baseline, but did select a type at Round 2, they fell into the Change Differently category (see below). These participants had complete consistency between their responses at the structured interviews at baseline and Round 2 as they related to behavior change intentions and actions. In some cases participants may have been engaging in this safe type of behavior even before enrolling in the study and they planned to and reported continuing to do so. Another possibility is that these participants knew they were at risk, understood what they were capable of changing with enrollment in the study, and were able to follow through with a particular type of behavior change.

Change Differently: The types of behavior change selected at baseline and Round 2 were not exactly the same. For example, a participant may have intended to have partners who are less risky, but at Round 2 reported increasing her condom use. Participants in this category indicated at the baseline structured interview that they anticipated changing their behavior as a result of being enrolled in the study, and they did report changing their behavior at the Round 2 structured interview, but reported doing something other than what they had originally anticipated. Or, they indicated a type of change at Round 2, but at baseline anticipated changing but did not select a type of change. There are several possible reasons for this for this difference in type of change intended and type reported. Participants may have altered their strategies based on receipt of STI or HIV results, or based on trying one strategy at baseline, not succeeding, and switching to a new strategy.

Unexpected Change: Any type of change (including reported change with no specified type) was reported at Round 2 while no intentions to change were reported at baseline. Participants who fell into this category of not intending to change but changing regardless could be classified into one of a few groups. Some of these participants perhaps knew that they were engaging in unsafe sexual behavior but assumed that there were constraints preventing them from changing their sexual behavior and thus indicated not anticipating change as a result of study enrollment. Or, at the time of the baseline questionnaire, some participants may have thought that their current behaviors were not unsafe and therefore did not think they needed to change, but found out otherwise during the course of the study, either through receipt of STI results, or from individual or group counseling sessions. Finally, the incentive of the cash award may have motivated them to try something that they did not anticipate trying when they were interviewed at baseline.

Unexpected Lack of Change: No change was reported at Round 2 while at baseline, any type of change (included intended change with no type specified) was intended. Participants in this category may have thought they could change their behavior but when they tried to implement the change, faced constraints that were beyond their control. Or, these participants may have thought at baseline that they were engaging in risky sexual behaviors, but receipt of their STI and HIV test results made them think otherwise, and they felt they no longer needed to change.

Expected Lack of Change: No change was intended at baseline, no change was reported at Round 2. Participants in this group may have reported not intending to change their sexual behavior as a result of being enrolled in the study because they knew that they were already effec-

tively avoiding unsafe sex and STIs, or they may have known that they were at risk with their current behaviors but they also knew that there was not much that they could do about it.

The majority of the 1897 participants included in the analysis were in the Change Differently category (38.2%). Unexpected Lack of Change was the next most common (29.6%) followed by Expected Lack of Change, Unexpected Change, and finally Change as Intended (see Figure 4). Women fell into the Unexpected Lack of Change and the Expected Lack of Change categories more frequently than men, men were more commonly in the Change Differently category. Figure 4 stratifies the five change categories by intervention group as well. Among males, there was little difference between cash award and control groups by change category. Among women, differences were more pronounced—women in the treatment group were more likely to fall into the Unexpected Change category compared to women in the control group, and were less likely to fall into the Unexpected Lack of Change category. It should be noted that 241 of the 2420 study participants (12%) reported having had no sex partners in the four months prior to enrollment in the study. It follows that these participants would fall primarily in the Intended Lack of Change category—they are already abstaining and therefore have no reason to intend to change. We did not find this to be the case—of the 241, 25 (9.6%) fell in the Intended Lack of Change category. The majority of the 241 fell into the Change Differently category (86, 33%). It is possible that even if these participants had not recently engaged in risky behaviors, they are aware that they have done so in the past and would in the future if not presented with an opportunity to change. They may have, for example, been working at the farm for several months, and therefore not recently been sexually active. This does not preclude their need to change their behavior going forward if they perceive themselves to be at risk and able to change.

We used these categories to test each of the hypotheses listed above. To do this, we used multinomial logistic regression models, varying the comparison group with the specific hypothesis being tested. Unless otherwise specified, the models used the Expected Lack of Change category as the baseline comparison group. This section proceeds by modeling predictors of each of the change categories to test each of the stated hypotheses.

H1: Those with more risky sexual behavior are more likely to intend to change and report changing.

This hypothesis predicts that those who report engaging in risky sexual behaviors at baseline (see Tables 2 and 3) were more likely to fall in to either the Change as Intended or Change Differently categories compared to those who did not engage in risky sexual behaviors. Table 8 compares those falling into one of these categories to those who reported no intended or actual behavior change. The results of the model support this hypothesis: those who categorized themselves as having a high probability of current HIV infection, those engaging in transactional sex, those who received a positive STI test result at baseline, and those with more sex partners in the past four months were more likely to fall into the Change as Intended/Change Differently categories. Additionally, non-Catholic Christians, a particularly low-risk group as indicated by the baseline reported sexual risk behaviors, were less likely to be in this group. However, having more education and being unmarried were also significantly associated with being in the Change as Intended or Change Differently categories. Based on previous research showing that married women are at greater risk for HIV infection and on self-reported higher probability of being infected with HIV, we might expect the opposite result as regards marital status, especially among

women. Stratifying the model by gender (Tables 9-10), we still find single women to be more likely to fall into this category. One possible explanation for this is that although married women may be at greater risk for infection, they have less agency and thus are less likely to report change. We explore this possibility in Hypothesis 3.

H2a, H2b: Gender differences and behavior change in relation to reported baseline sexual risk behaviors.

These hypotheses predict that men are more likely, and thus women are less likely to fall into the Change as Intended or Change differently categories because of their risk behavior profile. Table 8 compares those in these categories to those in the Intended Lack of Change category. The model supports this hypothesis and shows that women are significantly less likely than men to fall into these behavior change categories. However, the model shows that women are less likely than men to change even controlling for reported baseline risk behaviors. This suggests that it is not risky behavior alone that makes men more likely to anticipate and report behavior change. An additional explanation for women's lack of change is that women have a lower perceived ability to change and are thus not intending change or reporting actual change even if they have a perceived need to change. The next hypothesis relates to women's agency in decision-making and how this might influence intended and reported change.

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.

This hypothesis predicts that women are more likely to fall into the Intended Lack of Change category or into the Unexpected Lack of change category than men because they face greater constraints to changing their behavior than men. The model uses baseline self-reported agency in sexual decision-making to evaluate this hypothesis, and compares those in the Intended Lack of Change category and those in the Unexpected Lack of Change category to those who reported changing their behavior at Round 2—those in the Change as Intended, Unexpected Change, and Change Differently Categories (Table 11). The results of this analysis do not support this hypothesis. Women were significantly more likely than men to fall into the Intended Lack of Change category and the Unexpected Lack of Change category compared to those reporting any behavior change at Round 2. However, agency in sexual decision-making was not significant for either the Intended Lack of Change group or the Unexpected Lack of Change group. The interaction term for gender and agency was not significant in the model (data not shown). Additionally, stratification of the model by gender (Table 12) showed that women lacking agency in sexual decision-making were no more likely to fall into the Intended Lack of Change category or the Unexpected Lack of Change category than women who reported sharing equally in the decision or being able to make the decision on their own.

H4: Although married women are at greater risk for HIV infection than single women, they are less likely to intend to change and to report change than single women because they generally have less agency in sexual decision-making with their husbands.

This hypothesis is similar to H3, except that it is specified for married women. Again, these women would, according to this hypothesis, be more likely to fall into the Intended Lack of Change category or the Unexpected Lack of Change category. Table 11 shows the model only among women. Single women were significantly less likely to fall into both the Intended Lack of Change category and the Unexpected Lack of Change category, supporting the hypothesis that married women are less likely to report change. However, as noted in the discussion of the previous hypothesis, agency in sexual decision-making was not significantly associated with falling into the Intended Lack of Change category among women. The interaction term for marital status and agency among women was not significant (data not shown). Therefore, in the multivariate model, it does not appear that the relationship between agency and Lack of Change is stronger among married women. So while it is clear from the data that married women report less agency in sexual decision-making and that married women are less likely to report change, after adjusting for other potentially confounding factors, there is no interactive effect of these two variables on the reported change outcome.

H5: Participants receiving positive STI results are more likely to report changing their behavior compared to those receiving negative STI results, even if they did not intend to change their behavior at baseline.

This hypothesis predicts that participants receiving positive STI results are more likely to fall into the Unexpected Change category compared to those who fell into the Intended Lack of Change category. The notion here is that the positive test provides an opportunity for change through new information. Therefore those who thought at baseline that they did not need to change may have learned otherwise upon receipt of their results, or those who may not have had the perceived ability to change may be able to use the test results as leverage to convince a partner to change their behavior. Participants receiving a positive STI test may also be more likely to fall into the other reported change categories, Change as Intended and Change Differently. It is possible that participants knew that they were at risk of having an STI at baseline (perhaps they had symptoms or knew their partner had symptoms) and therefore intended to change. For those in the Change Differently category, they may have known they were at risk and intended to change but the positive results convinced them they need to use a different strategy—perhaps increasing condom use or treating their infections instead of reducing the number of partners for example. Table 8 shows these models. The relationship between testing STI positive at baseline and falling into the Unexpected Change category, while in the anticipated direction and of substantial magnitude, is of only marginal significance ($p=0.08$). Receipt of a positive STI result is significantly associated with falling into the Change Differently category, but not with the Change as Intended category. We added an interaction term for gender and STI test results to each of the models, and found no significance. 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. Thus, we cannot say that receipt of a positive STI was more influential for women than it was for men in driving behavior change.

To explore the notion that receipt of a positive STI test might provide women with increased leverage for convincing partners to change their behavior, we also looked at self-reported agency in sexual decision making at Round 2 of the study, after participants had received one round of STI results. If receipt of a positive test results in increased agency, we would expect those who had a positive result at baseline and reported lacking agency at baseline to report hav-

ing increased agency at Round 2. Table12 shows this analysis. Increased agency was defined as reporting that a partner made decisions about sex at baseline, and at Round 2 reporting that either both made decisions equally or that the respondent made decisions about sex. Women were more likely to report increased agency than men (23.4% and 15.9%, respectively, $p<0.01$). We do not find any effect of receipt of a positive STI test on Round 2 reported agency among men or women.

H6a: Participants in the cash award group are more likely to report having changed their behavior in Round 2 of the study even if they did not report intending to do so at baseline.

H6b: 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.

These hypotheses predict that participants in the cash award group are more likely to fall into the one of the change categories: Change as Intended, Change Differently, or Unexpected Change. The promise of the cash award may provide some new and unexpected opportunity that increases perceived ability (and in this case incentive) to change behavior. Additionally, among women, the cash award may provide added leverage in sexual decision-making, and thus women in the cash award group may be more likely to fall into the Unexpected Change category compared to those in the Intended Lack of Change category. Table 8 shows these models. Being in the cash award group is significantly associated with falling into the Unexpected Lack of Change category, but not with falling into the other two change categories, Change as Intended and Change Differently. The interaction term for gender and intervention group was not significant in this model.

Stratifying the model by gender (Tables 9-10), we find that among women, those in the cash award group were more likely to fall into the Unexpected Change category compared to those in the Expected Lack of Change category, and that there is a marginally significant relationship between being in the cash award group and falling into the Change Differently category ($p=0.07$). These associations do not significantly differ from the associations found among males.

We also added an interaction term to the female model testing the interaction between marital status and intervention group. We found no evidence that the cash award had more of an effect on married women than it did on single women. So while being in the cash award group may provide increased leverage to women in changing their behavior, this effect is not stronger for married women, despite the fact that married women reported lower agency in sexual decision-making at baseline compared to unmarried women.

Similar to the previous hypothesis relating to the influence of the STI test results, to further explore the notion that being eligible for the cash incentive might provide women with increased leverage for convincing partners to change their behavior, we also looked at self-reported agency in sexual decision making at Round 2 of the study, after participants had been randomized and were aware of their eligibility for the cash award. If the cash incentive results in increased agency, we would expect those in the cash award group who reported lacking agency at baseline to report having increased agency at Round 2. Table 13 shows this analysis. Overall, we do not find any effect of being in the cash award group on Round 2 reported agency. However, interestingly, the cash award is associated with increased agency among men, but not among women. In summary, we find that the cash incentive is associated with Unexpected Change. This effect ap-

pears to be stronger for women, although not significantly so. There is no differential effect of the cash on married women, nor does being eligible for the cash influence reported changes in agency for women. However, the cash does influence reported changes in agency for men.

Summary of Hypotheses and Change Categories

Table 15 summarizes the characteristics that are associated with each type of change, and the corresponding support or lack thereof for each of the hypotheses that have been presented. Results from this analysis point strongly toward the notion that change among the study enrollees between baseline and Round 2 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 little evidence to support the notion that women report less change than men because they face constraints to behavior change. The data provide no support for the hypothesized association between agency in sexual decision-making and reported change, and 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 cash award group was significantly associated with unexpected change only among women. One potential reason for this is that women who at baseline felt they were unable to change saw the promise of the cash award as leverage to convince husbands or partners to change their behavior, and were able to do so between the baseline and Round 2 study visits. Or, women who depend on sexual relationships for money could end such partnerships as a result of a new source of income. Both of these potential explanations should be qualified however; the latter explanation is undermined in part because receiving pay for sexual relationships (perhaps not the most ideal measure of economic dependence, but a measure nonetheless) was not associated with unexpected change among women. Additionally, we did not find self-reported increased leverage among women in the cash award group compared to those in the control group. 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 currently being infected with HIV compared to single women, were overall less likely to report any kind of change compared to unmarried women. At best, our data merely hint at the effect that constraints that women, and in particular, married women may face have on reporting behavior change in the context of the RESPECT study.

In relation to the effect of ***new and unexpected opportunities for change***, we found that receipt of a positive STI test at baseline was significantly associated with falling into the Change Differently category, and marginally associated with falling into the Unexpected Change category. It is likely that the receipt of a positive test served as an indicator of the level of risk and thus revised the existing perceived need to change behavior. We did not find 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 point that women could use to convince husbands or partners to change. Similarly, being in the cash award group was significantly associated with falling into the Unexpected Change category, supporting the idea that this new opportunity revised the perceived ability to change, resulting in unintended behavior change. There is marginal 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 is stronger, and significant for women, but the gender difference is not significant.

Discussion

Two main findings result from this analysis. First, within the context of the CCT 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; (c) this group of risk-takers represents the low-hanging fruit. These participants were significantly more likely to fall into the change categories simply because they had more to change compared to those already engaging in safe sexual behavior, and the RESPECT study provided them with an opportunity to engage in that change. For example, if those in the risky group had prior to study enrollment adopted no risk reduction strategies, adopting only one is a change for them. It may be more difficult (and perhaps unnecessary) for those who are already engaging in one or more risk reduction behaviors to adopt yet another one. In effect, the low-risk group has reached a sort of saturation point in terms of needed behavior change. If the explanation is one of the latter two, then we can argue that the targeted groups are being reached by the intervention, either through a more informed perception of risk based on test results or through the incentives associated with being part of the study, and are changing as a result. In either case, it appears that messages directed at these high-risk individuals are being received. If the explanation has more to do with the counseling, then focus should be directed to working with counselors to identify those at high risk and raise self-awareness of risk among these individuals.

The second main finding is that we find supporting evidence that exposure to new and unexpected opportunities in the form of receipt of a positive STI test 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.

The results of this study support previous research in that strategies for avoiding infection are not evenly distributed across types of study participants--there are differences in choice of strategy by gender and by marital status. The intention to change behavior and the ability to follow through with that intention also vary by perceived risk levels, ability to change, and exposure to new and/or unexpected opportunities. The change consistency analysis illustrates that there is considerable complexity in modeling how the CCT trial might affect risk reduction strategy change and strategy choice over time. The notion of the cash award carries with it the assumption that an incentive will motivate people to do what they know is in their long-term self interest rather than making choices that fulfill their immediate self-interest. The typology of change illustrates that the cash incentive will likely affect people differently depending on what their priors are. This complexity gives us insight into the difficulty in creating unilateral HIV prevention programs that will have population-level effects. Sexual behavior change in general, and specifically, the type of change anticipated and reported among both males and females is a function of not just level of risk, but also experience, exposure, and life circumstances. There exists a non-static relationship between intentions and actions--both are adjusted with the receipt

of new knowledge and information--what Johnson-Hanks calls “flexible opportunism” (Johnson-Hanks, 2007).

This study has several limitations. 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 et al report on the validity of the collection of sexual behavior data using five different methods from a study done in Northern Tanzania (M. L. Plummer, Ross, Wight, Changalucha, Mshana, Wamoyi et al., 2004). While this study was done 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.

This research is also is limited by systematic loss to follow-up. 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.

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, 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 an important pathway for reducing risk among those engaging in risky behaviors will be to understand how self-assessments of risk are informed and find 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 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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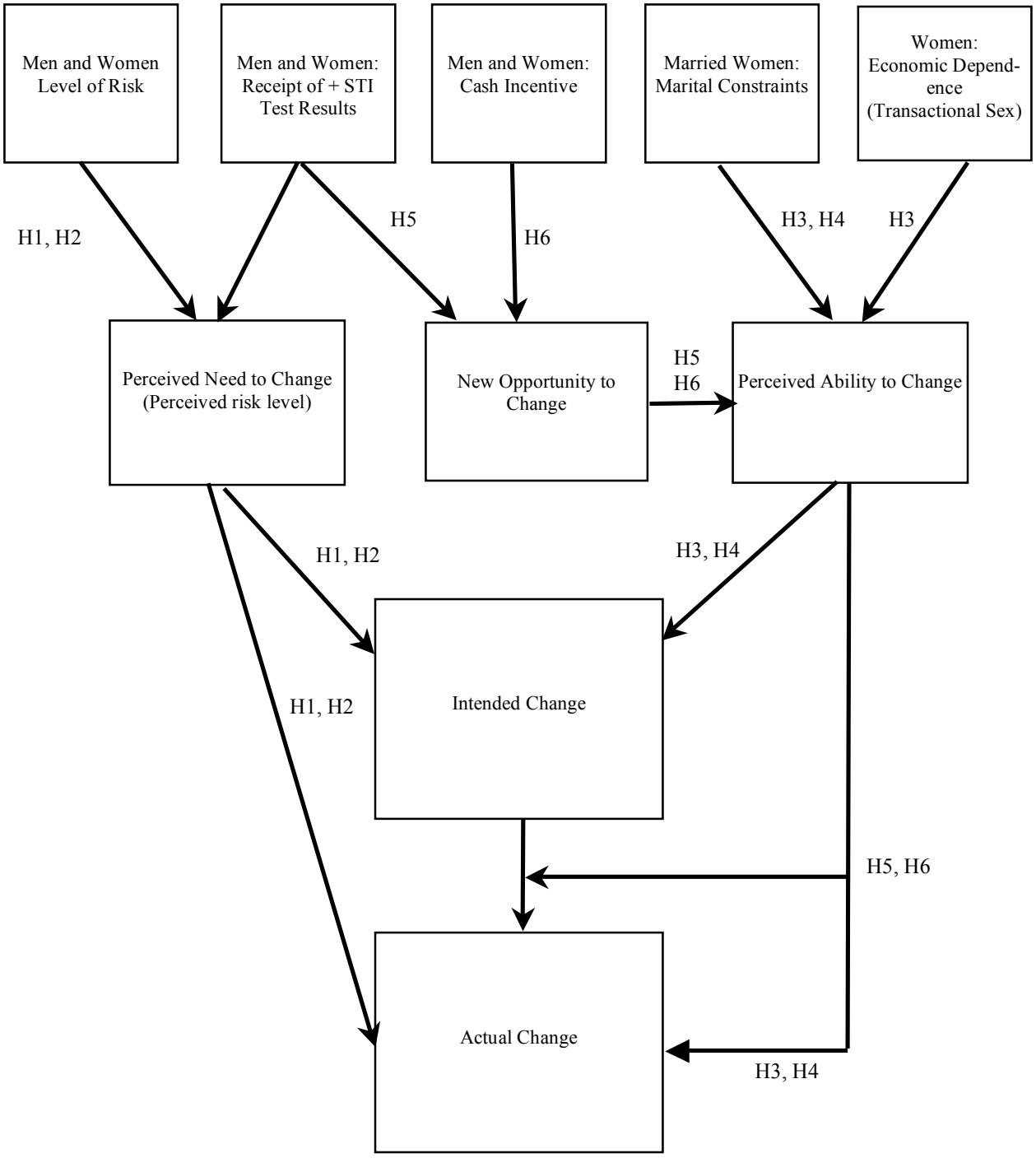
Figure 1: Conceptual Framework Underlying Hypotheses



Measures:
Marital Constraints: Level of agency in sexual decision-making; condom use
Economic Dependence: Women engaging in transactional sex
Level of Risk: Number of partners (lifetime, last 4 months), condom at first sex, transactional sex (men and women), age at first sex, alcohol use, chance of currently having HIV
Receipt of (+) STI test: Round 1 and Round 2 STI results
Cash Incentive: In one of the groups eligible for a cash award

Table 1: Characteristics of Baseline Study Population, by Gender

Demographic	Total Population at Baseline (N=2420)	Men (N=1198)	Women (N=1221)	p-value
Age (mean)	26.5 (se: 0.18)	27.6 (sd: 6.6)	24.4 (sd: 3.8)	<0.05
Single	500 (21.0)	331 (28.0)	169 (14.1)	<0.05
Married	1501 (63.1)	679 (57.4)	822 (68.7)	
Living Together	276 (11.6)	133 (11.2)	143 (12.0)	
Divorced	98 (4.1)	40 (3.4)	58 (4.9)	
Widowed	4 (0.2)	0 (0.0)	4 (0.3)	
Mean Annual Income (USD)	196.8 (sd: 371.3)	253.0 (sd: 413.7)	140.9 (sd: 314.4)	<0.05
Low Income (<=$77 per year)	1192 (49.3)	476 (40.5)	716 (60.4)	
High Income (>$77 per year)	1171 (48.4)	700 (59.5)	470 (39.6)	<0.05
No Education	265 (11.1)	80 (6.7)	185 (15.2)	
Some Primary School	1859 (78.1)	940 (78.5)	919 (75.3)	
Some Secondary School	254 (10.7)	178 (14.9)	117 (9.6)	<0.05
Muslim	913 (38.4)	466 (39.4)	446 (37.3)	
Catholic	1037 (43.6)	509 (43.0)	528 (44.2)	
Non-Catholic Christian	411 (17.3)	196 (16.7)	215 (18.0)	0.48
Treatment-High Value	615 (25.4)	300 (25.1)	315 (25.8)	
Treatment - Low Value	659 (27.3)	330 (27.6)	329 (27.0)	
Control	1124 (46.5)	559 (46,7)	565 (46.3)	0.78

Table 1a: Regression Comparing Those Who Did Not Return for Round 2 to Those Who Did Return

Demographic	Did Not Return for Round 2 (N=476)
Female	-0.077 [0.102]
Age (mean)	-0.037** [0.009]
Single	0.458** [0.123]
Living Together	-0.023 [0.173]
Divorced	0.409 [0.244]
Mean Annual Income (USD)	-0.001 [0.001]
High Income (>$77 per year)	0.018 [0.104]
Some Primary School	-0.348* [0.155]
Some Secondary School	-0.160 [0.200]
Catholic	-0.209 [0.113]
Non-Catholic Christian	-0.259 [0.153]
Treatment-High Value	-0.605** [0.139]
Treatment - Low Value	-0.089 [0.120]
STI-positive at Baseline	0.462** [0.133]
HIV-positive at Baseline	1.065** [0.228]

Note: Regression coefficients and standard errors reported in brackets; *p<=0.05, **p<=0.01
Referent groups are: Muslim, married, no education, control group, and low income

Table 2: Mean Baseline Sexual Risk Behaviors by Gender

Risk Behavior	Total Population at Baseline (N=2420)	Men (N=1198)	Women (N=1221)	p-value
Lifetime Number of Sexual Partners	5.71 (sd: 9.16)	7.94 (sd:11.13)	3.57 (sd: 6.01)	p<0.01
Sex Partners in past 4 months	1.04 (sd: 0.62)	1.14 (sd: 0.77)	0.94 (sd: 0.40)	p<0.01
Age at first sex	16.56 (sd: 2.55)	16.80 (sd: 2.92)	16.33 (sd: 2.11)	p<0.01
Drink Alcohol	0.09 (sd: 0.29)	0.14 (sd: 0.35)	0.04 (0.18)	p<0.01
Ever had HIV Test	0.54 (sd: 0.50)	0.35 (sd: 0.48)	0.72 (sd: 0.45)	p<0.01
Chances of having HIV (mean score 1-10)	2.16 (sd: 1.81)	2.12 (sd: 1.76)	2.2 (sd: 2.09)	p=0.3
Condom almost never effective	264 (11.2)	159 (13.6)	105 (8.8)	
Condom sometimes effective	361 (15.3)	179 (15.3)	182 (15.2)	
Condom usually effective	438 (18.5)	224 (19.1)	214 (17.9)	p<0.01
Condom almost always effective	1032 (43.6)	518 (44.2)	514 (43.1)	p=0.57
Partner makes decisions about sex	908 (40.6)	155 (14.5)	753 (64.9)	
Both partners decide equally	603 (27.0)	287 (26.8)	316 (27.3)	
Respondent decides	719 (32.2)	630 (58.8)	89 (7.7)	<0.01
Weeks Spent Away from home in past 12 months	6.13 (sd: 9.99)	6.79 (sd: 10.68)	5.49 (sd: 9.21)	p<0.01

Note: Condom effectiveness beliefs was reported on a scale of 1-4, 1=never effective, 4=always effective; sexual decision-making was a three level variable, 1=partner decides, 2=both decide, 3=respondent decides

Table 3: Regression Models of Mean Baseline Sexual Risk Behaviors

Demographic	Lifetime Sex Partners	Age at First Sex	Condom At First Sex	Alcohol Use	Chance Have HIV	Sex Partners Past 4 Months	Sexual Decision Making	Pay for or Receive pay for Sex
Female	-3.193** [0.398]	-0.137 [0.115]	-0.013 [0.017]	0.075** [0.013]	0.118 [0.083]	-0.218** [0.028]	-0.994** [0.032]	0.032 [0.023]
Age	0.286** [0.039]	0.087** [0.011]	-0.019** [0.002]	0.011** [0.001]	0.019* [0.008]	0.004 [0.003]	0.002 [0.003]	-0.001 [0.002]
Single	-0.113 [0.538]	0.382* [0.155]	0.175** [0.024]	1.071 [0.017]	-0.178 [0.111]	-0.238** [0.038]	0.122** [0.045]	0.065* [0.032]
Living Together	0.663 [0.561]	-0.065 [0.162]	0.015** [0.024]	0.980 [0.018]	-0.046 [0.119]	0.068 [0.040]	0.022 [0.045]	0.117** [0.033]
Divorced	1.809* [0.893]	-0.365 [0.257]	-0.029 [0.039]	0.890** [0.025]	0.362 [0.190]	0.015 [0.063]	0.206** [0.076]	0.150** [0.052]
Widowed	-0.814 [4.271]	0.269 [1.230]	0.346 [0.186]	1.059 [0.144]	0.640 [0.904]	-0.192 [0.302]	0.854* [0.341]	-0.188 [0.249]
Catholic	-0.575 [0.393]	0.275* [0.113]	0.052** [0.017]	0.953** [0.012]	-0.069 [0.082]	-0.013 [0.028]	0.026 [0.032]	-0.058* [0.023]
Non-Catholic Christian	-1.645** [0.521]	1.384** [0.150]	0.010** [0.023]	1.001 [0.016]	0.478** [0.107]	-0.081* [0.037]	-0.038 [0.042]	-0.137** [0.030]

Note: Regression coefficients and standard errors reported in brackets; *p<=0.05, **p<=0.01
Muslim is referent group for religion; married is referent group for marital status

Figure 2: Change and Type of Change Intended at Baseline, by Gender

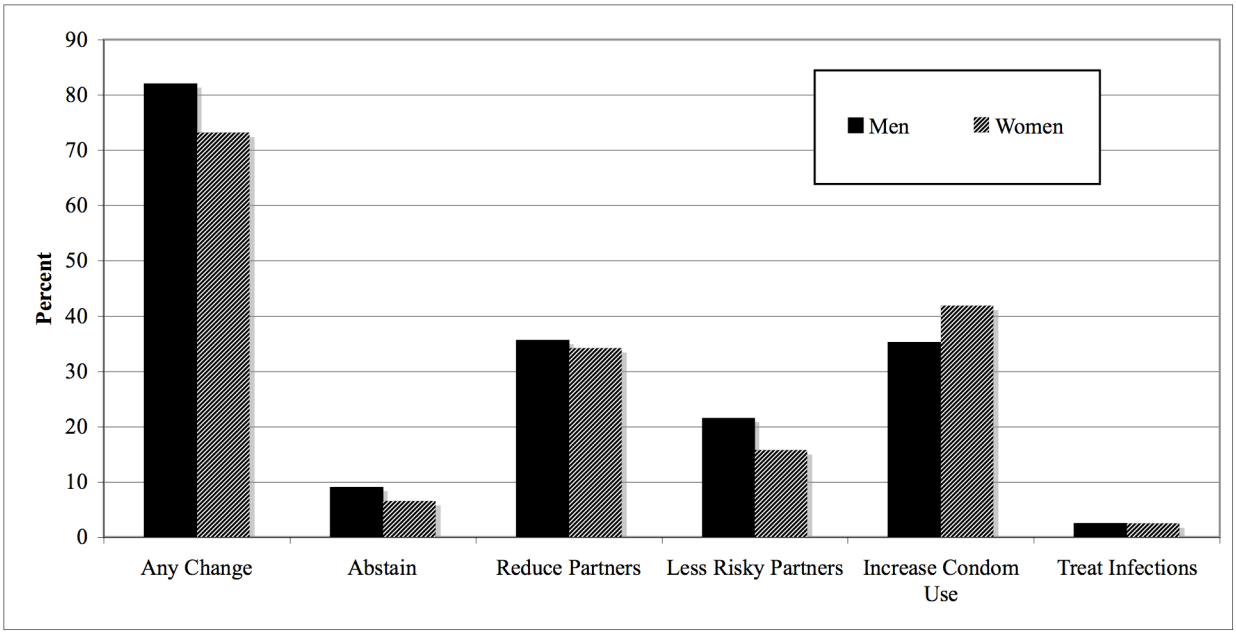


Table 4: Multivariate Regression of Anticipation of Behavior Change at Baseline

	Intended Change	Intended Change Men	Intended Change Women
Female	-0.703 [0.158]	N/A	N/A
Age	-0.032* [0.013]	-0.048** [0.017]	-0.01 [0.022]
Living Together	-0.568** [0.157]	-0.704** [0.253]	-0.543** [0.204]
Single	0.540* [0.219]	0.304 [0.343]	0.685* [0.295]
Divorced	0.784* [0.376]	0.321 [0.596]	0.997* [0.499]
Primary School	0.336* [0.169]	0.456 [0.345]	0.353 [0.199]
Secondary School	0.364 [0.276]	0.832 [0.478]	0.072 [0.363]
Catholic	-0.133 [0.129]	-0.187 [0.219]	-0.116 [0.161]
Non-Catholic Christian	-0.561** [0.155]	-0.984** [0.248]	-0.292 [0.201]
Probability of Having HIV	0.093** [0.036]	0.108 [0.062]	0.08 [0.044]
You and Partner Decide	-0.408** [0.137]	-0.471 [0.304]	-0.397* [0.157]
You Decide	0.122 [0.176]	-0.045 [0.287]	0.568 [0.338]
Paid for/Received Pay for Sex	0.442** [0.118]	0.400 [0.197]	0.461** [0.149]
Sex Partners past 4 months	0.681** [0.141]	0.797** [0.201]	0.545** [0.208]
Lifetime Sex Partners	0.003 [0.008]	0 [0.01]	0.007 [0.013]
Age at first sex	-0.092** [0.023]	-0.055 [0.031]	-0.145** [0.037]
Condom at first sex	0.345* [0.163]	0.38 [0.316]	0.386* [0.195]
Alcohol Use	-0.006 [0.212]	-0.094 [0.248]	0.414 [0.455]

Note: Referent groups are: married, no education, Muslim religion, partner decides about sex.
*p<=0.05**p<=0.01

Table 5: Behavior Change Actions Reported at Round 2 of Study

Actions at Round 2	Total (N=1943)	Males (N=954)	Females (N=988)	p-value
Changed behavior from baseline	1122 (57.8)	664 (69.6)	458 (46.4)	<0.01
Abstain	93 (8.3)	68 (10.2)	25 (5.5)	<0.01
Fewer sexual partners	491 (43.7)	287 (43.2)	204 (44.4)	0.67
Less risky sexual partners	139 (12.4)	97 (14.6)	42 (9.2)	<0.01
Increased condom use	332 (29.5)	194 (29.2)	138 (30.1)	0.75
More likely to treat infection	32 (2.9)	12 (1.8)	20 (4.4)	0.01

Figure 3: Type of Change Reported at Round 2, by Gender and Intervention Group

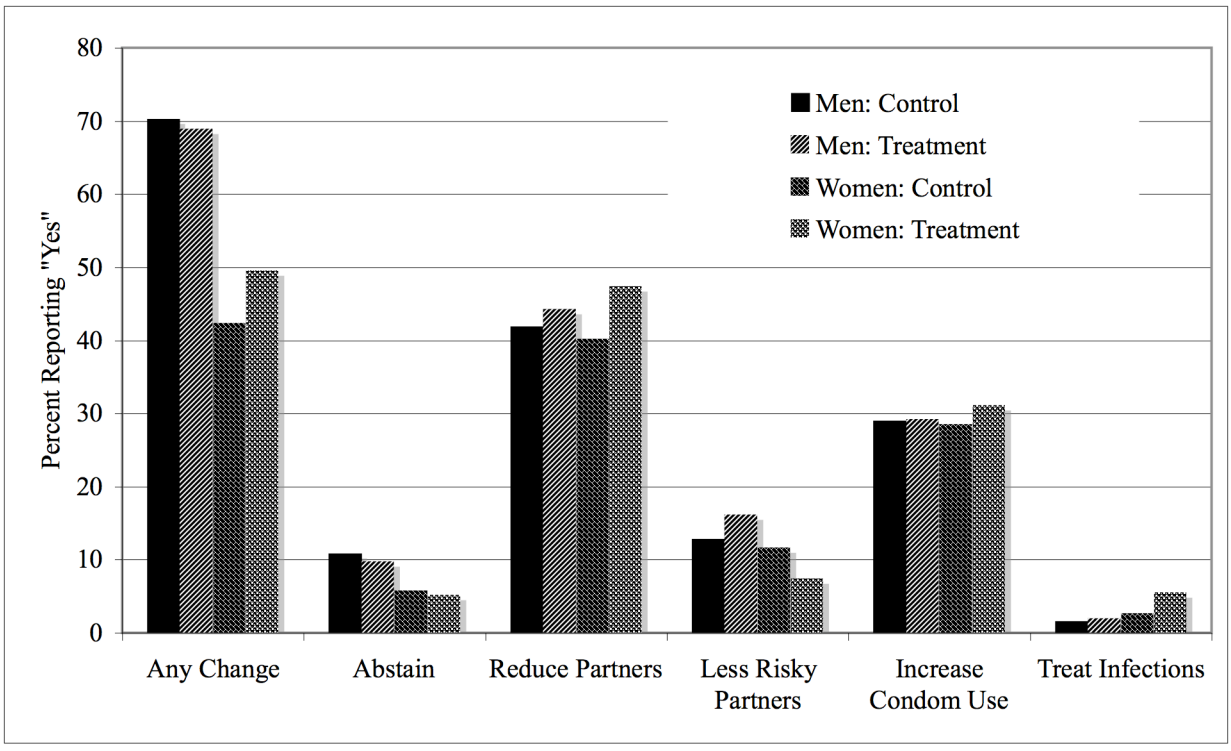


Table 6: Multivariate Regression of Reported Behavior Change at Round 2

	Reported Change R2	Reported Change R2 Males	Reported Change R2 Females
Female	-1.005** [0.148]	N/A	N/A
Age	-0.005 [0.012]	0.004 [0.016]	-0.026 [0.021]
Living Together	0.473** [0.159]	0.112 [0.243]	0.708** [0.208]
Single	0.673** [0.181]	0.474 [0.27]	0.859** [0.251]
Divorced	0.535 [0.292]	0.643 [0.521]	0.499 [0.364]
Widowed	0.551 [1.021]	N/A	0.586 [1.039]
Primary School	0.478** [0.167]	0.001 [0.32]	0.668** [0.21]
Secondary School	0.455 [0.252]	0.148 [0.41]	0.435 [0.355]
Catholic	-0.004 [0.115]	-0.14 [0.18]	0.125 [0.154]
Non-Catholic Christian	-0.625** [0.152]	-0.906** [0.223]	-0.394 [0.208]
Cash Award Group	0.169 [0.104]	-0.06 [0.158]	0.345* [0.14]
STI-positive at Baseline	0.204 [0.109]	0.186 [0.174]	0.202 [0.142]
Probability of Having HIV	0.053 [0.029]	0.034 [0.046]	0.073 [0.039]
You and Partner Decide	-0.095 [0.132]	-0.165 [0.263]	-0.106 [0.16]
You Decide	0.03 [0.156]	-0.081 [0.24]	0.047 [0.269]
Paid for/Received Pay for Sex	0.223* [0.107]	0.289 [0.165]	0.168 [0.144]
Sex Partners past 4 months	-0.023 [0.101]	-0.011 [0.12]	-0.021 [0.189]
Lifetime Sex Partners	0.011 [0.008]	0.005 [0.009]	0.021 [0.017]
Age at first sex	-0.038 [0.022]	-0.053 [0.028]	-0.016 [0.036]
Condom at first sex	0.2 [0.142]	0.433 [0.245]	0.058 [0.18]
Alcohol Use	-1.005 [0.148]	0.273 [0.229]	0.474 [0.408]

Note: Referent groups are: married, no education, Muslim religion, partner decides about sex.
*p<=0.05**p<=0.01

Table 7: Intended Type of Change at Baseline and Corresponding Reported Type of Change at Round 2

	Reported Type of Change at Round 2 (n=1123)				
Type of Change Anticipated at Baseline (n=1830)	Abstain (n=73)	Fewer sexual partners (n=398)	Less risky sexual partners (n=110)	Increased condom use (n=285)	More likely to treat infection (n=28)
Will Abstain (n=83)	17 (20.5)	35 (42.2)	10 (12.1)	25 (30.1)	1 (1.2)
Will Not Abstain (n=826)	56 (6.8)	363 (44.0)	100 (12.1)	260 (31.5)	27 (3.3)
Will have fewer sexual partners (n=320)	20 (6.3)	146 (45.6)	39 (12.2)	90 (28.1)	9 (2.8)
Will Not Have Fewer sexual partners (n=589)	53 (9.0)	252 (42.8)	71 (12.1)	195 (33.1)	19 (3.2)
Will have sexual partners who are less risky (n=174)	14 (8.1)	74 (42.5)	15 (8.6)	66 (37.9)	9 (5.2)
Will not have sexual partners who are less risky (n=735)	59 (8.0)	324 (44.1)	95 (12.9)	219 (29.8)	19 (2.6)
Will increase condom use (n=371)	30 (8.1)	155 (41.8)	45 (12.1)	131 (35.3)	16 (4.3)
Will not increase condom use (n=538)	43 (8.0)	243 (45.2)	65 (12.1)	154 (28.6)	12 (2.2)
Will be more likely to treat infection (n=23)	1 (4.4)	8 (34.8)	3 (13.0)	11 (47.83)	1 (4.3)
Will not be more likely to treat infection (n=886)	72 (8.1)	390 (44.0)	107 (12.1)	274 (30.9)	27 (3.1)

Note: Responses not mutually exclusive so percentages do not sum to 100; percentages are row percents

Figure 4: Distribution Across Change Categories by Gender and Intervention Group

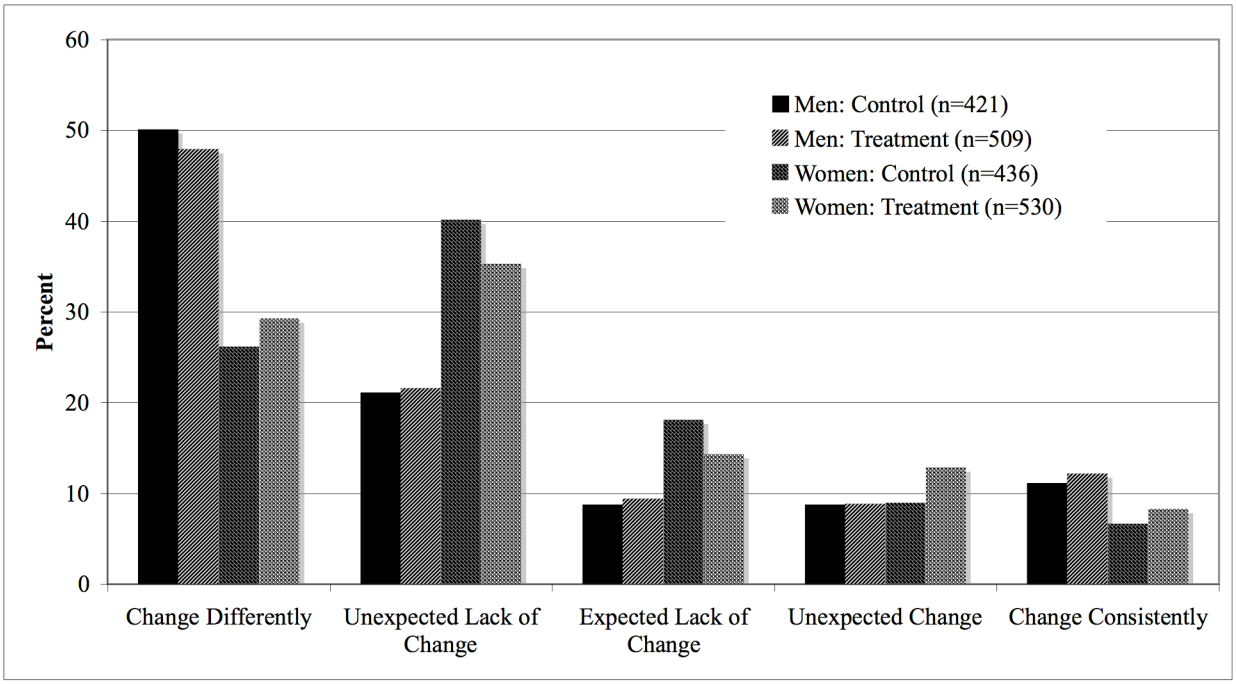


Table 8: Multinomial Regression on Categories of Change, Overall Model

	Unexpected Change	Unexpected Lack of Change	Change Consis-tently	Change Differ-ently
Female	-0.235	-0.285	-1.286**	-1.445**
	[0.315]	[0.258]	[0.319]	[0.254]
Age	-0.001	-0.038	-0.024	-0.041*
	[0.025]	[0.021]	[0.025]	[0.02]
Living Together	0.312	-0.79	-0.547	-0.083
	[0.28]	[0.252]	[0.339]	[0.238]
Single	0.843	0.711	1.418**	1.307**
	[0.474]	[0.4]	[0.442]	[0.393]
Divorced	0.137	0.351	1.041	0.891
	[0.735]	[0.582]	[0.639]	[0.57]
Primary School	0.272	0.264	0.091	1.068*
	[0.319]	[0.243]	[0.314]	[0.276]
Secondary School	-0.079	-0.091	-0.742	0.924
	[0.52]	[0.415]	[0.537]	[0.423]
Catholic	0.163	0.091	0.112	0.043
	[0.249]	[0.205]	[0.252]	[0.204]
Non-Catholic Christian	-1.171**	-0.623	-0.748*	-1.081**
	[0.312]	[0.223]	[0.306]	[0.233]
Cash Award Group	0.445*	0.16	0.333	0.223
	[0.216]	[0.17]	[0.218]	[0.172]
STI-positive at Baseline	0.386	0.27	0.273	0.448*
	[0.223]	[0.178]	[0.23]	[0.181]
Probability of Having HIV	0.083	0.127	0.171*	0.167**
	[0.073]	[0.059]	[0.068]	[0.059]
You and Partner Decide	0.166	-0.207	-0.426	-0.349
	[0.257]	[0.203]	[0.283]	[0.211]
You Decide	0.442	0.349	0.162	0.294
	[0.348]	[0.285]	[0.341]	[0.28]
Paid for/Received Pay for Sex	0.17	0.437	0.417	0.702**
	[0.228]	[0.18]	[0.228]	[0.182]
Sex Partners past 4 months	-0.307	0.431	0.436	0.417*
	[0.271]	[0.215]	[0.234]	[0.211]
Lifetime Sex Partners	-0.005	-0.011	0.013	0
	[0.016]	[0.014]	[0.013]	[0.012]
Age at first sex	0.022	-0.055	-0.106*	-0.101**
	[0.044]	[0.035]	[0.045]	[0.036]
Condom at first sex	-0.092	0.07	0.541	0.285
	[0.317]	[0.246]	[0.3]	[0.247]
Alcohol Use	0.03	-0.388	0.084	-0.048
	[0.398]	[0.345]	[0.381]	[0.321]

Note: Multinomial regression model with no intended change at baseline or reported change at R2 as comparison group (Expected Lack of Change, see Figure 4); referent groups are: married, no education, Muslim religion, partner decides about sex; *p<=0.05**p<=0.01

Table 9: Multinomial Regression on Categories of Change, Males

	Unexpected Change	Unexpected Lack of Change	Change Consistently	Change Differently
Age	0.006	-0.06*	-0.029	-0.049
	[0.033]	[0.03]	[0.033]	[0.027]
Living Together	-0.131	-0.847	-0.881	-0.476
	[0.502]	[0.452]	[0.525]	[0.411]
Single	-0.862	-0.513	0.486	0.084
	[0.785]	[0.592]	[0.615]	[0.558]
Divorced	N/A	-0.584	0.41	0.315
		[1.015]	[0.978]	[0.876]
Primary School	-0.035	0.199	-0.481	0.616
	[1.113]	[0.612]	[0.623]	[0.595]
Secondary School	-0.817	0.419	-0.802	1.083
	[0.661]	[0.803]	[0.861]	[0.77]
Catholic	-0.329	0.401	0.411	0.105
	[0.896]	[0.402]	[0.427]	[0.38]
Non-Catholic Christian	0.279**	-1.016**	-1.226**	-1.608**
	[0.454]	[0.397]	[0.457]	[0.371]
Cash Award Group	-2.092	-0.02	0.017	-0.132
	[0.556]	[0.309]	[0.339]	[0.291]
STI-positive at Baseline	0.011	-0.015	0.075	0.123
	[0.372]	[0.334]	[0.368]	[0.314]
Probability of Having HIV	0.655	0.05	0.071	0.091
	[0.391]	[0.102]	[0.108]	[0.097]
You and Partner Decide	-0.142	-0.548	-0.748	-0.593
	[0.136]	[0.515]	[0.566]	[0.49]
You Decide	-0.214	-0.093	-0.301	-0.104
	[0.627]	[0.496]	[0.532]	[0.474]
Paid for/Received Pay for Sex	-0.095	0.589	0.539	0.866**
	[0.603]	[0.337]	[0.368]	[0.319]
Sex Partners past 4 months	0.236	0.666*	0.583	0.598*
	[0.409]	[0.318]	[0.327]	[0.307]
Lifetime Sex Partners	-0.303	-0.019	0.007	-0.013
	[0.425]	[0.016]	[0.014]	[0.014]
Age at first sex	-0.014	-0.052	-0.09	-0.105*
	[0.018]	[0.049]	[0.057]	[0.047]
Condom at first sex	-0.027	0.292	0.735	0.693
	[0.059]	[0.561]	[0.587]	[0.533]
Alcohol Use	0.405	-0.698	-0.17	-0.267
	[0.678]	[0.418]	[0.44]	[0.375]

Note: Multinomial regression model with no change at baseline or R2 as comparison group; referent groups are: married, no education, Muslim religion, partner decides about sex;*p<=0.05, **p<=0.01

Table 10: Multinomial Regression on Categories of Change, Females

	Unexpected Change	Unexpected Lack of Change	Change Consistently	Change Differently
Age	-0.052	-0.022	-0.02	-0.042
	[0.041]	[0.032]	[0.047]	[0.035]
Living Together	0.506	-0.889**	-0.456	0.089
	[0.347]	[0.314]	[0.476]	[0.306]
Single	2.081**	1.661*	2.044**	2.387**
	[0.729]	[0.665]	[0.764]	[0.667]
Divorced	0.277	0.701	1.382	1.135
	[1.035]	[0.786]	[0.896]	[0.799]
Primary School	0.545	0.235	0.35	1.189**
	[0.396]	[0.276]	[0.411]	[0.343]
Secondary School	-0.575	-0.539	-0.844	0.545
	[0.718]	[0.528]	[0.833]	[0.571]
Catholic	0.231	-0.019	-0.171	0.164
	[0.309]	[0.242]	[0.345]	[0.258]
Non-Catholic Christian	-0.662	-0.365	-0.452	-0.665*
	[0.389]	[0.278]	[0.437]	[0.322]
Cash Award Group	0.671*	0.184	0.442	0.41
	[0.276]	[0.208]	[0.31]	[0.226]
STI-positive at Baseline	0.219	0.365	0.302	0.626**
	[0.276]	[0.213]	[0.314]	[0.231]
Probability of Having HIV	0.191	0.159	0.233*	0.196
	[0.09]	[0.075]	[0.092]	[0.077]
You and Partner Decide	0.192	-0.193	-0.34	-0.428
	[0.293]	[0.228]	[0.355]	[0.254]
You Decide	1.021	1.084	0.871	1.013
	[0.725]	[0.634]	[0.776]	[0.646]
Paid for/Received Pay for Sex	0.137	0.384	0.392	0.59*
	[0.286]	[0.22]	[0.321]	[0.236]
Sex Partners past 4 months	-0.505	0.016	0.23	0.134
	[0.393]	[0.322]	[0.434]	[0.338]
Lifetime Sex Partners	-0.007	0	0.003	0.028
	[0.042]	[0.033]	[0.042]	[0.03]
Age at first sex	0.07	-0.065	-0.176	-0.101
	[0.072]	[0.055]	[0.081]	[0.06]
Condom at first sex	-0.333	0.076	0.626	0.139
	[0.372]	[0.281]	[0.382]	[0.299]
Alcohol Use	0.4	0.675	1.073	1.086
	[1.04]	[0.799]	[0.961]	[0.809]

Note: Multinomial regression model with no change at baseline or R2 as comparison group; referent groups are: married, no education, Muslim religion, partner decides about sex; *p<=0.05, **p<=0.01

Table 11: Multinomial Regression on Categories of Change Compared to Any Change at Round 2

	Intended Lack of Change	Unexpected Lack of Change
Female	1.181**	0.922**
	[0.243]	[0.162]
Age	0.032	-0.005
	[0.019]	[0.014]
Living Together	0.054	-0.725
	[0.224]	[0.188]
Single	-1.257**	-0.571**
	[0.384]	[0.191]
Divorced	-0.797	-0.475
	[0.554]	[0.311]
Primary School	-0.653**	-0.41*
	[0.243]	[0.18]
Secondary School	-0.374	-0.485
	[0.396]	[0.276]
Catholic	-0.075	0.02
	[0.197]	[0.124]
Non-Catholic Christian	1.037**	0.41*
	[0.216]	[0.168]
Cash Award Group	-0.297	-0.129
	[0.163]	[0.112]
STI-positive at Baseline	-0.401*	-0.132
	[0.171]	[0.118]
Probability of Having HIV	-0.153**	-0.028
	[0.057]	[0.031]
You and Partner Decide	0.224	0.035
	[0.197]	[0.145]
You Decide	-0.325	0.029
	[0.27]	[0.169]
Paid for/Received Pay for Sex	-0.531**	-0.101
	[0.173]	[0.116]
Sex Partners past 4 months	-0.298	0.084
	[0.201]	[0.107]
Lifetime Sex Partners	-0.002	-0.014
	[0.011]	[0.009]
Age at first sex	0.075*	0.024
	[0.034]	[0.024]
Condom at first sex	-0.241	-0.182
	[0.237]	[0.153]
Alcohol Use	0.014	-0.368
	[0.309]	[0.225]

Note: Multinomial regression model with any change at Round 2 as comparison group; referent groups are: married, no education, Muslim religion, partner decides about sex; *p<=0.05, **p<=0.01

Table 12: Multinomial Regression on Categories of Change Compared to Any Change at Round 2,By gender

	Intended Lack of Change	Unexpected Lack of Change	Intended Lack of Change	Unexpected Lack of Change
	Men		Women	
Age	0.039 [0.026]	-0.022 [0.019]	0.041 [0.032]	0.019 [0.023]
Living Together	0.486 [0.399]	-0.353 [0.283]	-0.131 [0.278]	-1.011** [0.25]
Single	-0.106 [0.546]	-0.66* [0.295]	-2.252** [0.654]	-0.608* [0.26]
Divorced	-0.281 [0.853]	-0.901 [0.635]	-1.058 [0.774]	-0.397 [0.377]
Primary School	-0.087 [0.57]	0.04 [0.354]	-0.824** [0.29]	-0.600** [0.223]
Secondary School	-0.422 [0.744]	-0.08 [0.453]	-0.005 [0.522]	-0.562 [0.388]
Catholic	-0.184 [0.375]	0.227 [0.195]	-0.124 [0.24]	-0.142 [0.164]
Non-Catholic Christian	1.578** [0.356]	0.552* [0.26]	0.624* [0.284]	0.258 [0.225]
Cash Award Group	0.071 [0.284]	0.061 [0.175]	-0.489* [0.208]	-0.299* [0.15]
STI-positive at Baseline	-0.183 [0.306]	-0.185 [0.194]	-0.461 [0.212]	-0.105 [0.153]
Probability of Having HIV	-0.065 [0.095]	-0.021 [0.05]	-0.199 [0.074]	-0.041 [0.04]
You and Partner Decide	0.544 [0.478]	0.016 [0.289]	0.234 [0.228]	0.056 [0.174]
You Decide	0.133 [0.465]	0.038 [0.259]	-1 [0.63]	0.078 [0.278]
Paid for/Received Pay for Sex	-0.718** [0.313]	-0.143 [0.181]	-0.429 [0.218]	-0.051 [0.155]
Sex Partners past 4 months	-0.496 [0.295]	0.117 [0.126]	0.012 [0.315]	0.001 [0.199]
Lifetime Sex Partners	0.007 [0.013]	-0.011 [0.011]	-0.02 [0.03]	-0.02 [0.018]
Age at first sex	0.088* [0.045]	0.04 [0.032]	0.065 [0.055]	0.005 [0.039]
Condom at first sex	-0.655 [0.527]	-0.37 [0.263]	-0.106 [0.277]	-0.039 [0.193]
Alcohol Use	0.242 [0.363]	-0.455 [0.27]	-0.984 [0.782]	-0.315 [0.429]

Note: Multinomial regression model with any change at Round 2 as comparison group; referent groups are: married, no education, Muslim religion, partner decides about sex; *p<=0.05, **p<=0.01

Table 13: Change in Agency in Sexual Decision-making from Baseline to Round 2 as a Function of STI Test Results

	STI-negative at Baseline	STI-positive at Baseline	STI-negative at Baseline	STI-positive at Baseline
	Men (n=664)		Women (n=926)	
Unchanged or less agency	366 (82.9%)	192 (86.1%)	337 (76.4%)	369 (76.1%)
Increased agency	75 (17.0%)	31 (13.9%)	104 (23.6%)	116 (23.9%)

Table 14: Change in Agency in Sexual Decision-making from Baseline to Round 2 as a Function of Intervention Group

	Control Group	Cash Award Group	Control Group	Cash Award Group
	Men (n=664)		Women (n=926)	
Unchanged or less agency	264 (87.7%)	295 (81.0%)	317 (76.0%)	389 (76.4%)
Increased agency	37 (12.3%)*	69 (19.0%)*	100 (24.0%)	120 (23.6%)

*$p<0.05$ for difference of percent reporting increased agency by intervention group among men.

Table 15: Summary of Results

Hypothesis	**Change Category**	**Result**
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.	Change as Intended & Change Differently	Strong support
H2a:Men are more likely to intend to change and to report change than women because generally they have more risky sexual behaviors than women.	Change as Intended & Change Differently	Strong support
H2b: Women are less likely to intend to change and to report change than men because they do not consider themselves to be at risk or their current behaviors to be risky.	Intended Lack of Change	Strong support
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.	Intended Lack of Change & Unexpected Lack of Change	No support
H4: Although married women are at greater risk for HIV infection than single women, they are less likely to intend to change and to report change than single women because they generally have less agency in sexual decision-making with their husbands.	Unintended Lack of Change & Unexpected Lack of Change	No support
H5: Participants receiving positive STI results are more likely to report changing their behavior compared to those receiving negative STI results, even if they did not intend to change their behavior at baseline.	Unintended Change, Change as Intended, Change Differently	Marginal support
H6: Participants in the cash award group are more likely to report having changed their behavior in Round 2 of the study even if they did not report intending to do so at baseline.	Unintended Change, Change as Intended, Change Differently	Strong support
H6a: 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.	Unintended Change, Change as Intended, Change Differently	No support

Paper 2: Evolving Strategies, Opportunistic Implementation: HIV Risk Reduction Behaviors in Tanzania

Abstract

Abstinence, remaining faithful, and consistent condom use (A-B-C) are all reliable methods of preventing transmission of HIV and other sexually transmitted infections (STIs), however in reality such methods are not implemented consistently. The shortcomings of translating the A-B-C strategies into practice is at least in part the result of barriers arising from the sociocultural context, or as a result of structural or economic constraints on behavior change. Drawing on interviews from participants enrolled in an HIV prevention trial in Tanzania that used cash awards to create incentives to engage in safer sexual behaviors, we illustrate the difficulties inherent in staying faithful to one of the A-B-C strategies and describe the tools that people use in an attempt to avoid infection. After discussing the barriers that prevent tenacious implementation of risk reduction strategies in their promoted form, we describe what study participants actually did to try to reduce their risk of infection during the course of the study. We find that a) temporary abstinence, though limited in its effectiveness, appears at least as likely as condom use as a risk reduction strategy; b) certain situations provide increased leverage for sexual negotiation, and these situations serve as a means to opportunistically implement risk reduction strategies; c) the opportunity to learn one's health status, in this context through repeat STI testing, occupies an important space in the repertoire of available risk reduction strategies, and the combination of inconsistent condom use, testing and treatment are sometimes implemented as a three-pronged approach to decreasing risk of infection. Although these data alone should not be taken as the basis for novel prevention strategies, they do point to the potential role that increased trust and decreased uncertainty might play in HIV/AIDS prevention efforts. While the role of condoms, partner reduction and abstinence need not be abandoned, our results suggest that more efforts need to be made to increase effective implementation of these strategies. One such approach might be to build trusting sexual relationships where frequent partner testing for STIs is a component of a healthy committed relationship.

I. Introduction

Abstinence, remaining faithful, and consistent condom use (A-B-C) are all reliable methods of preventing transmission of HIV and other sexually transmitted infections (STIs), however in reality such methods are not implemented consistently. The shortcomings of translating the A-B-C strategies into practice is at least in part the result of barriers arising from the sociocultural context, or as a result of structural or economic constraints on behavior change (Gupta, 2008; Krishnan, Dunbar, Minnis, Medlin, Gerdts, & Padian, 2008). Accordingly, the field of HIV prevention is evolving to focus on structural interventions that address these barriers. Qualitative data from one such structural intervention in Tanzania, a conditional cash transfer (CCT) HIV prevention trial, provides a unique opportunity to learn more about strategic thinking on the part of people at risk of HIV infection in the context of a monetary incentive to elect safer sex strategies. We know from previous research that HIV risk reduction strategies implemented in the African setting are frequently tailored to address what is perceived to be the primary source of risk (Poulin, 2007; Smith & Watkins, 2005; Tavory & Swidler, 2009; Watkins, 2004). For example, strategies of married women often center around convincing their husbands to leave outside partners, while male strategies are focused on careful partner selection and condom use with

non-primary partners. Building on these findings, this paper explores both the barriers to and strategies for risk reduction in the context of the CCT trial. Drawing on the qualitative data, we identify existing but overlooked points of leverage that might increase the effectiveness of ongoing HIV/AIDS prevention strategies in the African context.

Even in the U.S., the range of STI and HIV prevention strategies that people actually put into practice is vast, and the consistency with which such strategies are practiced is varied. Donovan has examined the entire range of strategies people have used over time in an attempt to avoid STIs, both before or instead of sex, and during or after sex (Donovan, 2000a, b). Donovan notes that the "tyranny of having to keep the message simple and socially acceptable" has resulted in the focus of prevention efforts on abstinence, condom use and being faithful to one partner who has tested. In reality, people tend to focus more on tools that they can use to try to adopt an effective risk reduction strategy. These tools include, for example, partner reduction, avoiding intoxication, avoiding sexual temptation or opportunity, exercise, getting tested and treated for infections, and choosing less risky partners. Partner selection as a strategy for risk reduction is also diverse, and as Donovan sees it, includes the following considerations: geography, age, attractiveness and other physical attributes--proof of having tested negative, use of alcohol or other drugs. Other strategies used during or after sex include condom use, avoiding sex during menses, examining partner genitals, informing sex partners of infection and referring them for treatment. Donovan underscores the importance of understanding the repertoire of strategies that are in use in the target population in designing successful STI prevention interventions (Donovan, 2000a, b).

Some work describing strategies in use in Africa has been done, mostly as part of the Malawi Diffusion and Ideational Change Project (MDICP) (Poulin, 2007; Smith & Watkins, 2005; Tavory & Swidler, 2009; Watkins, 2004). This rich and fruitful longitudinal data has yielded interesting insight into how well, or how poorly, most of the typical HIV prevention interventions are suited to this population. Poulin studied pre-marital partnerships in Malawi using both in-depth interviews and survey data from MDICP (Poulin, 2007). While her main focus was on transactional sex, she also examined strategies that young people in pre-marital relationships use in choosing partners. She found that women often enquire about the sexual histories of potential partners from friends and relatives, and that they will often end relationships based on the perceived loyalty of the partner and their own understanding of risk of infection based on this loyalty. This risk perception often comes from discussions with friends and relatives rather than discussions directly with the partner. She also found that among these young couples, condoms are often used both for pregnancy prevention and disease prevention; many of the young women expressed concern that there is no way for them to know what their partner is doing outside of their relationship.

Smith and Watkins argue against the notion that Africans come from a perspective of denial and fatalism as regards HIV. Rather, they see proactive behavior change happening, but not necessarily change that aligns perfectly with expectations (Smith & Watkins, 2005). Using a mixed methods approach to examine risk perception and HIV prevention strategies in the MDICP population, the authors found that for married women, most of their worry relating to HIV and other STIs is centered around their husbands, whereas married men worry most about their partners outside of the marriage. Strategies adopted by men and women are tailored to these worries. Women work to convince their husbands to use condoms outside of the marriage, or they simply leave the marriage. Men use condoms, try to select outside partners wisely, or reduce the number of partners they have outside of the marriage. While these are not the prevention

methods espoused by typical HIV prevention programs, Smith and Watkins argue that these strategies constitute potentially effective behavior change in preventing HIV infection as measured by perception of risk of infection in this population. These behavioral changes, while perhaps not entirely effective at the individual level, may be effective at the aggregate level and could potentially influence HIV incidence (Smith & Watkins, 2005).

Condom use is one of the most often recommended strategies for prevention of HIV and STIs. Condom promotion campaigns targeted at high-risk populations have had some success in slowing the HIV epidemic. For example promoting condom use with sex workers was quite effective in Thailand (Ford & Koetsawang, 1999), although partner reduction also played a major part in this success in the form of a decrease in the number of men going to commercial sex workers. Condom use has had less success in Africa, especially in countries with a generalized epidemic (Hearst & Chen, 2004). A number of authors have examined the attitudes toward condoms among African populations, and have found largely negative attitudes, especially as regards condom use within marriage (Chimbiri, 2007; Plummer, Wight, Wamoyi, Mshana, Hayes, & Ross, 2006; Tavory & Swidler, 2009). Chimbiri et al paired Tanzania Demograhpic Health Survey (DHS) data from 1992 and 2000 with semi-structured interview data from married men and women in Tanzania. Generally, the authors found that there was very little condom use within marriage. When there is discussion about condoms between martial partners, it revolves around use of condoms with external partners to prevent infection within the marriage. Bringing up condom use within a marriage is considered as intrusive to the partnership, so this topic is broached with caution, if at all (Chimbiri, 2007). The decision to use a condom in a sexual relationship often carries with it great meaning in these contexts. Tavory and Swidler found from their qualitative work in Malawi that a relationship in which a condom is used is often regarded as an informal, less intimate and potentially risky partnership (Tavory & Swidler, 2009). The flip side of this is that when the relationship is defined as more intimate or serious, condom use is seen as a negative statement about the relationship, and the desire to avoid such negative meanings outweighs any risk that may come with unprotected sex.

This paper describes the range of strategies implemented to avoid STI infection among a population of rural Tanzanians participating in an HIV prevention trial. The HIV prevention trial examined the effectiveness of a cash transfer conditional on testing negative for a panel of STIs in changing sexual behaviors and decreasing STI prevalence over the period of 12 months. Providing incentives to promote certain behaviors or making certain behaviors more costly by paying people to avoid them has been effective in bringing about behavior change in some settings. While conditional cash transfers have only very recently been applied to AIDS prevention (Kohler & Thornton, 2009), they have been used successfully for many years in various social policy domains, including public health, to encourage behavior change (Lagarde, Haines, & Palmer, 2007). They work in part 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. Perhaps the best-known and most thoroughly evaluated example is that of Mexico's Oportunidades, a large-scale poverty alleviation program that makes monthly payments to poor families conditional on their use of preventative and other basic health care and educational services. A randomized controlled trial designed to evaluate the Oportunidades program demonstrated significant impact on a range of health and educational outcomes among enrollees (Gertler & Boyce, 2003).

The purpose of this paper is to assess why some methods for risk reduction that are endorsed by the public health community seem to have little traction in many African settings. To

that end, we examine contextual barriers to behavior change as reported by study participants and village diarists and describe reported risk reduction behaviors in order to learn about the most commonly used strategies for avoiding infection in the study population. Drawing on interviews from participants enrolled in an HIV prevention trial in Tanzania that used cash awards to create incentives to engage in safer sexual behaviors, we illustrate why the A-B-C model may be ineffective in its endorsed form in this population. After discussing the barriers that prevent tenacious implementation of risk reduction strategies in their promoted form, we describe what study participants actually did to try to reduce their risk of infection during the course of the study. We find that a) temporary abstinence is at least as common as consistent and even inconsistent condom use; b) certain situations provide increased leverage for sexual negotiation, and risk reduction strategies are often opportunistically implemented in these situations; c) the combination of inconsistent condom use, testing and treatment are sometimes implemented as a three-pronged approach to decreasing risk of infection.

II. Background

A. Setting

The study took place in the Morogoro Region of Tanzania in the Kilombero and Ulanga Districts. Ten villages centered around the main town in the region, Ifakara, were selected for participation in the study. The region has an HIV prevalence of 5%, just below the national prevalence of 6% (Tanzania Commission for AIDS, 2008). The region is, for the most part, very rural. In Tanzania, rural regions tend to perform lower on several health and development indicators such as literacy rates, total fertility rates, schooling rates, and rates of unemployment. The Morogoro region generally fits this picture; for example the illiteracy rate in Morogoro among women is 32.5% compared to 15% among urban women and 10.7% among males in Morogoro compared to 8% among males living in urban areas. The Ifakara Health and Development Centre administers the Demographic Surveillance Survey (DSS) and provided the sampling frame for the selection of residents to participate in the CCT study.

B. Conditional Cash Transfer Trial

The results reported in this manuscript originate from data collected from the first two rounds of a randomized, controlled trial of a cash transfer conditional on negative STI tests at 4-month intervals over 12 months in all (the RESPECT study). The purpose of the RESPECT study was to understand the effectiveness of cash rewards, conditional on having negative tests for STIs, on prevention of risky sexual behaviors among young men and women in rural Tanzania. The idea is that the promise of a cash reward conditional on negative STI tests will make the decision to engage in risky sexual behavior more "costly" thereby preventing such behavior among those eligible for the reward.

The study methodology for the CCT trial is described in detail elsewhere, but briefly, the Kilombero and Ulanga districts of Tanzania fall in the DSS catchment area for the Morogoro region of the country. Study participants age 18 to 30 residing in ten villages within these two districts were randomly selected from the DSS database that exists within the Ifkara Health Institute, the DSS implementing institution. The study recruited approximately 2400 participants, approximately 240 in each of the 10 study villages. Households of randomly selected potential participants were visited, and recruits and their live-in spouses (eligible at any age) were given a participation slip and information about where and when to show up for study enrollment.

Upon enrollment, all participants were randomized into either the intervention or control arm. All participants in both arms received free STI testing and counseling, and free STI treatment if needed at baseline, and at months 4, 8 and 12 and 24 of the study. In addition, all participants were tested for HIV at baseline and again at 12 months. Persons testing HIV-positive were referred for care and treatment, but retained in the study.

Those in the intervention group received the conditional cash transfer upon receiving negative test results for selected curable STIs at months 4, 8, and 12. Those testing negative in the intervention arm were also eligible to win a prize of approximately $100 USD through periodic lottery drawings. The control arm was not eligible to receive the cash award at any of the visits, but was eligible for parallel lottery drawings. Eligibility for the lottery for those in the control group was not dependent on STI test results.

All participants in both arms received a psychosocial intervention, comprised of regular group counseling. Half of the participants in the intervention arm received approximately $10 per award cycle, and half received approximately $20 per award cycle if they remained negative, allowing for the assessment of the impact of the level of reward on behavior change. Over the year, these accrued amounts are substantial relative to local terms, equal to 15-25% of typical annual earnings. Quantitative questionnaires were administered at all study visits.

III. Data and Methods

A. Qualitative Sub-study: Sampling and Recruitment

The qualitative study participants were recruited from four of the ten villages that were participating in the CCT study. The four qualitative villages represented a range of semi-urban to more rural, and ranged from 15 minutes to a 2-hour drive to Ifakara Town, the main urban center in the district. The target number of interviews at the outset was 92 (64 in the treatment group, 28 in the control group). We used stratified random sampling to select the qualitative study participants at baseline. In each village, the strata of interest were gender, marital status, and intervention/control group. We over-sampled from the treatment group as we were interested in hearing more experiences relating to how the money did or did not motivate sexual behavior change.

As expected, there was some attrition of qualitative participants at the 4-month visit. We replenished the sample by randomly selecting participants who had tested positive for STI at the 4-month visit, and with participants who had tested HIV-positive at baseline. At both baseline and the 4-month follow-up, we also randomly selected two spouses of qualitative participants for inclusion in the qualitative study.

Recruitment for the qualitative study took place at the second visit of each study round -- the visit during which participants received test results and post-test counseling. Participants whose study ID number appeared on the randomly generated list of potential qualitative participants were approached and asked if they would be willing to be interviewed. If the participant agreed, he or she was consented, and given the option to be interviewed then and there, or to make an appointment. Qualitative participants received a small cash payment equal to approximately $3 USD at the end of each interview.

B. Qualitative Data Collection, Management and Analysis

The qualitative interviews were conducted at the time participants received their baseline HIV and STI test results, approximately three weeks after the initial structured interview. In June and July of 2009, 1943 of these 2420 participants returned for Round 2 of the study, and were again interviewed using a closed-ended structured questionnaire. Fifty-nine of the original qualitative

participants were re-interviewed using the in-depth interview format, and an additional thirty six participants were added to the qualitative sub-study population, and interviewed at Round 2. Tanzanian interviewers were trained in both open and closed-ended interviewing techniques. Following participant written consent, interviews were conducted either in Kiswahili or in English (with an interpreter present) by trained social scientists from both Ifakara Health Institute and U.C. Berkeley. An effort was made to match interviewer and interviewee by gender, and to match the interviewer/interviewee pairs from baseline again at 4-month follow-up, but logistical constraints precluded this outcome for all interviews. All interviews were audio-recorded, transcribed in Kiswahili, and then translated into English.

The interviews were conducted using an interview guide. The main topic areas covered during the interviews were opinions about the study, community perceptions about the study, strategies and/or steps for avoiding STI and getting the cash award, perceptions of the cash incentive, and future plans generally and for use of the cash incentive if received. The guide was revised for Round 2, and included questions about respondent's experiences being enrolled in the study over the previous four months, what strategies they tried, and why or why not these strategies were successful.

Qualitative interview transcripts were imported into TAMS Analyzer Qualitative Coding software. First, each manuscript was coded descriptively, using the quantitative data to indicate the gender, marital status age, intervention group, interview round, and STI status of each respondent. Next, each manuscript was coded by topic; sections of transcript that related to strategies participants intended to use, tried to use, or did use were coded generally as strategies. Finally, each section of transcript that was topic coded as a strategy was analytically coded to indicate the type of strategy, and perceptions relating to the type of strategy. For example, condom use was mentioned as a potential strategy, but in practice, condoms were only used sporadically, and the respondent in fact does not trust that condoms truly work to prevent infection. Analytic coding was an iterative process and codes were created as needed based on what was uncovered through reading and re-reading the transcripts. The result of this process was a codebook that was then applied to all reviewed transcripts.

The demographic and other quantitative data included here came from the structured questionnaire conducted at the baseline and Round 2 study visit, and administered to all study participants. Differences in demographic and other characteristics noted here were examined using a Chi Square test, and differences were considered significant if $p<0.05$.

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.

C. Diaries

Following a methodology developed by Watkins and Swidler termed conversational journals, we hired ten diarists who were "cultural insiders" in all of the communities in which the CCT trial took place (Watkins & Swidler, 2009). Swidler and Watkins have very successfully used this method as part of their HIV research in Malawi (A. Swidler & Watkins, 2007; Watkins & Swidler, 2009). Conversational journals provide a method to get at interpretation and meaning not just at the individual level, but at a more collective level, and to capture the dynamic nature of meaning and interpretation on a daily basis. Text from journals kept by the hired cultural insiders journaling the details of conversations that they overhear or participate in were analyzed to try to get at interpretation and meaning.

In the context of the CCT, journalists were instructed to capture all conversations and events that related to the study, the researchers, the incentive, and sexual behavior and partnerships generally. The diaries allow us to understand from an insider's perspective how the communities are responding to the parent study and those who are participating in it, and whether and perhaps why there are differences in the community response across villages. The diaries provide us with social context and meaning relating to the parent study. In this regard, information from the diaries has allowed us to better tailor the in-depth interviews at each subsequent round, and to understand what the relevant issues are, and what we may have been missing during the interviews in each village. Data collected from the conversational journals does not include names or identifying information of anyone that the diarists are writing about. If the diarists mistakenly include names in their notebooks, names were redacted upon review of the journals. The data analyzed for this manuscript includes diaries from February through July 2009, from all ten study villages.

Diaries were coded differently than the interviews. In addition to reading each diary and conducting descriptive, topic and analytic coding using the strategies codes derived from the interview coding process, diaries were also searched using keywords relating directly to discussion of strategies that people were implementing. Keywords searched were derived from the analysis of the interview transcripts.

The conversational journals method carries with it some limitations. The fact that the diarists were paid $30 per notebook filled with documentation of conversations and events relevant to the parent study might have created an incentive to simply make up stories and fill the notebooks with fake documentation. In their experience using the conversational diaries method in Malawi, Watkins and Swidler (Watkins & Swidler, 2008) have occasionally found crude efforts to pad the diaries, for example, by copying out part of a religious tract or a story from the newspaper, but these are very obvious. The diary materials—if one insists to the diarists that one wants them to remember and record what they actually heard—are generally much too complex to be made up. To assess the degree of authenticity, diaries were regularly reviewed by study staff and evaluated for repeated or made-up stories. Diarists in a few villages were either replaced or their services terminated if study staff found this to be an issue.

IV. Results

A. Qualitative Study Population

At baseline, we randomly sampled 92 trail enrollees from four of the ten study villages to be interviewed using an in-depth interview format. Of these 92, 80 showed up at the study site. Of these 80 that were interviewed, 66 transcripts were received (14 transcripts were lost through data management error--either the recordings were inadvertently deleted or the electronic version of the transcript was inadvertently deleted).

At Round 2, we interviewed 59 of the 66 people interviewed at baseline (7 people did not return to the study site). In addition to these 59 people, we randomly selected 10 to 12 additional people from each village (for a total of 49) to be interviewed to replace both those interviews lost through data management error and those who did not come to the study site at baseline, and to supplement the sample with people who had tested STI-positive at Round 2 (only three people of the 60 interviewed at baseline tested STI-positive). Of these 49 that were randomly selected at Round 2, 36 showed up and were interviewed. Therefore, at baseline, we have data for 66 interviews, and at Round 2, we have data for 95 interviews, for a total of 161 interviews, representing 102 individuals.

Table 1 shows the demographic and other characteristics for the qualitative study population by gender using data from the structured questionnaire that was administered at baseline and Round 2 of the study. The qualitative study population was 60% female, with a mean age of 26 years. Most of the interviewees were married (49%), 28% were single, and 14% were living with a partner. The majority of the qualitative participants had received at least some primary school education (76%), but only 12% had continued on to secondary school. Most participants were Catholic (47%) or Muslim (44%). Just over 35% of qualitative participants had a spouse enrolled in the CCT parent study. Over half of the participants had an HIV test previously, but this differed markedly by gender; 70% of women had an HIV test before the study compared to only 24% of men ($p<0.01$). This gender difference is a result of routine HIV testing for pregnant women. On a scale of one to ten, with ten being most likely, the average score for interviewee estimates of the chances of currently having HIV was 2.2. Forty-eight percent of participants stated that their partner makes the decision about when to have sex; as expected this also varied by gender. Among women, 66% said their partner made sexual decisions compared to 22% of men ($p<0.01$). The majority of participants were in the treatment (cash award) groups (69%). Treatment group participants were oversampled for the qualitative study because the primary interest was in understanding why the cash award did or did not succeed in motivating sexual behavior change. Anticipated and reported behavior change as reported during the structured interviews in the first two rounds of the study were common. Over 80% of the qualitative study population anticipated changing their behavior as a result of study enrollment at baseline. At Round 2, overall 69% of participants reported that they had changed their behavior since enrolling in the study. More males reported behavior change than did females (75% of males and 66% of females).

The qualitative coding resulted in several categories of strategies to avoid unsafe sex, mentioned both at baseline and Round 2 of the interviews. These included abstinence or periodic abstinence, having one partner who has tested and not using condoms, having one partner only and using condoms with this partner, convincing your spouse to use condoms outside of the marriage, convincing your spouse not to go outside the marriage, using condoms with your spouse, avoiding situations and circumstances that might lead to unsafe sexual behavior, filling time with other activities, reducing the number of sexual partners overall, having less risky partners, using the money to help convince a partner to stay safe, and separating or divorcing a current partner. Table 2 summarizes these mentioned strategies, who most often mentioned them, and provides an example of what was said during the interviews.

B. Barriers to Behavior Change

The data from this study support previous research arguing that individuals are engaging in risk reduction strategies, but often not in the ways that dovetail with the expectations set out by the A-B-C formulation (Poulin, 2007; Smith & Watkins, 2005; Tavory & Swidler, 2009; Watkins, 2004). In exploring strategies in use, we want to know both what barriers exist to adopting strategies that, if implemented, would be highly effective and what strategies the public health community might be overlooking that could provide added risk reduction if promoted.

In this section, we begin by discussing evidence of barriers to risk reduction that interview subjects and diarists report. We discuss three barriers specifically: women's economic dependence on men, barriers for married women, and barriers to assessing risk. These barriers were selected for inclusion here based both on prior research and on themes emerging from the qualitative data. Existing literature guided what was asked during the in-depth interviews, but other re-

lated topics arose as part of the conversations with study participants. First, existing conceptual frameworks that attempt to explain the differential risk of HIV infection among men and women highlight gender inequality and women's economic dependence on men as potential drivers of these differences (Gupta, 2008; Krishnan, Dunbar, Minnis, Medlin, Gerdts, & Padian, 2008).

Second, married women may face even greater constraints than their unmarried counterparts in avoiding risk and protecting themselves against HIV infection. Several authors have found that for African women, marriage is an independent risk factor for HIV infection (Bongaarts, 2007; Carpenter, Kamali, Ruberantwari, Malamba, & Whitworth, 1999; Clark, 2004; Glynn, CaraÎl, Buve, Musonda, & Kahindo, 2003). The mechanism for this increased risk is thought to be through several pathways, including increased frequency of intercourse, infrequent condom use coupled with risky sexual behavior of the male partner, decreased control over type and frequency of sex, and an increased likelihood of having an HIV-infected partner (Clark, 2004, Glynn et al 2003). Married women are also at increased risk through having their own extramarital partners (DeWalque, 2007).

Third, the literature also points to assessment of a partner's risk as a strategy used to avoid infection (Poulin, 2007; Smith & Watkins, 2005; Tavory & Swidler, 2009; Watkins, 2004). During the in-depth interviews, when participants discussed navigating their relationships, they often brought up the difficulty inherent in knowing the risk level of a current or potential partner. The first two barriers discussed herein are focused on women. Less research has been conducted on behavior change barriers that might exist for men in large part because the epidemiology shows higher HIV prevalence among women. Notably, one recent exception from the comparative anthropology perspective discusses in detail the "opportunity structures" in place that perpetuate the benefits that men derive from having multiple and extramarital partners (Hirsch, Wardlow, Smith, Phinney, Parikh & Nathanson, 2009). The authors find that, although driven by varying factors and histories, this theme emerges cross-culturally (Mexico, Nigeria, Uganda, Vietnam, Papua New Guinea). While barriers to behavior change for men specifically is not discussed here, it is important to note that for men, as for women, benefits derived from engaging in risky behaviors may outweigh the perceived risks of doing so.

The qualitative data show that for both married women and single women who depend on men financially, there exist varying degrees of agency based in part on how dependent women are on the money they receive from the men in their lives. Women who are less dependent on their sexual relationships for money have more leverage, and women who perceive their risk to be very high are more willing and able to take some action, even if that action means insisting on condom use or leaving a partner or spouse. However, part of what hinders this potentially increased agency is that assessing risk is not straightforward, making it difficult to get acquire the knowledge indicating a high-risk situation. The three barriers discussed in this section work in concert to complicate unilateral implementation of A-B-C strategies in this setting. As a result, participants come up with their own methods of reducing risk.

B.1 Barriers: Women's Economic Dependence on Men

Prior research shows that transactional sex is common and finds that it is driven, in part, by economic dependence of women on men (Hunter, 2002; Luke, 2003; Silberschmidt & Rasch, 2001; A. Swidler & Watkins, 2007). Reviewing these data, we find evidence that women see sex as an opportunity for economic security, though the data are mixed with respect to establishing a clear story line of dependence. Specifically, there are arenas in which women are active participants in these relationships, for example, partner selection and the ability to leave partners. However,

women may have less ability to negotiate safer sex practices in these relationships (Luke, 2003; Silberschmidt & Rasch, 2001), and married women are in fact less likely to use a condom with extramarital partners than are married men or single women (De Walque, 2007). It is important to note that the types of sexual partnerships that result in material exchange that have been described and studied in the African context are quite varied, and it is likely that most women engaging in such relationships would not categorize themselves as prostitutes (Hunter, 2002; A. Swidler & Watkins, 2007)[2].

The diaries from the study villages provide some background as to the financial constraints women are regularly facing, and how some do engage in sexual relationships to help them cover expenses. The following example is from a diary written by a female and dated June 2009, and documents the conversation of three young women who are discussing the relationship between poverty, condom use and AIDS.

I heard a story from three girls aged 24 years. It was evening time when I walked on foot to my sister and I met these girls nearby the football ground. They were standing under the tree. They were talking charmingly and shaking their hands to support their stories. But the one girl said to others that our poverty leads to us to sex without condoms and the result is to get the virus of AIDS/HIV. ...an affected man needs to transmit the infection to others by makusudi [intentionally]". Then the second girl supported this by adding, "actually rich men who are affected by AIDS, they want to transmit to unaffected women by using their richness, then she proceeded to express that "when you ask to use condom he will refuse it and adds that if you don't like more money, wear a condom and if you need heavy prize you should sex without condom." The first girl supported her message and she added that "because we have poor lives we will choose to sex without condom in order to receive high prize after a procedure". After the explanation those girls together they laughed and shook their hands, and the one of them said that "our poverty it brings us in dangerous sections then we will die as diseased chickens (sotoka) do. (Lip, Jun 2009)

These women are well aware of the risks they face in having sex without condoms, and how their poverty forces them into such risky situations. From the lighthearted nature of the conversation above, it is clear that this is a problem that they encounter regularly, and they are able to laugh about the predicament they are in as young women. The passage also speaks to the perception that money and malicious intent to infect others with HIV are intimately tied together, and that these rich men use the reliance of women on them for money to purposely spread the disease. Whether or not this is a widespread practice cannot be ascertained from these data, but the presence of the perception is telling--wealth and evil are intertwined, and the victims of this coupling are often poor young women.

Other women whose primary source of income is material exchange for sex have come up with their own strategies for ensuring their safety on the job. This passage from a diary entry from one of the male diarists dated February 2009 documents a conversation the diarist heard

[2] There are varying degrees of material exchange for sex. For some, the material gain is for small items (soap) or non-necessities (soda), rather than obtaining money for day-to-day survival (Hunter, 2002; Kaufman & Stavros, 2002; A. Swidler & Watkins, 2007; Tawfik & Watkins, 2007). In addition, the reasons for engaging in multiple partnerships for women are also varied, and not necessarily primarily about monetary or material gain. Tawfik and Watkins found that revenge for a husband's infidelity was one motivating factor for women to seek extramarital partnerships (Tawfik & Watkins, 2007). Related to this, other work has found that the perception that women are powerless in these relationships is not entirely correct.

among three young women. The woman talking is a prostitute, but this is not her only source of income. Perhaps because she has a second source of income, she is able to refuse sex with men who will not use a condom.

One among the three women whose age is under 25 years whose name is H has the following ideas. "This is just a spare job to my life. It contributes me just 25% of all my income. What made me to have a house, bicycle and better life is prostitution. But I am very careful in my prostitution. I care. I don't mind the amount of money. If you don't agree with my condition, you are not my friendmate. Condom first, then sexual act is my daily motion. Even if you promised me with million of shillings, but if you don't agree to wear condom then your million shillings is nothing. This carefulness made me to stay a safe an happy life through whole these years. I repeat again, no condom, no sexual act. At all my prostitution period I have never got STI diseases like gonorrhea and syphilis. The use of condom made all these possible. I advise my young women if you don't stay with the one faithful man, then use condoms to do every sexual act. One condom for every one sexual act," she emphasized. "And I checked my health every six months" she finalized. (Kat, Feb 2009)

This woman understands the importance of her health and is not willing to put her health in jeopardy for any amount of money. She has a back-up strategy as well--she gets tested every six months to ensure that she has not become infected. She has been able to take control of her financial dependence on men. The key here is that she has another source of income and she is not solely dependent on what she brings home from sexual encounters with men. This gives her the ability to walk away and therefore, some negotiating power in her interactions with men.

Other women have been able to move away from depending on sexual relationships to make financial ends meet. This excerpt from a male diarist dated February 2009 documents two women talking about how they have managed financial independence from selling local alcohol. They both recognize the dangers inherent in depending on sexual encounters for money, and the second woman discusses how she was able to move away from what she calls prostitution and she no longer needs to worry about these inherent dangers.

It was a rainy day, and I was in an open hut (banda) waiting for rain to stop. In the hut were people of different races and different ages. I preferred mostly by the talks of two women, who were selling liquor (local brews and coconut wine). I documented their talks as follows. "The current situation is not good. We live with many diseases. If you will not be very careful, you will contract either HIV or STI diseases, or both. Thus why I (B.L.) have chosen this job to satisfy my necessary needs. Through it, I get money which helps me with agriculture, education, home aspects, and treatment. It also made me busy full time in that it didn't give me time to join in jobless activities, rundown movements etc."

A.L, the second woman who is also a liquor saleswoman said that local brew and coconut wine business has changed her character from a high class prostitute as she was at first to a woman to be revered (a woman of high quality). "It was normal for me to stay or to commit sexual intercourse with more than 2 to 3 men during the afternoon and one during night. At first I was frequently attacked with STI disease like syphilis and gonorrhea. As days went on, I started using the so-called condoms in every sexual act to reduce the hazard. But then there are problems for the men. Now that I am engaging in this, business, I don't have any need to stay with more men in order to get money. I have one husband and we plan when and times of sexual in-

tercourse. Nobody now can cheat me to do sexual act, out of my husband without condom." (Kat, Feb 2009)

From these examples it is clear that one of the barriers women face in changing their behavior is the degree of their financial dependence on men, and their ability to use sex as a resource, bringing in money to help them with their lives through their sexual encounters with men. Some women have been able to overcome these barriers by finding alternative sources of income such as selling alcohol. Others have been able to use sex as a resource safely, arguably by having a second source of income that provides them with some negotiating power in their sexual relationships and by employing back-up strategies such as regular testing for infections. Others have not been able to escape the dangers inherent in depending on sexual relationships for money. Regardless of which category these women fall into, they recognize their risk and are doing what they can to minimize their risk given the existing constraint of financial dependence.

B.2 Barriers: Married Women

Married women also face barriers in avoiding unsafe sex and trying to change their sexual behavior. Condom use within marriage is for the most part not accepted by men or women, and simply the suggestion by either member of the couple is often interpreted as an admission of having external partners (Chimbiri, 2007; Plummer et al., 2006; Tavory & Swidler, 2009). Therefore, women and men who suspect their husband or wife of having other sexual partners are generally constrained to asking their spouse to use condoms with these outside partners, or to convincing them to leave these partners. Reviewing the interview and diary data, we find multiple examples of women reporting difficulty in convincing their husbands to engage in risk reducing behavior. The diaries also illustrate that women rely heavily on their social networks to help them understand the level of risk that they may face, and how they might take action to lower these risks that their husbands bring into their marriage.

The following story from one of the diaries gives us a brief view of what life is like at a fishing camp near one of the study villages. This male diarist visited the fishing camp, and while there documented the conversation between two older women. The women discussed the risks they are exposed to via their husbands. Interestingly, the source of the risk they speak of is one particular HIV-positive woman who is selling sex at the fishing camp. She is apparently irresistible in her attractiveness--so much so that she "traps" these men--and she regularly insists that her sexual partners do not use condoms.

This story was delivered at ILUA fishing camp at Katindiuka where as more than 30 people are living there permanently and more than 50 people go there for buying fish and then send them to Ifakara market for selling, daily. This make the total of people crowding at the camp be more than 80 daily.

At the camp, there are 3 local stores which sell local brews such as tekawima, wanzuke and tembo or rather mdafu as others used to call it. There are also two mini stores which sell soft drinks like Pepsi, coca cola fantas and mirindas. There are also industrial brews like safari lager, Serengeti, Kilimanjaro and konyagi. There are also non-alcoholic drinks like vita malt, Malta Guiness etc.

I was at that camp from 18/11/2009, and succeed to collect the following true story I met two women of 55 years age complaining. They were complaining of their husband's habit. "Mama S, we shall all die of AIDS if we will not be very careful." Started mama S.A. "This

woman known as mama SL whose true resident is at Kiberege is said to be living with HIV. Her first husband who gave her one child had died of AIDS. Her child who is now 3 years old has every sign of having HIV. This proves to us that she must be living with HIV," continued mama S. "Since she first entered in this camp, five weeks ago, she has gone with more than 25 men. She doesn't know to say no to every husband needing her. She responds to every man who likes her. More dangerous is that she doesn't like those husbands who use condom in their sexual acts. She says that there is no excitement to those using condom. She doesn't feel shame at all. She every day want to stay with more than 2 men. She doesn't like to be married. She always says that, to be married is like wasting your time and missing a chance of registering other men at their spare time. She one day said that she charges only 5000/= for one ejaculation and if he want to continue he must pay more according to this rate. But reduction is given to a man who will spend with her for a full day. Man of this kind must pay 7000/= plus meal and drinking charge for that day. This runs to more than 12,000/=. This seems to be an affordable expense to our husbands especially in these days of high income to the fishermen. So they are exchanging like people who are entering to a doctor for a certain consulting. While one is inside, others are waiting out side.

How will we escape with this dangerous woman? She knows that she is her self a victim of HIV but with prior understanding, she decides to spread it to every one possible. According to her beautifulness and her prettiness, many of our husbands are attracted and trapped with her. More dangerous is that, they obey to perform sexual acts without condom, as ordered by this dangerous woman. My woman – mate, if we will not be very careful ourselves, we shall all die," ended mama S. What shall we do to protect with this dangerous woman? Asked mama R. "From now onwards, don't do sexual act without condom" answered mama S. "Will it be possible?" asked again mama R. "To my husband, this will not be possible; he always says that it is better to divorce the woman than using condom to your wife. How can I escape?" "Mama R you must choose one between the two, life and husband," answered mama S "If you see that life is very important thing, you must use condom and let him die himself. But if you see that husband is everything, then follow him, at the end you will die together," answered mama S. At the end, all of them agreed the only thing which will save their life at that camp is the use of condom at every sexual act. If we don't do so fearing for being divorced, we will all die of it, challenged HM. In fact life in this camp is very dangerous one. Many people (men and women) are coming in and others are coming out everyday. Marriage contracts are being opened everyday. Sexual intercourse without condoms is a common and used behavior among the camp residents. By just looking, many people of this camp have every signs of having HIV. What is left is just laboratory testing to prove this fact. (Kat, Nov 2009)

This diary entry represents one of the few instances in the qualitative data that women discuss demanding condom use with their husbands. There is an understanding among these women that it will not be easy to make this demand, in fact they may face divorce as a result. But if choosing between death and divorce, they would choose divorce. The other interesting piece of this story is the clear understanding that being at the camp and the transience inherently part of the camp brings with it higher risk for them as married women. One interpretation of this story and the dangerous woman discussed here is that she has been created as an embodiment of the high levels of risk these women face at the camp—risk that is beyond their control. This dangerous woman who insists on not using condoms with her sex partners gives these married women a reason that they cannot insist that their husbands use condoms with outside partners; she demands that no condoms be used. The dangerous woman could be seen here as a fictional amal-

gam of the most risky extramarital partner these married women could imagine. She gives them a reason, and perhaps the courage, to demand condom use with their husbands within the marriage. In this sense, the diary excerpt supports what we find in the in-depth interview data. Women rarely demand condom use with their husbands, and when they do it is usually due to extraordinary circumstances, for example, when they know they are at increased risk in the camps, or when they know their husbands have been out with other women. Even if the dangerous woman discussed here is real, we still see women responding to a situation of perceived increased risk by resorting to what they consider to be extreme measures—demanding condom use with their husbands.

In some cases, it was difficult for women even to convince their husbands to test. Even when testing and treatment are free, as they were in the CCT study, there was still some resistance on the part of men in knowing their health status. Most likely, this is because the husband knows that he has been engaging in risky behavior, and if he received a positive result, he would have to face the consequences. This 24 year-old married woman in the control group talks about trying to bring her husband in for testing and attempting to get him treated even if he refused testing.

I: What did you talk with your husband about this study?
R: I told him to come to check our health status
I: What did he say?
R: He just said he is not going
I: Did you ask him why?
R: He just said he is not going; he told me to come
I: Did you share your result with him when you came for the first time?
R: Yes, when I went home I told him the results straightaway.
I: How were your results?
R: I tested negative for HIV but positive for STI
I: So, you got free treatment service?
R: Yes, I got that service
I: You and your husband were supposed to take these medicines. Did he take these medicines?
R: I gave him those medicines…I am not sure if he took them. This is because when I gave him those medicines he took them with him –Married woman, control group, round 2

There is even evidence that women who are not married understand how marriage curtails women's ability to dictate the terms of their sexual relationships with their spouses. One of the female diarists documented this conversation between a few girls while attending a wedding celebration.

It was during the morning when I went to participate in a certain wedding celebration. I met with other participants who were girls. One of the girls began to talk saying it is better for our fellow women who are married because it is difficult for them to be affected by STIs and HIV for it is impossible for them to go out of their marriage". And another girl replied that this is not a reason because STIs and AIDS can only be avoided if you will be careful and not otherwise. For instance through using condom or being faithful for making love relationships with only one partner who has checked his or her health. But if you will be doing unsafe sexual intercourse

with everyone without being careful for instance without using condom it is possible to be affected with both STIs and HIV/AIDS. Also in a marriage, in case neither a husband nor his wife has checked his or her health actually their marriage will not be safe because it is possible either for both of them or one of them to have been affected with either STIs or AIDS. And also, another girl said that it is not easier for a woman who has not been married to be affected with either STIs or AIDS because a woman will be powerful of telling and decide to her partner on using condom and if her partner will not agree them she will refuse to do sexual intercourse with him and the action will not be performed. But it is vice-versa for those who are in marriage because if one will go out of his or her marriage without telling his or her husband and performing unsafe sexual intercourse and then if one of them has been affected with either STIs or AIDS, it will be easier for either a husband to transmit to his wife or a wife to her husband. And the next girl said that this problem should be left to God only because he is the one who knows this secret. But another girl replied, "God said that you must prevent first by yourself from dangerous things and then [God] will be with you." (Lup, Oct 2009)

This is interesting because even among these young girls as they attend a wedding celebration, there is discussion as to whether marriage brings with it security or risk. The girls show a range of understanding and perspective of the benefits and dangers of marriage for women. The first girl understands marriage to be protective because women, once married, stay only with their husbands. This perspective of course assumes that the husband is safe, and risk for the woman comes primarily from her partner choices. The second girl points out that safety only comes with marriage in the instance that both husband and wife have checked their health. If going into the union, one or the other is infected, then the marriage cannot provide safety. The third girl adds to this understanding the decreased negotiating power that women often experience because of the expectations that come with marriage, and the uncertainty that comes with the commonality of extramarital partnerships among married men. This third girl leads us to the conclusion that this increased level of risk is part of the social structure of marriage in this context, and women are aware, to varying degrees, of the increased exposure marriage brings and of their limited capacity to escape the risk. However, as the last girl speaking indicates, women do have some agency and a corresponding ability to minimize their risk, even if they cannot eliminate it entirely. Assessing the risk of a potential or current partner is one arena in which women can exercise such agency. However, effective and accurate risk assessment is a difficult endeavor. This is the focus of the next section.

B.3 Barriers: Assessing Risk

Prior research has documented the strategy of assessing the risks that a current or potential partner poses (Watkins, 2004; Poulin, 2007). These data support prior research by showing that assessing partner risk is, indeed, a common risk reduction strategy. However, the data also suggest that individuals are finding this strategy less effective in an era of access to ARVs. In the following diary passage documenting a conversation among men, the well-known A-B-C prevention messaging gets a new twist. The passage, written by a woman, also touches on a common strategy to reduce risk in this context (and in other contexts--see Watkins, 2004), careful selection of partners.

It was an evening to night time, when I met a group of men on the way they were walking on their feet. They were talking about various news but one man has raised the topic of to have

more than one woman/girl. Most of their group disagreed with him and added that nowadays we have the letters A,B, and C only. One of the group asked a question, do you know the meaning of this letters? Then he added even in the public meeting they talk more about the letters, and in these days you should choose one of these three letters if you know the meaning of this." The second one of the supporters added that "now is the time of truth and transparency (ukweli na uwazi)" then he proceeded to express to him by touching and shaking to him, so now you should know the meaning of these letters. A means: use condom with unfaithful partners B. means be with only one lover who is faithful. C. means do not sex for all of your life. If you follow one of the above letters you may escape or surely you will escape from AIDS/HIV suffering. The opposer asked a question and added some expression that "My dear to not have sex for us we are physically fit it's very difficult, and my question is how can I know if a girl is faithful"? The main speaker of that group laughed and then he added that "first you should be faithful yourself at the time you can get your girl to be faithful". (Lip, June 2009)

The man who describes the A-B-C strategy certainly puts his own spin on it--not only does he confuse what the letters stand for (understandable among non-English speaking Tanzanians), but he adds to the use condoms piece, "with unfaithful partners". This is telling because it illustrates that in this context, regular and consistent condom use with all partners does not seem reasonable. It also highlights the importance that is placed on the knowledge that a partner is faithful. Where this knowledge comes from appears to be highly variable, and also often drives the strategies that people use to try to protect themselves from infection. Some people insist on seeing the physical HIV and STI test results before they can be assured that their partner is faithful, while others are willing to rely on verbal assurance of good test results.

For others, trust and decreased risk come simply with time. Once a couple has been together for long enough, often there is an implicit assumption that they are faithful and each partner takes it for granted that the other is safe. In these instances, condoms are used up to a certain point, then abandoned when the couple feels like an appropriate amount of time has passed. Some are able to convince their partners to go and get tested if there is an interest in moving toward sex without condoms. Others exploit their social networks and talk to friends and relatives in an attempt to assess the risk of a potential partner, or rely solely on the appearance of a potential partner. If he or she is fat, the thinking goes that they are unlikely to be HIV-infected. Of course, this strategy now appears to its proponents to be less effective with the widespread use of ARVs in Africa, and some are opposed to the use of the drugs for that reason alone--they are no longer able to effectively gauge the risk level of a partner by looking at them.

There was ample discussion about this in the diaries, and there appears generally to be much debate about the use of ARVs and how keeping those infected healthy may be a threat to those who are not infected. This passage from a diary written by a male diarist dated July 2009 documents the discussions of attendees of a funeral for a young woman who died of AIDS. The excerpt illustrates the importance of appearance in partner selection for men, and how blame is laid on ARVs for allowing those who are infected to look healthy--to remain beautiful, fat and attractive.

As you have heard our relative has died suddenly. She was bathing at the toilet, suddenly she fell down and cried, When we went to know what had happened to her we saw she was already dead. Medical examination showed that she had HIV and she was using ARV drugs. Burial occasion

has arranged to start at about 4:00 pm today. We request you to remain with your tolerance while waiting for burial.
Murmurs spread all over the place. Did she had HIV? "Is it true that HIV lead to her death"? "If this is the case, then almost 5% of our villagers have HIV as a result of this. She was a very beautiful girl, bright and she was very fat. No one could think that she was affected," wondered H. "She respected everybody in this village although she didn't have a husband. Many of us believed that she was free of HIV. Even I believed that she was free, this made me treat her as my second outside wife. In all our sexual intercourse, I didn't use condom. I am 100% sure that I am the one among her fellow mates to follow. He cried very much. Then he stopped and said, "I am not alone, we are many. At the end of all this, all the people there had the following opinions to the government and NGO. The names of all HIV victims must be put on public notes board at every village. Those using ARV also must be known or if not possible, then stop uses and introduction of ARV in our country. ARV is major problem. People don't see the difference between those who are living with HIV and those who are not. He who is using ARV looks like he doesn't have any problem while he has. We beg our government to stop ARV drugs if they really want to fight against HIV/AIDS. (Kat, July, 2009)

These men are angered because the widespread use of ARVs has effectively removed what they believe to be their primary risk reduction strategy: careful selection of partners based on a healthful appearance. This has made the question posed by the young man in the A-B-C diary excerpt, "how can I know if a girl is faithful," more difficult to answer. Work done as part of the Malawi Diffusion and Ideational Change Project (MDCIP) has also pointed to careful partner selection as an important HIV risk reduction strategy (Kaler, 2004; Poulin, 2007; Smith & Watkins, 2005). Authors have written about the importance of partner selection especially among men--men use partner selection as a strategy to minimize risk of infection over other methods of risk reduction such as abstinence, partner reduction and condom use (Kaler, 2004; Smith & Watkins, 2005). Women are assessed as potential partners based on marital status, appearance, age, and on information gleaned from people in their social network. Fat, married women are presumed to be the least risky in this scenario (though young women, "schoolgirls," are frequently mentioned as well). Young, single women often rely on social networks to determine the risk level of a partner; they ask friends and relatives for advice and select and/or leave partners accordingly (Poulin, 2007).

While, earlier in the epidemic partner selection based on healthful appearance may have seemed an effective strategy, attention is turning to testing as a more reliable means of avoiding infection. When asked how they might avoid infection over the duration of the study, CCT study participants frequently mentioned a strategy of making sure that a partner had tested, and several mentioned the importance of seeing the paper showing the results.

The data from the in-depth interviews and diaries generally support previous research that has outlined barriers to sexual behavior change and reasons for the failure of many behavioral HIV prevention interventions in Africa. Particular difficulties exist for women who are economically dependent on men, and for married women, in part because of the negative attitudes toward condom use within marriage and the accepted nature of extramarital partnerships. Successful and consistent implementation of prevention strategies is also hampered by the difficulties involved with assessing the risk of a current or potential partner--especially salient in a context where careful partner selection is an important risk reduction strategy. The next section discusses in detail how strategies for risk reduction have evolved in relation to the barriers outlined in this sec-

tion. Specifically, what emerges from the data is that although economic dependence, the constraints of marriage, and the difficulties inherent in risk assessment may prevent consistent and unilateral adoption of A-B-C strategies, people have developed adaptive risk reduction methods that are realistic given their life circumstances.

C. Adaptive Strategies

The obstacles faced by this rural Tanzanian population are substantial, and perhaps even more significant for women. That such difficulties exist does not mean that people faced with them are doing nothing. It does mean, however, that often people are unable to implement prevention strategies or engage in sexual behavior change consistently or exactly as indicated by prescribed behavioral interventions. Rather, in some instances, they use the resources at hand and the opportunities that arise to decrease their risk of infection and as a result provide themselves with fragmented protection.

This section describes the strategies that study participants have adopted as told through the in-depth interviews, and in some cases, the diaries. While respondents were asked about strategies both at baseline (what do you think you will do to remain negative) and at Round 2 (what did you do over the past four months to try to remain negative), the baseline responses were much more difficult to interpret. Potential reasons for this are first, the comfort level of the interviewee was lower--at this point participants were still new to the study and the study procedures, and they had just received their first round of HIV and STI results. Second, upon review of the first-round interview transcripts, it was clear that the interview guide was followed too closely. Early on, the interviewers were not well trained in conducting open-ended in-depth interviews. The responses were overly structured and there was little room for interviewees to discuss their real-life situations. Rather the interviewees were mostly repeating counseling messages that they likely heard during the post-test counseling session that occurred just prior to the qualitative interview. In addition, the interviewees were not yet sure what their strategies going forward would be. They had just gotten news on their health status, which, by all indications in the data, was extremely influential in how they would conduct their sexual lives going forward. They were still figuring out what they would do next as they processed the news of their test results. As a result of these issues, strategies outlined here are derived mainly from the Round 2 interviews.

Three adaptive strategies are discussed in this section. First, we introduce the centrality of regular testing as a reliable method overcoming the barrier of risk assessment and discuss the combination of inconsistent condom use, testing and treatment as a three-pronged approach to decreasing risk of infection. Second, we describe how certain situations provide increased leverage for sexual negotiation, and risk reduction strategies are often opportunistically implemented in these situations. Third, we explore the use of temporary abstinence as a frequently mentioned risk reduction strategy. What emerges from the data is that the barriers described in the previous section are addressed through innovative means of risk reduction. There are difficulties in assessing risk, but frequent and strategic testing can be used to ease those difficulties; and women who otherwise lack agency in sexual decision-making as a result of marital and/or economic constraints can take advantage of certain situations where they have leverage to minimize risk at certain points in time.

C.1 Adaptive Strategies: The Importance of Testing

From our data, we have illustrated that determining the level of risk that a current or potential partner might bring to a relationship is a difficult endeavor. This difficulty, in conjunction with the generally negative attitudes toward condom use creates a situation in which testing for HIV or STIs becomes an important tool in minimizing exposure to infection. For people who are in the early stages of a relationship, determining when a partner is safe, and when condoms are no longer needed is not straightforward. Testing has helped in making this determination. In fact, one strategy mentioned frequently during the interviews was a combination strategy involving condom use and testing for HIV and/or STIs. For those who are married or in long-term relationships and condoms are no longer a realistic option, regular testing provides an opportunity to assess risk and to bring temporary security (or insecurity, depending on the results) to relationships that are often plagued with uncertainty.

It should be noted here that repeat testing in the context of the CCT study and as mentioned by the study participants during the in-depth interviews refers mostly to STI testing. HIV tests were performed only at the baseline visit and the 12-month visit of the study while STI tests were performed at all study visits (4 times in total). What emerged as particularly important to the study participants was the regular opportunity to learn about their health status. Every four months all study participants received information about their own health and their partner's health if their partner was enrolled in the study and willing to share their results. These results, as the data illustrate, translated into information about the risks participants face in their relationships. So while HIV testing is important, and in some ways the ultimate test of health status and risk exposure, the opportunity to repeatedly check health status using a proxy measure for sexual risk was of paramount importance.

The qualitative data reveal that condom use is typically viewed as a temporary strategy for risk reduction until some preferred strategy is made available. Condom use is often situational, sometimes based on objective evidence of the risk level of the partner, and sometimes based on a general feeling of trust. For example, some participants mentioned wanting to ensure that their partner has a certificate stating they have tested negative before having sex without a condom, while others were fine with just a verbally communicated result. Others discussed how they find it difficult to trust potential partners when they say they have tested negative, and show concern if the most recent test was several months ago.

This 28 year-old unmarried man is a CCT study participant in the low-value cash award group who used condoms with his partner until they could both get tested with good results. They used the testing that was part of the CCT study to do this, and then they were able to continue having sex without a condom. Before they were living together, he did not trust that she was faithful, and the only way he felt that he could be sure was by seeing that her test results were negative.

I told her to use condoms because before we married she was at her place and I don't trust her. Therefore, before I paid the dowry I wanted to use a condom until we shall go for medical check up. After the check up if our results are OK then we can continue doing sex without using condom. It was good because we came here for medical check up and since we are both OK we continue without using condom. –Unmarried man, cash award group, round 2

Testing to assess risk is not a strategy limited to partner selection, but is also used to assess the risk level of a current partner, as is illustrated above, or to prove to a partner that he or she is in fact risky. This interview excerpt is from a 29 year-old married woman enrolled in the CCT

study. She tested negative for STIs at the baseline round, and her husband refused to come for testing. At the second round, she tested positive for an STI and she is angry that her husband refused testing and is prepared to try and convince him to test.

I: Did you talk with him when you came here for the first time and got your results?
R: Yes, I talked with him that my results were good and I also advised him to go for check up because my results were good. I advised him but he refused.
I: Now that you have received your results today will you talk with him about the kind of results you have got?
R: I will not tell him because if I am infected it means that he is the one who transmitted this to me. This is because maybe he is the one infected and had he come for tests this disease would have been treated already. Therefore, when I am going he must go for test and if he doesn't want to come here I will tell him to go to the hospital
I: Do you think he will accept when you tell him to go for testing?
R: This time he will accept to go to test --Married woman, cash award group, round 2

This passage highlights centrality of testing as a risk reduction strategy within a marriage, where condom use is not an option. This woman discusses the importance of having the actual test results in hand so that she can use them as leverage to get her husband to test, and as a result of his test results, she can convince him to change his behavior. The power of persuasion in this case lies in the test results and the ability to show a partner that he or she is risky with authority. In other cases, the "certificates" proving that a person has tested and is safe are what establish trust. In this example, another layer is added in establishing the risk level of a partner.

This single 21 year-old single man discusses not only the need to see the proof of testing, but also to ensure that the testing has happened very recently because it is difficult to know what might have happened between the date of testing and today.

...even your partner you can't trust her that much. Even the one you follow you can't trust well because she didn't show you her certificate although you have...You can trust each other when you follow her, you have approached her and she accepted, you can give her a witness, before doing sex I think we should first go to the hospital we test. She can tell you I have already tested but my certificates are here. You won't believe her directly, you must use tools [condoms]. Because she has shown you her certificates even 2 months haven't passed you don't know what has happened in between. –Unmarried man, cash award group, round 2

Others are less concerned about testing but use the passage of time and the level of trust as a gauge for the risk level of a partner. Once there is a certain level of trust established, then they can start having sex without a condom.

One 22 year-old woman talked about how she and her partner moved away from using condoms--they waited until they "knew one another," and there was some level of trust between them. However, as was revealed by her STI test results, the strategy of waiting until enough time passes is not fool-proof for either member of the couple. This woman tested positive for HSV at baseline, and her positive test helped her understand the importance of making sure that her partner also be tested, even though he was not enrolled in the CCT study. Here she talks about asking him to get tested, and convincing him to take the extra medication she was given even though he tested negative.

When I came for the first time they told me I have malengelenge [HSV]. I went for medicine and I took it. I also advised my husband and he went for testing, but not here. He went to the hospital. When he went for testing he tested negative. But since I was sick I told him to use medicine even when he didn't have any disease. He took some medicine. I also took medicine. I took these medicines when he was not around; he was not around. And hence both of us had to take these medicines. –Married woman, cash award group, round 2

Our data reveal that regular testing alone and in combination with condom use are risk reduction strategies used to facilitate the problematic issue of understanding the risk level of a current or potential partner. The information that test results provide brings some certainty to relationships that, as regards risk of infection, are often filled with ambiguity. The new information and knowledge that comes from test results can also create opportunities for negotiating safer sex where previously little agency in decision-making existed—testing is important both for risk assessment as a bargaining chip in sexual negotiations. The next section explores how study participants took advantage of circumstances that provided resulted in increased leverage and thus an opportunity to decrease their risk, even if temporarily.

C.2 Adaptive Strategies: Leverage and Opportunity

A second insight that came out of the qualitative data and the discussions about strategies to avoid unsafe sex related not to a specific strategy, but rather to how and when strategies were implemented. Risk avoidance was often practiced inconsistently and episodically. This was especially true for women who faced the barriers discussed in the first section; women who much of the time lacked sexual decision-making power in their relationships. During their interviews, these women talked about how they took measures to reduce their risk of infection when they felt they could--if an opportunity arose that temporarily gave them increased agency, they took that opportunity to protect themselves. These opportunities arose as a result of some circumstance or situation that provided women with increased knowledge, and as a result, added leverage with which to negotiate with their partners. Specifically, added leverage arose from study enrollment, the cash incentive, and certain situations that provided opportunities for women to refuse sex or enforce condom use—after having a baby, or when a husband or partner felt guilty about being with another woman.

Women who cannot for whatever reason leave partners whom they know to be risky are not necessarily completely without agency in their sexual decision-making. Several CCT participants talked about opportunistic implementation of strategies that lower but do not eliminate the risk they face from their husbands. These women are taking advantage of circumstances or situations that temporarily give them some increased level of control or leverage over their sexual lives. One 19 year-old married woman explained how she is able to convince her husband to use condoms within their marriage when she perceives her risk to be high--when her husband comes home late at night.

I: Did you try to avoid unsafe sex?
R: Yes
I: What did you do?
R: I asked my husband to use condom the days when he was not in good mood
I: Did you use it throughout or in dangerous days only

R: During dangerous days only
I: What are these dangerous days?
R: When my husband comes back at 2 am in the night and he needs to stay with me I ask him to use
I: Is this because you don't trust him?
R: Yes
I: So, you think this time you can get STI?
R: Yes
I: But when he comes back early you continue as usual?
R: Yes
I: Can't you get STI when he comes early? What do you think?
R: I can –Married woman, control group, round 2

There are a few different possible interpretations on why this woman chooses the nights that her husband has been out late with what she assumes to be another woman. The first is that she is not educated on how she might become infected, and does not understand that enforcing condom use only after she suspects that her husband has recently been with another woman is not an effective means of preventing infection. The second is that this woman is taking action when she feels she has leverage to take action. She understands that she can still be infected if she uses a condom today but not tomorrow, but she also understands that she needs to be strategic about when she can implement her prevention efforts. When she feels she has the upper hand in the relationship and her husband is perhaps guilty of having an outside partner, she can request that her husband use a condom with her. A third possibility is that she is angry about her husband staying out late with other women and when this situation presents itself, it gives her an opportunity to confront him and perhaps to discourage his infidelities. While it is possible that she acknowledges her risk on days where her husband "comes home early" only to avoid contradicting the interviewer, her affirmative response suggests that she is aware of her risk on "non-dangerous days." Under this interpretation of the interview, the second or third hypothesis is a more likely explanation for the woman's approach than a lack of understanding of transmission risk.

This example highlights the importance of understanding the nuances of preventive behavior that women and men engage in. An intricate level of contextual and cultural understanding is required in order to successfully reorient behavior. From an HIV prevention standpoint, these interpretations of the interview excerpt have vastly different consequences in terms of intervention focus and design. If the first interpretation is correct, the failure to enforce condom use in this context is purely a result of not understanding the transmission dynamics of HIV or other STIs. In this case, an intervention focused on increasing knowledge of how these diseases are transmitted would be warranted. If the second or third interpretation is correct, then no amount of education will help to prevent HIV infection in this case. A more appropriate intervention might focus on promoting condom use with extramarital partners, persuading men not to have extramarital partners, or empowering women to increase their control over sexual decision-making.

Female participants in the CCT study discussed other ways in which they could implement prevention strategies based on transient increased leverage or agency. Some women took the opportunity to use their enrollment in the study as a leverage point to achieve goals that they had previously (such as getting their husbands to be more faithful), and were able to successfully avoid sex or enforce condom use as a result. This 23 year-old married woman explained how she

was able to convince her partner(s) to use condoms by explaining to him that she is part of this study and has an opportunity to receive a cash award.

I: Also I would like to know if the promise of getting cash money managed to make you change your sexual relations with other people
R: Yes, I explained to them...they agreed with me about what I told them
I: And did your sexual partners accept to avoid unsafe sex?
R: It was possible according to how they saw me in the cycle of this study and they had to agree with me
I: What means did you manage to use in order do safe sex?
R: We used condom
I: Was it not hard for you or to them to agree with this?
R: It was difficult because they were not happy with this, but since I was in this cycle [study] I had to tell them –Married woman, cash award group, round 2

Without assuming that all women lack the ability to negotiate with their partners, it is clear that the money might be particularly beneficial in providing some women increased leverage to negotiate. One 26 year-old woman who lives with her partner talked specifically about how the cash award associated with the study has allowed her to leave other men because the money from the study will help her in her life.

R: I have come back for round two of this study because when I come back I learn more about my health...another thing is the award, when I came I was given award and I know what to do with it so as to take care of my children. The prostitution behavior I had before, I can stop it completely
I: You were a prostitute…can you explain to me what kind of a prostitute were you?
R: Changing men from time to time. All this was because of problems
I: Did you have the behavior of having many men before you were enrolled to this study?
R: Yes, I had this behavior before I was enrolled to this study
I: Over the period of four months ago have you had multiple sex partners?
R: I didn't have this behavior; I left them completely...since I knew my health status and got the award I decided to continue with my life and stop this behavior; I have known that my health is OK...Therefore, when I get here there will be money for inconvenience to use with my children. So, what is the importance of continuing with these men?
I: Is there any other thing which made you come back for round two of this study?
R What made me come back for round two is to come to collect my reward from this study because it will help me in my life –Married woman, cash award group, round 2

Joint strategizing between couples enrolled in the study was also mentioned by both men and women in the cash award groups. If a woman's partner or spouse is enrolled in the study, the couple might discuss staying safe together so that both of them can receive the award, and the woman might have more leverage, backed by the money that they will both receive, to convince her husband to leave outside partners or use condoms with outside partners. This 27 year-old woman in the cash award group talks about how she discussed the CCT study with her husband, and how they agreed to try an make sure she would receive the award.

R: I told him there is a new study which is checking our health status. He said he was free and I should not fear about this
I: Did you tell him about receiving the reward?
R: Yes...I told him we are supposed to go for check up, at the first round we shall check blood and STI and after four months we shall come again for testing, and if we test negative we will get reward.
I: Therefore, you discussed together about what you should do in order to get reward?
R: Yes we discussed together...I told him after four months if I test negative for STI we shall get reward. Therefore, I told him to take care and he was ready.
I: Did he listen to you?
R: He listened to me so attentively...we just agreed that we should not go outside our marriage. --Woman, cash award group, round 2

Other points of leverage for women to gain some agency in sexual decision-making include recently having had a child and being infected with an STI. Because it is common not to resume sex for some time after a baby is born, women who have just given birth are in a position of having the ability to refuse sex without consequences, and can then engage in periodic abstinence. Having this temporary power to refuse sex with her husband was especially important for this married woman who knows that her husband has other partners, but is not sure if he uses condoms with his external partners.

I: Do you talk with your husband about this study?
R: I do tell him that this study is good and if you are found with HIV you will live with hope. He comes here just because I force him to come.
I: Why doesn't he like to come here?
R: I don't know; maybe he is confident that he is safe
I: Do you talk with him about using condom?
R: When I started staying with him I told him that if he is moving around he can continue doing so but he should not touch me. I told him that I will stay safe because I have a small child and I cannot monitor him. He said yes and he does move around a lot.
I: Do you allow him to move around?
R: Now, what will I do. When I report this to his mother she says that you cannot monitor a man. I cannot allow him to sleep with me because he is moving around
I: Do you think he is using condom outside?
R: I don't know if he uses condom or not
I: Have you talked with him about the importance of using condom?
R: When we came here we were given condom. I was given female condoms and he was given male condoms. I don't know if he uses condom when he moves around.
I: So, you haven't slept with him over the period of four months ago?
R: No, I haven't slept with him...it is easy to avoid sleeping with him because I have a small child
I: Was there time when you didn't want to sleep with him?
R: Yes, when someone does something bad to you, you find that event the appetite to sleep with him is not there
I: You will continue staying like this until when?

R: When he will correct himself we shall stay together as we used to live –Married woman, cash award group, round 2

This woman does not appear to have the ability to convince her husband to stop moving around, but she does have the capacity to refuse sex as long as she feels he is engaging in risky behaviors, in part because she has a small child and can use this as a legitimate reason to avoid sex with her husband. Clearly temporary abstinence with her husband may not be effective if he is already HIV infected, but this illustrates the episodic implementation of a strategy that will reduce risk, even if transitory, and the preference of temporary abstinence over the use of condoms within the marriage.

What emerges from these data are that leverage changes with money, study enrollment, testing and that certain situations—e.g. having a baby or knowing a spouse has been with an outside partner-- provide opportunities for women to refuse sex or enforce condom use.. Interestingly, for many women who experienced situations of added leverage in negotiating with partners or husbands about sex, enforcing no sex--temporary abstinence--seemed a more preferable and therefore more realistic strategy than condom use. This is the focus of the next section.

C.3 Adaptive Strategies: Temporary Abstinence

Temporary abstinence is a risk reduction strategy that, depending on the circumstances, is likely to be limited in its effectiveness in prevention HIV infection. However, what emerges from the data here is that given the range of strategies available, individuals in this setting are at least as likely to rely on temporary abstinence than they are on condom use. Temporary abstinence could include divorce, temporary physical separation from a partner, enforcing no sex for several months after the birth of a child, enforcing no sex after a positive STI test, or enforcing no sex because of the recognition that a husband has been out with another woman. It should be noted that divorce in this example is certainly a more severe form of temporary abstinence. However, women who are choosing to leave their partners are an example, albeit an extreme example, of a preference either on the part of the wife or the husband, for avoiding sex entirely over condom use. This section provides examples of each of these types of temporary abstinence. The data reveal that temporary abstinence in its many forms is often perceived as a more realistic and thus preferable risk reduction strategy than condom use with a long-term or marital partner.

If discussions of condom use, either within the marriage or with external partners, were ineffective, one option was to physically separate themselves from their husbands temporarily to lower risk. In the case of this 27 year-old married woman, simply the threat of separating their beds convinced her husband of the importance of avoiding having external partners.

I didn't know what to do because at times he was coming back home at 11 pm in the night and when I asked him where he was he said that he was working. I warn him if he was moving around but he told me that he was still working. I told him that if it doesn't work out we shall separate our beds so that everyone sleeps alone. He listened to me and that is why I tested negative today –Married woman, cash award group, baseline

The negative test results were enough to convince this woman that her husband had listened to her and was not "moving around". This example again illustrates the importance of the test results in establishing trust with a partner--either for partner selection, or building trust with a current partner. For others though, a test result is not enough to convince a partner to change his or

her behavior, or even to get tested. In this case, physical separation from a partner is sometimes the only option.

This passage from one of the diaries in May of 2009 documents a conversation between two women, one of whom is convinced she has an STI and wants her husband to get tested so they can both take treatment. The infected woman is concerned because her husband is refusing to go and test himself, and he is refusing to use condoms with her while she is not healthy. The woman she is discussing this with is the relative of her husband, and she is asking for help in convincing her husband to change. In the meantime, she will return to her parent's home against her husband's will until her husband is willing to cooperate.

When I go to the working place on foot, I saw two girls about 30 years they were in their own talks. After a time first girl said to her fellow that "aiseeh! Everyday I talked to your relative about my health, but he didn't want to understand me, please go and advise him, I am ready start to use a dose but not him. And when I advise him to go and to check it [his health], he didn't. When I want to use condom during sex he refuse to do it. So it's your time to educate him. Never the less I will go back home even without permission from him." The second girl agreed and adds that, "even me I amazed from him, now is the world of truth in marriage, ok I will try to advice him and if he refused! Even me I will support you to go back home-- that is not life." (Lip, May 2009)

This example actually uncovers two alternative strategies--physical separation from an uncooperative husband, but also using social networks and connections to help with convincing a partner to understand the consequences of his actions and perhaps change as a result.

The next step after temporary separation is permanent separation or divorce--another form of temporary abstinence, in many cases a preferable and more realistic strategy for risk reduction, for both the wife and the husband, than convincing a partner to use condoms within the marriage. Work done in Malawi has shown that divorce has increasingly become more common overall, and marital dissolution has increasingly been implemented as a strategy to protect oneself from an unfaithful spouse and from HIV (Kaler, 2004; Reniers, 2008; Smith & Watkins, 2005). In fact, as HIV/AIDS became more prevalent and was perceived as more of a threat, divorce as a response to infidelity was also steadily increasing in Malawi (Reniers, 2008). Over time, the proportion of women in Malawi who agreed that divorcing a husband who was unfaithful or was suspected of having HIV was justified also increased significantly based on data from the MDICP (Smith & Watkins, 2005).

Both women and men enrolled in the CCT study discussed having used this strategy in the past to separate themselves from a partner they perceived as risky. Female participants in the cash award groups also sometimes discussed divorce as a strategy they might need to implement in order to stay safe within the context of the CCT trial, and to ensure that they would be eligible to receive the reward. For women, divorce as a possible strategy is often something they mention after discussion of several other strategies. Other women are clear that they do not see divorce as an option at all, and are resigned to the reality that facing risk from their husband is part of the marriage experience.

This 29 year-old woman left her first husband because she was worried that he would bring infection into their marriage. She waited some time before finding a second husband who was willing to go for testing. After having a child with him, she eventually left him as well because

she felt his "service was not good," perhaps meaning he was not bringing in enough money to support the family.

In the past I would fear but since last year I was not worried to say that I have infections because I divorced my husband. I stayed for 5 years and I got another husband. I refused to accept him for quite long time but he told me that he was OK. We decided to go for testing and we found that both were OK. I stayed with him and I gave birth to one child who is 2 years and 2 months old. Therefore, since I gave birth to this child I stayed without doing sex and I didn't do sex even with the one I have this child. I decided to leave him because his service was not good. Therefore, I saw there was no meaning to stay with such a person. –Divorced woman, cash award group, baseline

Men also discussed leaving their wives if they felt that their wives were putting them at risk with their behavior. This man discussed his experience with his first wife. He was careful with her in the beginning, using condoms until he felt he could trust her, he felt that she did not have external partners, and they were ready to have children. After having children with her, he understood that she had other partners outside the marriage, and because he wanted to protect himself and his children, he left her.

R: When I started with her I was using condom and when I realized that she was faithful and when I came to have children with her I didn't use condom anymore. We stayed together and we had two children before we divorced. We divorced because my wife was moving around and taking the current situation into account, still I want to live more and remain safe in order to take care of my children. I decided to stop in order to allow her to continue with her safari. She had other partners aside.
I: Did you have other partners when you were with her?
R: No, I didn't have. I didn't have any other partner for the entire period of time I stayed with her. After nine years of staying together when I needed my wife to have sex with her we had to fight. I thought maybe she had some problems. I waited for one month but still the situation was the same. I stayed for about five years without sleeping with her. She was stubborn and she was not even cooking for me or even setting water for bathing for me. This is when I decided to divorce her. –Male, cash award group, round 2

CCT participants also talked about how they might have to resort to divorce as a strategy so that they can remain uninfected and/or remain eligible for the reward. This was especially true in the context of a woman trying to convince her husband to either leave his external partners, use condoms with his external partners, go for testing, or use condoms within the marriage. This married woman discusses her frustration in trying to convince her husband to either use condoms with her in the marriage or to go for testing.

R: The new strategy is to use condom and if he doesn't want…But the first strategy is to tell him to go test and I should make sure that I go with him if he accepts to go for testing. If it will be OK we will do safe sex.
I: Do you think he will agree with this?
R: He will accept...I don't know what I will do if he refuses; it is better to divorce than to get diseases...I will continue advising him to come for testing in round three. If he refuses to

come I am ready to divorce him rather than getting STI –Married woman, cash award group, round 2

It is notable that safe sex in this excerpt, and often in the interview transcripts, refers not to sex using a condom, but sex with someone who has proven through testing or through verbal acknowledgment that they are safe.

For other women, divorce or separation is not part of the menu of available strategies. They may be financially constrained from leaving their husbands, or because of the emotional attachment, leaving may be too difficult. When these women talk about their options, there is often an air of resignation in their words. This married woman in the low-value cash award group is willing to try to convince her husband to use condoms, but she is not confident that she will succeed. She is also well aware of her position in the marriage, and that there is only so much she can do to convince her husband that he needs to change if he is to protect her from infection. In this case, enrollment in the CCT study and eligibility for the cash incentive do not seem to provide her the added leverage she needs to convince her partner to protect her.

I: Do you think this time your husband will accept to use condom?
R: I don't know if he will accept, if he refuses that is it
I: What will you do if he refuses?
R: What will I do; I am in the marriage
I: Do you have freedom to tell your husband that if he does not put on condom you will not do sex with him?
R: Yes, I will refuse…because I will refuse today…tomorrow I will refuse…the day after tomorrow I will refuse… at the end I have to agree, I have to do it without condom...this man is just like that, you can tell him this today and he can accept, but he can refuse tomorrow. –Married woman, round 2

Younger, single men often discussed exercising sexual control through avoidance--either avoidance of sex or avoidance of situations that might lead to risky sex, for example taking drugs or alcohol. Another path of avoidance mentioned frequently was keeping oneself occupied with other activities, exercise, studying, and going to the farm for example, so that little time remained to focus on meeting women and sex. Such avoidance was preferable to consistently using condoms with partners--these men found it more realistic to avoid sex than to trust themselves that they would use a condom every time. This excerpt from a single man enrolled in the CCT study illustrate these strategies.

I: What strategies did you use in order to get the reward?
R: The first thing is to come back home early, not staying with people with bad behavior...some people want to stay with ladies all the time, when they sit somewhere they are talking about sex only. Now I am avoiding such people...because when you join their company anything can happen.
I: Will it be easy for you to avoid these temptations?
R: Yes, it is easy...when I think that my friends are about to come I can go somewhere, I can decide to go to shamba to look at my maize. Then I decide to leave, when they come they will be told that I am not around –Unmarried man, cash award group, round 2

What emerges from these data are that in this context, while episodic use of condoms and abstinence are likely similar in their limited effectiveness in HIV prevention, individuals in this setting are at least as likely to rely on temporary abstinence than they are on temporary condom use. Temporary abstinence is not a reliable means of preventing infection. However, refusing or avoiding sex at certain opportune moments or under specific circumstances is an intermediate strategy that over time might lead to more permanent strategies for risk reduction. If, for example, enforcing temporary abstinence by sleeping in separate beds or refusing sex if a partner comes home late at night is perceived as punishment, this intermediate strategy could eventually lead to a partner changing his behavior. Sexual behavior change is slow at best, and implementation of intermediate strategies such as temporary abstinence is both a means of gaining transient control, and perhaps a method of pushing for change through increased control.

V. Discussion

Four main findings result from this analysis. First, the data presented here are consistent with existing research relating to constraints that women face in African settings, very low levels of condom use within marriage, and the use of risk reduction strategies that are not entirely consonant with A-B-C strategies, but nonetheless show evidence that people work to reduce their risk within the constraints they face.

Second, these results add to the current repertoire of tools used to adopt effective risk reduction strategies in African settings that has been presented in previous research. In this population, the combination of inconsistent condom use, testing and treatment are sometimes implemented as a three-pronged approach to decreasing risk of infection. Having a back-up for condom use is important in a society where condom use carries with it such strong meaning about the type of relationship (Tavory & Swidler, 2009). In addition, having the ability to use testing as a sort of milestone after which condoms are no longer necessary provides some leverage for convincing a partner to use condoms. For example, if a couple can agree to use condoms until they test, and if their test results are negative, they can move away from condom use. This not only indicates that the condom use is temporary, it also provides extra incentive for testing sooner.

The importance of testing in this context is perhaps bolstered by the difficulty inherent in effective and accurate risk assessment of a current or potential partner. When asked how they might avoid infection over the duration of the study, CCT study participants frequently mentioned a strategy of making sure that a partner had tested, and several mentioned the importance of seeing the paper showing the results. The reliance on careful partner selection and the transition away from using a person's appearance to assess risk underscore the importance of regular, repeat testing for HIV and for other STIs in this context. This is the most reliable, and for many, most comfortable way to understand the risk that a potential or current partner might bring to a relationship. Knowing the risk level of a partner is especially important in a culture in which condom use within marriage and consistent condom use with long-term unmarried partners is uncommon.

Third, these data add to our current understanding of approaches to risk reduction by highlighting the often opportunistic and episodic implementation of strategies by women who face behavior change constraints. Women who may in typical circumstances lack sexual decision-making ability can and often do take advantage of situations that present added leverage with

which to negotiate. Most commonly, receiving STI test results and free treatment for partners through the CCT study provided this increased knowledge and added leverage for women. Simply being enrolled in a study that repeatedly provided the ability to check one's health status, and the promise of the cash incentive for testing negative for those in the cash award groups both provided participants with added negotiating power. Women who had recently had a child also had increased leverage with which to refuse sex with their husbands or partners without partners questioning. Finally, knowledge that a partner had been with another woman was also used as a bargaining chip in convincing the partner to use a condom or to avoid sex with the partner. While most of these leverage points were used by women to opportunistically implement risk reduction strategies, the cash award was used by both men and women to convince partners to stay safe. These results demonstrate the fact that individuals in this setting are willing to adopt risk reduction strategies even if they fall short of consistent behavior change.

Fourth, in this population, abstinence, in its many forms, is a more prevalent strategy than expected. The apparent popularity of this approach may be a result of the negative associations with and low levels of use of condoms within long-term serious partnerships. The data presented here suggest that abstinence is a favored strategy in certain situations--among young single people, among women who have just had children, and among women who can argue that they have been put at risk by their husbands. Tanzania, as with other high-prevalence African countries, has been inundated with condoms and condom messaging. Despite the deluge, we find little, if any, discussion of condom use within marriage in the data from our in-depth interviews. Married women seem to be more likely to be able to abstain from sex with their husbands in order to at least temporarily reduce their risk of infection than they are to insist on condom use.

This study brings with it some limitations. As with any study that includes self-reported sexual behavior as a data source, there is the possibility that unsafe sexual behaviors were underreported. Plummer et al report on the validity of the collection of sexual behavior data using five different methods from a study done in Northern Tanzania (M. L. Plummer, Ross, Wight, Changalucha, Mshana, Wamoyi et al., 2004). 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. Because there was some overlap in the questions being asked in the qualitative and quantitative interviews, we have been able to compare responses to some degree, and found some inconsistencies in reported behavior change. Even with this added benefit, we face the limitation that respondents may have incentive not to be completely forthright with the information provided during the in-depth interviews or the structured interviews. In fact, as we found in the baseline in-depth interviews, participants may have had incentive to answer questions with the "correct" response, rather than applying the question to what was currently happening in their lives. 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. To overcome this, for the Round 2 in-depth interviews, interviewers were trained to repeatedly assure participants that there was no right or wrong answer and that we were interested in hearing about what was actually going on in their lives, not what they learned in counseling.

A third limitation relates to the translation and transcription of audio-taped interviews. There is the potential for the content of the interview to lose meaning and nuance during the transcription and the translation process. We addressed this limitation to some degree by having one of our study interviewers (who is bi-lingual) review the transcripts and translations within two weeks of the actual interview, and revise the transcripts as necessary. This method still suffers from a secondary but related limitation; that is the revised translated transcripts are an interpretive process, wholly dependent on the perception of the interviewer.

Finally, the proposed research is potentially limited by systematic loss to follow-up. Those who were in the control arm and those in the low-value treatment arm, and those testing positive for STI and HIV at baseline were all more likely to drop out of the study after the first visit. 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. That said, the loss of participants in the qualitative study was small—only seven of the 66 participants interviewed at baseline did not return for Round 2 of the study, and no participants who were recruited for the qualitative portion of the study refused to be interviewed.

The public health community has largely rejected the conservative and religious endorsement of abstinence as an HIV mitigation strategy given the widespread belief that people will have sex outside of marriage. Certainly, these data give ample evidence to support that sentiment. However, these data also suggest that condom use is rarely, if ever, adopted as a normal part of sexual intercourse, especially within a marriage. Moreover, temporary abstinence appears at least as often if not more often than temporary condom use as a risk reduction strategy. These data suggest that the ABC approach is being implemented in a piece-meal and largely ineffective way. Given the resources and thoughtfulness that have gone into preventions strategies in countries with generalized epidemics, these results are discouraging. However, these data do contain some clues about future prevention approaches. Specifically, respondents mentioned repeatedly that they are seeking more stability and less uncertainty in their sexual relationships. While this may be a function of the CCT study, respondents in the control arm of the study seem no less interested in testing and partner health. Although these data alone should not be taken as the basis for novel prevention strategies, they do point to the potential role that trust might play in HIV/AIDS prevention efforts. While the role of condoms, partner reduction and abstinence need not be abandoned, these data suggest that one approach in this setting might be to work on steps to building trusting sexual relationships where frequent partner testing for STIs is a component of a healthy committed relationship.

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Table 1: Characteristics of Qualitative Study Population, by Gender

Demographic	Total (N=102)	Males (N=41)	Females (N=61)	p-value
Age (mean)	25.5 (se: 0.41)	26.1 (sd: 4.9)	25.0 (sd: 5.0)	0.26
Single	28 (28.0)	15 (36.6)	13 (22.0)	
Married	49 (49.0)	18 (43.9)	31 (52.5)	
Living Together	14 (14.0)	6 (14.6)	8 (13.6)	
Divorced	3 (3.0)	2 (4.9)	5 (8.5)	
Widowed	2 (2.0)	0 (0.0)	2 (3.4)	0.4
Mean Annual Income (USD)	151.3 (sd: 226.5)	176.6 (sd: 230.2)	133.7 (sd: 224.2)	0.35
Low Income (<=$77)	57 (57.0)	19 (46.3)	38 (64.4)	
High Income (>$77)	43 (43.0)	22 (53.7)	21 (35.6)	0.07
No Education	11 (11.0)	3 (7.3)	8 (13.1)	
Some Primary School	76 (76.0)	33 (80.5)	44 (72.1)	
Some Secondary School	12 (12.0)	5 (12.2)	9 (14.8)	0.58
Muslim	44 (44.0)	16 (39.0)	28 (47.5)	
Catholic	47 (47.0)	20 (48.8)	27 (45.8)	
Other Christian	9 (9.0)	5 (12.2)	4 (6.8)	0.54
Treatment-High Value	32 (31.4)	14 (34.2)	18 (29.5)	
Treatment - Low Value	38 (37.3)	16 (39.0)	22 (36.1)	
Control	31 (30.4)	11 (26.8)	20 (32.8)	0.76
Ever had HIV Test	51 (51.0)	10 (24.4)	41 (69.5)	<0.01
Know HIV Test Result	45 (88.2)	10 (100)	35 (85.4)	0.2
Chances of having HIV (mean score 1-10)	2.19 (sd: 1.93)	2.32 (sd: 2.0)	2.10 (1.87)	0.59
Spouse Enrolled	37 (36.3)	13 (31.7)	24 (39.3)	0.43
Partner makes decisions about sex	45 (48.1)	8 (22.2)	37 (66.1)	<0.01
Anticipated Change at Baseline	82 (82.8)	35 (85.4)	47 (81.3)	0.57
Reported Change at Round 2	66 (68.8)	28 (73.7)	38 (65.5)	0.40

Table 2: Strategies to Avoid Unsafe Sex Mentioned In Qualitative Interviews

Strategy	Example	Interview Excerpt
Abstinence	Young single men who have never had sex, or who have given up sex as part of the study	*I don't do sex at all; I am busy all the time. I play football. When I come back home after meals I take my jersey and I go to play football. After exercises I go to my activities.*
Temporary Abstinence	Women who have recently given birth or husband is at shamba (farm)	***I:*** *Do you still have sex with your husband or not? Are you still together or not?* ***R:*** *We* we *are together* ***I:*** *And* and *that means having sex?* ***R:*** *We have not yet started having sex because our child is young*
One partner who has tested	Women and men whose partners not enrolled in study	***R:*** *Yes, I talked with him that my results were good and I also advised him to go for check up because my results were good. I advised him but he refused* ***I:*** *Now that you have received your results today will you talk with him about the kind of results you have got?* ***R:*** *I will not tell him because if I am infected it means that he is the one who transmitted this to me. This is because maybe he is the one infected and had he come for tests this disease would have been treated already. Therefore, when I am going he must go for test and if he doesn't want to come here I will tell him to go to the hospital* ***I:*** *Do you think he will accept when you tell him to go for testing?* ***R:*** *This time he will accept to go to test*
One partner, use condoms	Single women	***I:*** *Now after getting results for your test, and he also went for testing, what do you do differently?* ***R:*** *We use salama (condoms)* ***I:*** *But even now, that you know your partner tested and you have tested, you still use condoms?* ***R:*** *Yes ...we are satisfied to use condom* ***I:*** *Is your partner ok with using condom?* ***R:*** *He doesn't have a problem*
Convince partner to use condoms outside	Married women, Married men--aware of risk	***I:*** *Did you do sex with or without condom?* ***R:*** *Without condom* ***I:*** *What did you discuss and how did you talk about using condom?* ***R:*** *We said that we should use condom and if you have an external partner you should use condom* ***I:*** *How about between the two of you inside?* ***R:*** *No...this is because we trusted each other*
Convince partner not to go outside	Married women, Married men--aware of risk	*I can tell him about important things and he can understand and stop moving around...I can tell him that nowadays there are many diseases, there is HIV and STI; he can understand me and stop moving around*

Strategy	Example	Interview Excerpt
Condoms with spouse	Married women, Married men	***I:*** *Is your husband OK to use condom?* ***R:*** *He is satisfied, I have decided the owner of the property and he must agree to use the condom* ***I:*** *So he listens to you?* ***R:*** *Yes (laughter)*
Condoms with outside partner	Married women and men	***I:*** *What do you talk with your wife about using condom?* ***R:*** *We talk about protecting ourselves from STI by using condom* ***I:*** *Do you have any other woman outside apart from your wife?* ***R:*** *I had one before but I don't stay with her anymore* ***I:*** *Were you using condom with her?* ***R:*** *Yes, I was using condom with her in order to avoid STI*
Avoid situations, including alcohol and drug use	Single men, single women	***I:*** *What strategies did you use in order to get the reward?* ***R:*** *The first thing is to come back home early, not staying with people with bad behavior...some people want to stay with ladies all the time, when they sit somewhere they are talking about sex only. Now I was avoiding such people*
Increase other activity	Single men	***R:*** *In this case you try to avoid them because when you join their company anything can happen. Not today or tomorrow but I continue fight it so as to be there* ***I:*** *Will it be easy for you to avoid these temptations?* ***R:*** *Yes it is easy...when I think that my friends are about to come I can go somewhere, I can decide to go to shamba to look at my maize. Then I decide to leave, when they come they will be told that I am not around*
Reduce number of partners	Married, living together men and women	***R:*** *Another thing is award, when I came I was given award and I know what to do with it so as to take care of my children. The prostitution behavior I had before I can stop it completely* ***I:*** *Were you a prostitute before?* ***R:*** *Yes* ***I:*** *You were a prostitute…can you explain to me what kind of a prostitute were you?* ***R:*** *Changing men from time to time. All this was because of problems* ***I:*** *What made you leave them?* ***R:*** *Since when I knew my health status and got the award I decided to continue with my life and stop this behavior; I have known that my health is OK*
Separate from Partner	Married women, single women, single men	***I:*** *What made you leave your partner?* ***R:*** *This is because I have been taught, I joined this group and I have learned a lot...being with a friend itself it is contradicting. This is why I decided to do away with a sex partner.* ***I:*** *Do you think the promise of getting the reward can be one of the factors which made you leave your partner?* ***R:*** *Yes, reward is what making me separate from my sex partner. This is because I can get STIs or any other infections. This is why I decided to separate from her*

Strategy	Example	Interview Excerpt
Use money to motivate partner to stay safe	Men and women with spouses or partners *not* enrolled in the study	***I:*** *The money we expect to give you after testing you for 4 months and find you don't have any STIs. Would you give part of your money to your partner if he promises that he will not have other sexual partners?* ***R:*** *If I will prove that he doesn't have other partners I will give him to continue with our life.*

Paper 3: Your Money or Your Health: Motivating Risk Reduction Behaviors for HIV Prevention in the Context of a Conditional Cash Transfer Trial in Tanzania

Abstract

The lack of success of traditional, individual-level HIV prevention interventions in Africa has contributed to the increase of structural interventions for HIV prevention. One such intervention is the use of conditional cash transfers (CCTs) to motivate sexual behavior change. CCTs have been successful in other areas of health behavior change, but have only recently been used to promote safer sex among populations at risk for HIV infection. A CCT HIV prevention trial with cash awards contingent upon STI test results and STI prevalence as the primary outcome was recently conducted in Tanzania. The purpose of this paper is to explore the possible pathways through which the intervention package implemented as part of the CCT study might work to decrease STI prevalence. The intervention package included three main pieces: the cash incentive (for the treatment group), the repeat STI testing and associated counseling (for all study participants), and voluntary group counseling sessions (for all study participants). This analysis focuses on the first two intervention components, the cash incentive and the repeat STI testing. Using qualitative data, we draw on the experiences of study participants to highlight potential pathways through which the testing and cash components of the intervention might have worked. We find that, from the perspective of the participants, the amount of money awarded was adequate and the timing of the award was appropriate to motivate behavior change. Less clear were the effectiveness of risk reduction strategies implemented in order remain STI-negative and whether or not some participants used the money to engage in more risky behavior, thus offsetting the potential effect of the cash incentive. These data also suggest that the second component of the package, repeat STI testing, counseling and free treatment, were critical motivators of behavior change in both the treatment and control groups of the study. The results of the CCT study will reveal whether the cash incentive had an independent effect on STI prevalence in the study population. Regardless of whether the cash incentive is found to be effective, this analysis will help explain the results of the trial and guide future direction for what should be included in the package should this intervention be brought to scale.

Introduction

Notwithstanding the billions of dollars spent on programs designed to reduce risky sexual behavior, the annual number of incident HIV infections and other sexually transmitted infections (STIs) has not declined. The tragic reality is that many of these new infections could have been prevented. The AIDS epidemic as well as other negative reproductive health outcomes are, at their core, fueled by risky sexual behavior. 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). However, despite isolated – and often, temporary – successes at lowering transmission rates, behavioral change interventions promoting safer sexual practices have proven remarkably ineffective at stemming the tide of the epidemic. While there have been some small declines in prevalence over the years, for the most part the standard HIV prevention interventions have not produced dramatic declines in HIV incidence (Potts, M., Halperin, D., Kirby, D., Swidler, A., Marseille, E., Klausner, J., et al., 2008). One potential reason for this is that there are cultural, social and economic constraints to implementing these prevention strategies consistently and effectively. The lack of success of traditional HIV prevention

interventions points to the need to move HIV prevention interventions in a new direction, a direction that specifically addresses the structural barriers to behavior change.

Economic interventions aimed at changing health behaviors are on the increase, and some have had a fair amount of success in bringing about behavior change to improve health. An extensive literature in clinical psychology on a similar type of intervention known as "contingency management" has demonstrated the efficacy of cash transfers and/or vouchers to reinforce abstinence and recovery from drug and substance abuse disorders (Petry, Martin, Cooney, & Kranzler, 2000; Rigsby, Rosen, Beauvais, Cramer, Rainey, O'Malley et al., 2000). Economic incentive interventions have also been tried in other arenas of behavior change including seat belt use (Geller, Paterson, & Talbott, 1982), weight loss (Jeffery, Bjornson-Benson, Rosenthal, Lindquist, & Johnson, 1984), and medication adherence (Claassen, Fakhoury, Ford, & Priebe, 2007), with varying success.

In addition to these incentive interventions targeted at changing unhealthy behaviors, there has also been a trend towards implementing conditional cash transfer (CCT) approaches on a large scale. Such programs have been used successfully for many years in various social policy domains, including public health, to encourage behavior change (Lagarde, Dirk, Puren, Reathe, & Bertran, 2003). They work in part 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. Perhaps the best known and most thoroughly evaluated example is that of Mexico's Oportunidades, a large-scale poverty alleviation program that makes monthly payments to poor families conditional on their use of preventative and other basic health care and educational services. A randomized controlled trial designed to evaluate the program demonstrated significant impact on a range of health and educational outcomes among enrollees (Gertler & Boyce, 2003).

The majority of these large scale CCT programs have been implemented in Latin America. While future research will reveal the appropriateness of such programs in Africa, the small amount of work done relating to CCT there thus far has had mixed results. A randomized controlled trial in rural Malawi examined the impact of cash incentives on returning to receive HIV test results (R. Thornton, 2006). Study participants were randomized to receive vouchers valued from zero to $3. The cash incentive increased the proportion of persons coming to the clinic to receive test results by a mean of 27%, controlling for distance to the clinic. The author also found a dose-response relationship—the proportion of persons collecting their HIV test results increased by 9% for each additional dollar given as incentive (R. Thornton, 2006).

The same author recently conducted research, also in Malawi, testing the effectiveness of a cash transfer conditional upon maintaining baseline HIV status for 12 months. Participants in the award group who maintained their status (positive or negative) received an award of varying amount 12 months after the baseline HIV test (R. Thornton, Kohler, H.P., 2009). This study showed no difference in HIV incidence between the intervention and control groups. Potential reasons cited by the authors for the failure of the trial included the long interval between baseline testing and receipt of cash-contingent results 12 months later, and targeting a relatively low-risk population of ever-married people, many of whom were in stable, long-term relationships. While there was no effect of the cash incentive on HIV incidence or on self-reported sexual risk behaviors, the authors did find that men receiving the cash award engaged in more risky sexual behaviors post-award, while women receiving the cash award engaged in fewer sexual risk behaviors post-award (participants were re-interviewed one week after receiving the money).

A similar CCT (the RESPECT study) was recently conducted in rural Tanzania with the same intention--using monetary incentives to motivate sexual behavior change and prevent HIV infections. There were some key differences between the Tanzania and the Malawi trials, however. In the Tanzania trial, the cash incentive was contingent upon testing negative for a panel of curable STIs, and participants were eligible for the award at four-month intervals based on the results of repeated STI testing over the period of a year, for a total of three possible awards. This aspect of the study design could in theory eliminate one of the suggested reasons for failure in the Malawi trial--the long interval between baseline testing and receipt of the award. Also, as the STIs included in the outcome measure for the Tanzania trial generally have a higher prevalence and incidence than HIV, and positive test results are more common, making it easier to detect a difference between the intervention and control groups. Additionally, the Tanzania trial targeted a younger and perhaps less stable and more at risk population (men and women age 18 to 30) and did not exclude never-married participants. Given the failure of the Malawi CCT HIV prevention trial to show an effect of a cash incentive, it is important to consider the possible mechanisms through which the intervention components employed in the Tanzania CCT study could work to motivate behavior change and decrease STI prevalence.

A qualitative sub-study was conducted within the CCT trial in Tanzania, the primary objective of which was to gain a deeper understanding of how participants experienced the study, their perceptions of the study and the incentive that went along with it, and why the cash incentive may or may not be effective in changing behavior in their communities. The purpose of this paper is to use the qualitative data to explore the possible pathways through which the intervention package employed in the RESPECT study might work to motivate behavior change and thus decrease STI prevalence in the study population. The intervention package included three main pieces: the cash incentive (for those randomized to the treatment group), the repeat STI testing and associated counseling (for all study participants), and voluntary group counseling sessions (for all study participants). This analysis focuses on the first two intervention components, the cash incentive and the repeat testing. These two components could work to decrease STI prevalence through two possible mechanisms. First, the testing and the cash together could have an additive effect, that is, both might have independent effects that, when applied together, increase the overall impact of the intervention. In this case, we would see a difference in STI prevalence between the treatment and control groups. Second, the testing may be a substitute for the cash incentive, in which case we would see no difference in the treatment and control groups as all study participants received the repeat testing.

The data presented in this paper does not distinguish between these mechanisms—once the final STI test result data are in, the quantitative data will show if the cash incentive had an additive effect in conjunction with the repeat STI testing. What this analysis does is to draw on the experiences of the study participants to highlight potential pathways through which the components of the intervention might have worked. To that end, first, we use the qualitative data to analyze pathways through which the cash incentive might have motivated behavior change among those randomized to the treatment group. Specifically, we examine the amount of money provided, the time interval between awards, the risk reduction strategies employed by participants, and how participants receiving the award spent the money. Second, we examine how the repeat STI testing and counseling might have functioned to motivate behavior change among study participants in the treatment and control groups. The qualitative data and the results presented here can guide hypotheses that will be useful in analyzing the quantitative data available at the end of the RESPECT study.

Methods

Setting

The study took place in the Morogoro Region of Tanzania in the Kilombero and Ulanga Districts. Ten villages centered around the main town in the region, Ifakara, were selected for participation in the study. The region has an HIV prevalence of 5%, just below the national prevalence of 6% (TZ HMIS 2007-2008). The region is for the most part, very rural. In Tanzania, rural regions tend to perform lower on several health and development indicators such as literacy rates, total fertility rates, schooling rates, unemployment and rates. The Morogoro region generally fits this picture; for example the illiteracy rate in Morogoro among women is 32.5% compared to 15% among urban women and 10.7% among males in Morogoro compared to 8% among males living in urban areas. The Ifakara Health Institute administers the Demographic Surveillance Survey (DSS) and provided the sampling frame for the selection of residents to participate in the CCT study.

CCT Trial: Sampling and Recruitment

The results reported in this manuscript originate from data collected from the first three rounds of a randomized, controlled trial of a cash transfer conditional on negative STI tests at 4-month intervals over 12 months in all (the RESPECT study). The purpose of the RESPECT study is to understand the effectiveness of cash rewards, conditional on having negative tests for STIs, on prevention of risky sexual behaviors among young men and women in rural Tanzania. The idea is that the promise of a cash reward conditional on negative STI tests will make the decision to engage in risky sexual behavior more "costly" thereby preventing such behavior among those eligible for the reward.

The study methodology for the CCT trial is described in detail elsewhere, but briefly, the Kilombero and Ulanga districts of Tanzania fall in the DSS catchment area for the Morogoro region of the country. Study participants age 18 to 30 residing in ten villages within these two districts were randomly selected from the DSS database that exists within the Ifkara Health Institute, the DSS implementing institution. The study recruited approximately 2400 participants, approximately 240 in each of the 10 study villages. Households of randomly selected potential participants were visited, and recruits and their live-in spouses (eligible at any age) were given a participation slip and information about where and when to show up for study enrollment.

Upon enrollment, all participants were randomized into either the intervention or control arm. All participants in both arms received free STI testing and counseling, and free STI treatment if needed at baseline, and at months 4, 8 and 12 and 24 of the study. In addition, all participants were tested for HIV at baseline and again at 12 months. Persons testing HIV-positive were referred for care and treatment, but retained in the study.

Those in the intervention group received the conditional cash transfer upon receiving negative test results for selected curable STIs at months 4, 8, and 12. Those testing negative in the intervention arm were also eligible to win a prize of approximately $100 USD through periodic lottery drawings. The control arm was not eligible to receive the cash award at any of the visits, but was eligible for parallel lottery drawings. Eligibility for the lottery for those in the control group was not dependent on STI test results.

All participants in both arms received a psychosocial intervention, comprised of regular group counseling. Half of the participants in the intervention arm received approximately $10 per

award cycle, and half received approximately $20 per award cycle if they remained negative, allowing for the assessment of the impact of the level of reward on behavior change. Over the year, these accrued amounts are substantial relative to local terms, equal to 15-25% of typical annual earnings. Quantitative questionnaires were administered at all study visits.

Qualitative Sub-study: Sampling and Recruitment

This paper uses data from the first three rounds of qualitative data collection. The qualitative study participants were recruited from four of the ten villages that were participating in the CCT study. The four qualitative villages represented a range of semi-urban to more rural, and ranged from 15 minutes to a 2-hour drive to Ifakara Town, the main urban center in the district. The target number of interviews at the outset was 92 (64 in the treatment group, 28 in the control group). We used stratified random sampling to select the qualitative study participants at baseline. In each village, the strata of interest were gender, marital status, and intervention/control group. We over-sampled from the treatment group as we were interested in hearing more experiences relating to how the money did or did not motivate sexual behavior change.

As expected, there was some attrition of qualitative participants at the 4-month and 8-month visits. We replenished the sample by randomly selecting participants who had tested positive for STI at the 4-month visit, and with participants who had tested HIV-positive at baseline. At baseline and the 4-month follow-up, we also randomly selected two spouses of qualitative participants for inclusion in the qualitative study.

We were particularly interested in those who had tested STI positive at the 4-month and 8-month visits because we wanted to understand why, if they were in the treatment group, the cash reward had not provided enough of an incentive to avoid unsafe sex. We were particularly interested in HIV-positive participants because, as we understand it, these participants already have some incentive over and above those who are HIV-negative not to engage in risky sexual behaviors if they are motivated to protect the health of their partners. Additionally, the incentive for those in the treatment group may give persons who are HIV-positive an excuse not to engage in risky behaviors, without their having to disclose their status to their spouse or sexual partner. We were interested in interviewing enrolled spouses of a subset of those in the qualitative study in both the treatment and control groups to get a sense of how well the responses of live-in couples correspond when discussing responses to the incentive.

Recruitment for the qualitative study took place at the second study visit--the visit during which participants received test results and post-test counseling. Participants whose study ID number appeared on the randomly generated list of potential qualitative participants were approached and asked if they would be willing to be interviewed. If the participant agreed, he or she was consented, and given the option to be interviewed then and there, or to make an appointment. Qualitative participants received a small cash payment equal to approximately $3 USD at the end of each interview.

Quantitative Data Collection, Management and Analysis

In March 2009, 2420 participants were enrolled in the CCT trial, and were interviewed using a closed-ended, structured questionnaire. The quantitative questionnaire that was administered to all participants at baseline and Round 2 of the study covered a wide range of topics. For the purposes of the analyses presented in this paper, we focused on demographic information (gender, marital status, education level, annual income, and religion), questions related to whether or not the money had motivated participants in changing their behavior, and one question related to

what participants spent the money on if they had received the award in the previous round. Data were analyzed using STATA version 10 (StataCorp, 2007). Specifically, with the structured interview data, we analyzed the degree to which the cash award was motivating among those in the treatment group. Pearson chi square tests and t-tests were used to detect differences upon bivariate analyses.

Qualitative Data Collection, Management and Analysis

A subset of the 2420 participants enrolled in the RESPECT study at baseline was also interviewed for the qualitative sub-study using an in-depth interview format guided by an open-ended question list. The qualitative interviews were conducted at the time participants received their baseline HIV and STI test results, approximately 3 weeks after the visit in each study round. Tanzanian interviewers were trained in both open and closed-ended interviewing techniques. Following participant written consent, interviews were conducted either in Kiswahili or in English with an interpreter present by trained social scientists from both Ifakara Health Institute and U.C. Berkeley. An effort was made to match interviewer and interviewee by gender, and to match the interviewer/interviewee pairs from baseline again at 4-month and 8-month follow-up, but logistical constraints precluded this outcome for all interviews. All interviews were audio-recorded, transcribed in Kiswahili, and then translated into English.

The interviews were conducted using an interview guide. The main topic areas covered during the interviews were opinions about the study, community perceptions about the study, strategies and/or steps for avoiding STI and getting the cash award, perceptions of the cash incentive, and future plans generally and for use of the cash incentive if received. The guide was revised for Rounds 2 and 3, and included questions about respondent's experiences being enrolled in the study over the previous four months, what strategies they tried, why or why not these strategies were successful, and how they used the money if they received it.

Qualitative interview transcripts were imported into TAMS Analyzer Qualitative Coding software. First, each manuscript was coded descriptively, using the quantitative data indicate the gender, marital status age, intervention group, interview round, and STI status of each respondent. Next, each manuscript was coded by topic; sections of transcript that related to strategies participants intended to use, tried to use, or did use were coded generally as strategies. In addition, coding was conducted highlighting sections of text that related to perceptions of the cash award, how motivating the cash and/or the STI testing was in changing behaviors, and use of the money if the reward was received. Finally, each section of transcript that was topic coded was analytically coded to indicate, for example, the type of strategy, and perceptions relating to the type of strategy. Analytic coding was an iterative process and codes were created as needed based on what was uncovered through reading and re-reading the transcripts. The result of this process was a codebook that was then applied to all reviewed transcripts.

Diaries

Following a methodology developed by Watkins and Swidler termed conversational journals, we hired ten diarists who were "cultural insiders" in all of the communities in which the CCT trial took place (Watkins & Swidler, 2009). Swidler and Watkins have successfully used this method as part of their HIV research in Malawi (Swidler & Watkins, 2007). Conversational journals provide a method to get at interpretation and meaning not just at the individual level, but at more collective level, and to capture the dynamic nature of meaning and interpretation on a daily basis.

Text from journals kept by the hired "cultural insiders" journaling the details of conversations that they overhear or participate were analyzed to try to get at interpretation and meaning.

In the context of the CCT, journalists were instructed to capture all conversations and events that related to the study, the researchers, the incentive, and sexual behavior and partnerships generally. The diaries allow us to understand from an insider's perspective how the communities are responding to the parent study and those who are participating in it, and whether and perhaps why there are differences in the community response across villages. The diaries provide us with social context and meaning relating to the parent study. In this regard, information from the diaries has allowed us to better tailor the in-depth interviews at each subsequent round, and to understand what the relevant issues are, and what we may have been missing during the interviews in each village. Data collected from the conversational journals does not include names or identifying information of anyone that the diarists are writing about. If the diarists mistakenly include names in their notebooks, names were redacted upon review of the journals. The data analyzed for this manuscript includes diaries from February through December 2009, from all ten study villages.

Diaries were coded differently than the interviews. In addition to reading each diary and conducting descriptive, topic and analytic coding using the codes derived from the interview coding process, diaries were also searched using keywords relating directly to discussion of perceptions of the study and the cash incentive and how people were responding to the study in each of the villages. Keywords searched were derived from the analysis of the interview transcripts.

The conversational journals method carries with it some limitations. The fact that the diarists were paid $30 per notebook filled with documentation of conversations and events relevant to the parent study might have created an incentive to simply make up stories and fill the notebooks with fake documentation. In their experience using the conversational diaries method in Malawi, Watkins and Swidler (Watkins & Swidler, 2008) have occasionally found crude efforts to pad the diaries, for example, by copying out part of a religious tract or a story from the newspaper, but these are very obvious. The diary materials—if one insists to the diarists that one wants them to remember and record what they actually heard—are generally much too complex to be made up. To assess the degree of authenticity, diaries were regularly reviewed by study staff and evaluated for repeated or made-up stories. Diarists in a few villages were either replaced or their services terminated if study staff found this to be an issue.

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.

Findings

Qualitative Study Population

At baseline, we randomly sampled 92 trail enrollees from four of the ten study villages to be interviewed using an in-depth interview format. Of these 92, 80 showed up at the study site. Of these 80 that were interviewed, 66 transcripts were received (14 transcripts were lost through data management error--either the recordings were inadvertently deleted or the electronic version of the transcript was inadvertently deleted).

At Round 2, we interviewed 59 of the 66 people interviewed at baseline (7 people did not return to the study site). In addition to these 59 people, we randomly selected 10 to 12 additional people from each village (for a total of 49) to be interviewed to replace both those interviews lost through data management error and those who did not come to the study site at baseline, and to

supplement the sample with people who had tested STI-positive at Round 2 (only 3 people of the 60 interviews at baseline tested STI-positive). Of these 49 that were randomly selected at Round 2, 36 showed up and were interviewed. Therefore, at baseline, we had data for 66 interviews, and at Round 2, we had data for 95 interviews, for a total of 161 interviews, representing 102 individuals. At Round 3, 9 new participants were interviewed, and 46 participants interviewed at baseline or Round 2 were re-interviewed, for a total of 114 individuals interviewed (Figure 1). As at Round 2, at Round 3 new qualitative participants were purposively sampled in order to increase the number of participants interviewed who had tested positive for an STI at Round 3. Additionally, we made the decision to conduct fewer overall interviews at Round 3 because we felt that we had reached saturation with the number of participants we had already enrolled. As a result, some participants who were interviewed in Round 2 were purposely not interviewed in Round 3. The decision of which participants to drop was not random; transcripts were reviewed for particularly "talkative" respondents, and consideration was given also to gender, intervention group, and STI status of the participant. It should be noted that transcripts were not reviewed for content when making the decision to keep or drop a respondent; rather the text was reviewed for coherency of responses and a willingness to talk at relative length about the subject matter. No participants who were recruited for the qualitative study refused to be interviewed.

Table 1 shows the same demographics and other characteristics for the qualitative study population and the overall study population. Notable differences in the qualitative and quantitative populations included the distribution by intervention group (oversampling of those in the treatment groups was intentional), and marital status (the proportion of married participants was lower in the qualitative population).

The Cash Incentive

The quantitative data collected through structured interviews conducted at each study round can give us a general understanding of how influential the participants perceived the cash incentive to be in motivating behavior change. For those in the cash award groups, one of the questions asked on the structured questionnaire at Round 3 of the study was, "*How much does eligibility for the reward motivate you to change your behavior?"* The possible responses to this question were: *very much, somewhat, a little, none*. Tables 2 and 3 show the distribution of responses to this question stratified by gender and low-value/high-value cash award groups. These data tell us that the majority of those in the cash award groups found the award to be at least somewhat of an incentive for behavior change, and that this was true for both men and women. Additionally, the amount of money mattered—those receiving the larger award reported being more motivated by the cash. However, close to 35% of those in the treatment group (28% in the high-value and 42% in the low-value) found the award to be only a little bit or not at all motivating. This section will explore in detail why the cash may have been motivating for some and not others, and how, even if the cash did serve to motivate behavior change, it may or may not have been effective in decreasing STI prevalence.

In order for the cash incentive to be effective, at a minimum, the following criteria would have to be met:

1) Amount of Money: The amount of money provided as an incentive to avoid unsafe sex needs to be large enough so that the "cost" of engaging in risky behaviors is prohibitively

high—the benefits gained from unsafe sex, whether sensual or monetary, cannot be considered greater than the payoff four months down the line for avoiding unsafe sex.

2) Timing of Award: The time interval between testing and re-testing for the cash award needs to be appropriate. This is important because the benefits of unsafe sex (whether sensual or monetary) may be immediate and the reward for foregoing unsafe sex is in the future. If the award is too far in the future, the cash incentive may not factor in to the cost of engaging in risky sex.

3) Effectiveness of Risk Reduction Strategies: Even if the amount of the money is adequate and the time interval to wait for the award is appropriate, in order for the cash incentive to be effective, the risk reduction strategies that those eligible for the cash award choose need to be effective in avoiding infection. If participants who had effective behaviors were already doing this pre-study enrollment, and those who tried to implement a new strategy (such as condoms) were unable to do so consistently, we would be less likely to see an effect of the cash incentive.

4) How the Money is Spent: Finally, in order for the incentive to continue to be effective through the duration of the study, participants eligible for the cash award need to choose to spend the money in ways that do not increase their risk behaviors, for example, to have more sex partners or to engage in transactional sex. If some participants decrease their risk behaviors after receiving the cash award but others increase theirs, this has the potential to offset the overall effect of the monetary incentive.

In this section we use the in-depth interviews and study diaries to explore each of these pathways through which the cash incentive might have been effective or ineffective in the RESPECT study setting. For each of these pathways, the influence of potential biases that might have resulted from the sampling strategy for the qualitative study and the nature of the self-reported data are discussed. Recall that while the first draw of qualitative study participants was random, at subsequent rounds, purposive sampling was conducted to ensure that we had an adequate number of STI-positive participants. Additionally, the cash award group was over-represented in our data.

1. The Amount of Money Provided

Neoclassical economic theory predicts that the CCT intervention would raise the price of risky sexual behaviors, since loss of a near-time financial reward would become at risk, and thus would reduce risky sex. However, researchers from non-economic traditions (Blanc, 2001; Boerma & Weir, 2005; Gupta, Parkhurst, Ogden, Aggleton, & Mahal, 2008; Krishnan, Dunbar, Minnis, Medlin, Gerdts, & Padian, 2008; Price & Hawkins, 2007) have focused more intensively on how the role of cultural and institutional factors, particularly surrounding gender relations, where women's economic dependence on their partners can limit their ability to reduce their risk, may shape and constrain sexual behaviors, and how a CCT intervention might work to overcome such constraints. Regardless of which of these mechanisms is at work (or even if both are at work), in order for the cash incentive to be effective, the money provided for testing negative for

STIs would need to be large enough either to overcome economic constraints for women or to significantly raise the price of risky sexual behaviors.

Before delving into the discussion of how the data from the qualitative interviews inform whether the amount of money provided was enough, it is important to note potential biases and limitations that these data may bring with them. First, as mentioned in the methods section, sampling for participation in the qualitative sub-study was not random. Oversampling those with a positive STI test may have resulted in an overall more risky sample of participants in the CCT study. Those who are more risky may be more inclined to say that the money was not enough to motivate behavior change. While interview excerpts from all categories of respondents are represented in this paper, if we have systematically excluded a particular group, their views are not represented here. Second, as with any research that relies on self-report for its outcome, there exists the issue of reliability of responses, particularly when sensitive questions are asked. Questions about money in this context may fall into this category—generally we found that participants were not always open to discussing how much this amount of money meant to them. Added to this is the issue of social desirability bias. Participants may not have wanted to insult members of the study staff by telling them that the money offered through the study was too small. This was less of an issue in exploring the adequacy of the amount of money (the following includes at least a few examples of participants stating that the amount of money was quite small), but came up repeatedly when we asked participants more generally about whether the promise of money was motivating them to change their behavior. In any case, it bears repeating that responses discussed below do not come from a random sample of study participants, and are subject to all of the limitations that are inherent in self-reported data.

Participants in the qualitative sub-study were asked during in-depth interviews if they thought the award money was a significant amount, and if they received that money, whether it would bring major change to their lives. Participants in both the treatment and control groups were asked about this at the baseline in-depth interview--for those in the control group, the question was formulated as hypothetical. At the in-depth interviews at Rounds 2 and 3 of the study, participants in the cash award eligible groups were again asked what difference the money was making for them in their lives, and how they were using the money had they received the award. There were varying opinions about the amount of money provided as the cash award, with no clear indication that the money was too little to make any difference. Differences in opinion about the amount of money also could relate to the amount of money received by the low-value cash award and high value cash award groups. Following are some examples from the interviews that represent both sides--the money is a lot, and the money is a little.

This 26 year-old married woman in the treatment group was interviewed at baseline, Round 2 and Round 3 of the study. At baseline, she simply states that she thinks the cash award is a lot because it is unexpected money--money that she did not have to look for elsewhere. In Rounds 2 and 3 she explains how the money she has received as being part of the study has allowed her to leave external partners, and start her own business. Even the inconvenience fee (~$3) seemed enough for her to make a change in her behavior of having external partners in exchange for money. In this case, the money was clearly sufficient for her to overcome her economic barriers to behavior change that existed before she was part of the study.

I: *Is this a lot of money for you?*

R: *To me I think it is much because I haven't looked for it, I'm just given cash*. --woman, low-value award group, Baseline

I: Was it easy for you to leave these partners?
R: It was just easy to leave these partners...although they were helping me, what can 1000 shillings do? When I was given money for inconvenience I started a small business of selling green vegetables at the market --Woman, low-value award group, Round 2

I: I remember you told me that money motivated you to do safe sex.
R: This is because the money I received enabled me to start a small business of selling tomatoes. This is because if I didn't have this business I could get a man who wants to do sex with me in exchange of money. If I refuse to do sex with him it means he will go away with his money. In this regard I have to accept because I didn't have money. But now that I have this business, I am not ready to do sex with any man without using a condom. --Woman, low-value award group, Round 3

This next passage is from a 23 year-old single woman in the cash award group. At her baseline interview, she indicates that she thinks the cash award is enough for her to be able to start a business and solve her financial problems on her own. However, at the Round 2 interview, she says that the money she has received is not enough for her to reduce her monetary dependence on her partner.

I: Is this a lot of money for you?
R: No.
I: What would it mean if you got that money? Does the motive of getting this money in the future change the way you think about sexual life?
R: Yes.
I: Those motives of getting the money in future do they make you change your sexual life, how?
R: Because if I get that money I can do business and I can solve minor problems on my own
--Woman, low-value award group, Baseline

I: Were you depending on your friends or partners for any assistance?
R: Yes, only this one
I: Do you think the promise of cash award will reduce your dependence on him for money and finance?
R: No
I: Do you think the award you have received can satisfy the needs you have?
R: No, it cannot because it is a small amount of money
--Woman, low-value award group, Round 2

Apart from the money helping or not helping women to overcome their economic dependency on men, we also heard varying responses from men in terms of how they saw the amount of money being awarded and whether or not that amount would be motivating for them to change their behavior. This 24 year-old married man in the high value award group said that this is a lot of money for him, and that the promise of the reward will make him think twice about engaging in risky sexual behaviors:

I: Why are they offering you the cash after 4 months?
R: That is how time has been planned
I: Is this a lot of money for you?
R: Yes it is
I: Does the promise of money in the future change the way you think about sexual life?
R: Yes...Because I want to win...I must think because I know that if I have sex I can be infected with a virus, then I will miss the money. It is better I don't do sex in order to get the money.
--Man, high value award group, Baseline

Some were unambiguous about the fact that the money was enough--this excerpt from one of the diaries documents a discussion between two men about enrollment in the CCT study and how one man plans to handle his opportunity to receive the awards, and exactly what the award means for him.

If you want to have a third baby with your wife, what measure will you take so as to insure that you are not doing careless sexual acts? "In fact I will be very happy, answered Njegura. Now that I have been placed in a cash reward group I will be very happy with the negative results answer. This will ensure me with the cash payment of 20,000x2 for every 4 months. From the date of receipt, I will stay honestly with my wife, doing safe sexual acts. I will make sure I get cash reward till the end of the exercise. I will use condom daily and at every sexual act with my wife. And I will continue with this system to the whole existence of the exercise. If I want to have a third baby, my wife and I, will go to the clinic for checking and if proved negative, we will stop using condom. And if fertilization is done i.e. my wife has got pregnancy, I and my wife will go on using condom for the rest period. Money will encourage me very much. You know that 20,000/=x2 is not small amount of money. I can get 8 tins of maize (140 Kgs). This amount of food will last for not less than 3 months. It is a long period. It is like an aid to my ordinary budget of food. I advise all people male and female young people and older one to stay with their mates safely faithfully, and honestly. If not possible them use condom for every sexual act. For those checked and proved negative and that have fallen on a cash reward group, must be very careful with their sexual acts. Don't allow new infections. Take it as a subsidiary employment and be careful with it," finished Njegura.

This man's reference to the cash award as "subsidiary employment" and the fact that he is willing and ready to use condoms every day with his wife are quite clear indications that the amount provided through the monetary incentive is substantial for him. He has already worked out how to fit the promise of the money into his financial planning and even into his family planning with his wife.

The following 30 year-old married male in the low value treatment group felt differently--at the Round 2 interview (before which he received the low-value award for testing negative for STIs) he talks about the money:

R: This money is just little but I have to consult my wife and see how we will spend this money. We shall spend it on something which we have agreed with my wife
I: Will this money bring any changes in your life?

R: It cannot bring any changes in my life because it is a very small amount of money. You cannot even budget about how to spend it. It cannot even start a business—Man, low-value award group, Round 2

Feelings about the money did not always correspond to low-value versus high-value award group membership. For example, this 28 year-old married woman in the low value award group was certain that that the money received would be very helpful.

I: Is this a lot of money for you?
R: [Laughing] I don't know to me getting it at once, it is a lot.
I: What would it mean if you got that money?
R: This money, because if we get it we shall thank God, it assists us for this year's starvation. You make a small business; children, they continue with studies, so you have 4-5 children it is a burden. Our fellows who are educated bear one child only, he/she sees his/her salary is low. For us poor people you think it is better you get 6 children so that you can have 6 hoes to increase the number [of laborers]--Woman, low-value award group, Baseline

The qualitative data indicate that the amount of money provided for both the low-value and high-value cash awards was adequate to motivate behavior change. While participants had mixed views on how useful and/or motivating these sums of money were, generally, the themes that emerge here are that the money may in fact be useful for some women who faced economic barriers to sexual behavior change prior to enrollment in the study; for some the money is unexpected, and therefore helpful; for some, the amount of money is small, and will allow them to do little more than cover one or two daily expenses. While some respondents indicated that the incentive was insignificant, more frequently, respondents indicated that the cash award did have a positive effect on their finances and/or did factor into their decision-making regarding risky sex.

2. The Timing of the Award

One of the suggested reasons for the failure of the CCT HIV intervention trial conducted in Malawi was the long interval (12 months) between baseline testing, and receipt of cash-contingent HIV test results (R. Thornton, Kohler, H.P., 2009). If study participants did not have a significantly long-term perspective such that they did not take into account in their daily lives an award that they would receive 12 months in the future, the promise of a cash award would likely have little effect on daily decisions. One of the mechanisms through which a CCT functions is 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. If the short-run is perceived to be too long, this mechanism falls apart. This notion is rooted in behavioral economics and the idea of discounting--people, and especially adolescents, tend to underweight the future and have preferences inconsistently weighted toward immediate or near-immediate gratification (O'Donoghue, 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).

In the Tanzanian trial, the repeated awards distributed at shorter time intervals (every 4 months) may have helped to alleviate the problem of the too-long interval and the not-so-short-term incentives that were possibly experienced in the Malawi trial. Alternatively, it could be that

the promise of a cash award four months out is in fact still too long an interval for people take into consideration when making decisions on a day-to-day basis. We explore that question here, again using the data from the in-depth interviews. Qualitative study participants were asked at the baseline interview whether they thought four months was too long a time to wait to receive the award, and if they would have preferred some other time interval, shorter or longer. It is important to again think about how the qualitative sampling strategy and self-report bias may have influenced the responses to questions about the time interval. Similar to the question about the amount of the award, more risk-prone participants might be more likely to respond that the length of time is too long. Those in the cash award group might be more apt to respond favorably in general about the study. Alternatively, because they know they have a chance to receive the money, they may be more anxious and thus more likely to respond that the interval is too long. Social desirability bias may again have made respondents less likely to say anything negative about how the study was designed.

As in the excerpt below, most participants expressed an unsurprising preference for getting the cash sooner than four months.

I: Does the next study visit seem too far in future to change things about your sexual practices.
R: Yes
I: Is it very far?
R: Yes, far.
I: What if you were going to get the money in a week?
R: It would be better.
I: What if you were going to get the money in a month?
R: All could be better.
I: How about if you were not going to get the money for 1 year?
R: Mmmh! My heart could regret--Woman, cash award group, Baseline

When asked if the time interval were longer, say, one year, there was more aversion to this, and some did mention that they may have to resort to other means of acquiring money.

I: How about if you were not going to get the money for 1 year?
R: After one year? I wouldn't tolerate. [laughing].
I: You wouldn't tolerate-- could you have another partner or what could you do?
R: I would have another partner to assist me.--Woman, cash award group, Baseline

Another theme that arose here was that participants are used to figuring out how to acquire money, and because they are often unsure of how much money will be coming in, and when it will come, they are flexible and make spending and lifestyle adjustments. They are therefore able to adjust accordingly if the interval is one week, one month, or one year. These two males, both in the cash award group, discussed the timing of the award and how timing may not be important because they are not accustomed to expecting to receive money at regular intervals:

I: So the second visit of study seems too far or not far to bring the changes you told me? Is it far or not far?

R: I can say it is far because even if I say it is after 2 months; 2 months for our situation I can say it is 2 years. I can see it is far.
I: What if you were going to get the money in a week?
R: I would decide to stay with the money for my own morals. If it has to save me it will; if it is for saving to assist me when I don't have money I will continue to use
I: How about if you were not going to get the money for 1 month?
R: All this is like what I said in the beginning. If it is one week or one month it is the same. And I shall plan how the expenditures will be, because the money to be given you can be given its plan how to use. If I won't get the money for one year I think each human being is now thinking how to look for money. So I can say if I don't get money for one year Im an adult human being with my energy may God enable me, I will keep looking for money to use in the house to avoid the money to be given. Your own money if you get 100 or 200 it suits.--Man, cash award group, Round 1

I: Does the next study visit seem too far in future to change things about your sexual practices.
R: Oh! It isn't very far.
I: What if you were going to get the money in a week?
R: It could be good.
I: What if you could get within a month?
R: All could be fine.
I: How about if you were not going to get the money for 1 year?
R: All could be good!
I: What could it be if you get in a week, it is fine, within a month it is fine, what if you couldn't get within a year it is fine. Why all are fine?
R: Because you shouldn't expect it much. --Man, cash award group, Round 1

Some participants were less interested in the timing of the cash award, and more interested in the interval being too long between testing. We will revisit this theme in the section on the repeat testing component of the intervention, but it bears mentioning here that the focus on testing as opposed to money came up when participants were asked specifically about the timing of the cash award. This woman in the cash award group mentions that she'd like the time interval to be one month so that she could be sure of her health status sooner.

I: What if you were going to get the money in a week or a month? How about if you were not going to get the money for 1 year? How do you see, would you like it to be in a 1 week, 1 month or 1 year?
R: 1 month.
I: Why would you like it to be after 1 month?
R: I would like it to be after 1 month because I will be certain that my results are clean for now. --Woman, cash award group, Round 1

Most respondents, unsurprisingly, say that getting the cash sooner—in a week or a month as opposed to four months—would be better. In fact, we would expect most individuals to prefer money sooner rather than later. So, this result is not surprising. However, the difference between the way respondents talk about receiving the cash in four months versus a year gives us

some confidence that the four month time horizon is relevant for behavior change. Specifically, when talking about waiting for a year, several respondents indicate that they would have to think about other sources of money for their financial planning. This, in economic terms, suggests that they are severely discounting the hypothetical cash that would not arrive for a year. On the other hand, most respondents speak in concrete terms about what they might do with the cash that they could receive in four months. This suggests that the four-month horizon is short enough to allow them to plan concretely around the expected income.

3. *Effectiveness of Risk Reduction Strategies*

Even if participants in the cash award group were motivated by the cash incentive to change their sexual behavior, in order for the incentive to be effective in reducing STI prevalence, the strategies people chose to avoid unsafe sex would need to be effective risk reduction strategies. If, for example, participants who had effective risk reduction behaviors were already doing this pre-study enrollment, or those that tried to implement a new strategy (such as convincing a partner to use condoms) were unable to do so consistently, we might not see a difference between the control and treatment groups in STI prevalence. Previous research has shown that implementation of risk reduction is complex. Strategy choice is very much a function of an individual's specific circumstances--what married women do to avoid HIV infection differs markedly from strategies that men or single women might use to avoid risk. There is empirical evidence from Malawi that for married women, their main source of concern in becoming HIV-infected centers around their husbands, while for men, concern about HIV is focused on primarily on extramarital partners (Smith & Watkins, 2005; Watkins, 2004).

These authors, as well as others, have found that divorce is becoming a more common and accepted strategy for managing HIV risk among women in Malawi (Reniers, 2008; Smith & Watkins, 2005), and that marital decision-making in general is a strategy for avoiding HIV infection for both men and women (Reniers, 2008). Single women also employ strategies that are tailored to their situation and that address their particular sources of risk. Poulin studied pre-marital partnerships in Malawi using both in-depth interviews and survey data from MDICP and found that young women often enquire about the sexual histories of potential partners from friends and relatives, and that they will often end relationships based on the perceived loyalty of the partner and their own understanding of risk of infection based on this loyalty (Poulin, 2007). This risk perception often comes from discussions with friends and relatives rather than discussions directly with the partner.

What this research tells us is that risk reduction strategies may not only differ from those that HIV experts recommend and those that have been the focus of HIV prevention interventions, but also that the consistency with which strategies are implemented may vary considerably. This section uses the in-depth interview data to explore the effectiveness of strategies implemented by study participants. Effectiveness here is not measured through a biological outcome, but rather through the description participants give of what they changed or tried to change between each study round.

The oversampling of STI positive respondents may bias the interview data toward discussion of less than effective risk reduction strategies. Alternatively, those who had tested STI positive were aware that their previous strategy was not effective, and at least at Round 2 of the study, this may have informed their description of strategies. Participants in the cash award group might report more effective strategies because they are more motivated to stay safe. However, examples provided from both the control and cash award groups do not support this notion.

The biases that come with self-reported data certainly may have influenced responses about risk reduction strategies. Particularly during the baseline interviews, participants may have had incentive to answer questions about risk reduction strategies with the "correct" response, rather than applying the question to what was currently happening in their lives. For example, "I use condoms and have one faithful partner who has tested," was a typical refrain among respondents. 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. Before the second and third rounds of interviews, interviewers were trained specifically on how to extract more "truthful" responses, or at the very least, responses that appeared to relate directly to the respondent's life rather than a repeated counseling message.

This section first presents examples of traditionally effective risk reduction strategies--abstinence, be-faithful, or condom use (A-B-C)--that were implemented by study participants. Next, we present three reasons and supporting qualitative data as to why implementation of risk reduction strategies often does not strictly follow the A-B-C guidelines. Rather, risk reduction in this setting is complex and strategies implemented by study participants may not have been fully effective in preventing infection.

Some study participants did talk about using one of the A-B-C strategies to avoid infection. For example, this single man in the control group, age 24, discussed how he avoids sex altogether by keeping busy with exercise and other activities:

I don't do sex at all; I am busy all the time. I play football. When I come back home after meals I take my jersey and I go to play football. After exercises I go to my activities.
---Single man, Cash award group, Round 2

This single woman in the control group discussed how she and her partner are satisfied to use condoms even though they have both tested and are not infected:

I: Now after getting results for your test, and he also went for testing, what do you do differently?
R: We use salama (condoms)
I: But even now, that you know your partner tested and you have tested, you still use condoms?
R: Yes...we are satisfied to use condom
I: Is your partner ok with using condom?
R: He doesn't have a problem -- Woman, control group, age 18, Single

Finally, this married woman in the cash award group discussed how her strategy was to remain faithful to her husband:

I Can you tell me from the past four months the last time we met. What did you do, so that you could get the award today?
R I decided to stay with my husband
I And did you talk to your husband about staying just only with him?
R Yes, I talked with him
I What did he say? Did he agree to stay with you only?
R Yes, he agreed -- Female, cash award group, married

More often though, we found that participants discussed risk reduction strategies that did not strictly follow the recommended A-B-C guidelines, but were more complex in their design and implementation. Three main themes relating to the effectiveness of risk reduction strategies emerged from the data. First, participants in this study seem to rely much more heavily on making sure that partners have tested, and have negative HIV and STI test results as a strategy for avoiding infection than they do condom use. This is especially true among participants who are married or are in long-term relationships. Finding the balance between discontinuing condom use and convincing a partner to go for testing can be difficult. Additionally, people can and apparently do lie about the last time they tested and the results that they received. Reliance on testing is not a foolproof strategy, but one that many people find preferable to consistent condom use in this context. This 22 year-old single woman in the high-value award group talks about how she and her partner moved away from using condoms. She describes how the passage of time and the feeling that she and her partner "know one another" allowed them to make the decision to stop using condoms.

In the beginning we were using condoms but at the moment we don't use condoms...as you know in the beginning we didn't trust each other yet. Therefore, we went on like that but when we knew one another we stopped using condoms –Woman, high value award group, Round 2

Others discussed how they find it difficult to trust potential partners when they say they have tested negative, and show concern if the most recent test was several months ago. This 28 year-old man was a CCT study participant in the low-value award group who used condoms with his partner until they could both get tested with good results. They used the testing that was part of the CCT study to do this, and then they were able to continue having sex without a condom. Before they were living together, he did not trust that she was faithful, and the only way he felt that he could be sure was by seeing that her test results came out negative.

I told her to use condom because before we married she was at her place and I don't trust her. Therefore, before I paid the dowry I wanted to use condom until when we shall go for medical check up. After the check up if our results are OK then we can continue doing sex without using condom. It was good because we came here for medical check up and since we are both OK we continue without using condom. --Man, low-value award group, Round 2

This single 21 year-old man in the high-value award group discusses not only the need to see the proof of testing, but also to ensure that the testing has happened very recently because it is difficult to know what might have happened between the date of testing and today.

...even your partner you can't trust her that much. Even the one you follow you can't trust well because she didn't show you her certificate although you have...You can trust each other when you follow her, you have approached her and she accepted, you can give her a witness, before doing sex I think we should first go to the hospital we test. She can tell you I have already tested but my certificates are here. You won't believe her directly, you must use tools [condoms]. Because she has shown you her certificates even 2 months haven't passed you don't know what has happened in between. --Man, high value award group, Round 2

The second theme emerging from the data relating to risk reduction strategies was that implementation of strategies was often inconsistent and opportunistic. Women were sometimes able to take advantage of situations in which they had temporarily increased leverage to convince their partners to use condoms or to convince them to go for testing. Regular condom use was more commonly mentioned among single men and women as a strategy for avoiding infection. Several CCT participants talked about opportunistic implementation of strategies that lower but do not eliminate the risk they face from their husbands. These women are taking advantage of circumstances or situations that arise in their lives that temporarily give them some increased level of control or leverage over their sexual lives. One 19 year-old married woman in the control group explained how she is able to convince her husband to use condoms within their marriage when she perceives her risk to be high--when her husband comes home late at night.

I: Did you try to avoid unsafe sex?
R: Yes
I: What did you do?
R: I asked my husband to use condom the days when he was not in good mood
I: Did you use it throughout or in dangerous days only
R: During dangerous days only
I: What are these dangerous days?
R: When my husband comes back at 2 am in the night and he needs to stay with me I ask him to use
I: Is this because you don't trust him?
R: Yes
I: So, you think this time you can get STI?
R: Yes
I: But when he comes back early you continue as usual?
R: Yes
I: Can't you get STI when he comes early? What do you think?
R: I can —Woman, control group, Round 2

The third theme relating to effectiveness of risk reduction strategies was related to trust and uncertainty in relationships. For both married men and married women, but more so for women, participants could ensure only that their own behavior was safe. But because of the negative attitudes towards and associations with condom use within marriage, often their only option was to try to convince their spouse to either leave external partners or to use condoms with external partners. This was a strategy mentioned frequently among married women. Generally, there exists a fair amount of uncertainty in these marital relationships, on the part of both men and women. Even if a discussion is had between spouses about staying safe from infections, often one spouse cannot be sure what the other is doing, and convincing a spouse to protect you can only be so reassuring. This points to the importance of regular testing and treatment as a mechanism for removing some of the uncertainty and inconstancy from these relationships. This 27 year-old married woman in the low-value cash award group discussed the difficulties in convincing her husband to use condoms with outside partners, and interestingly, she talks about how the test results are her indication that he is doing what she asked of him.

R: I have participated in this study because I don't like STI and I don't like doing unsafe sex. I am with my husband only. In this case I have changed my behavior and I don't like to have any kind of partner.
I: You have told me that you do not have another partner. Maybe what other strategies have you used in order to receive the award today?
R: I don't have any other partner if I get STI it is my husband who has brought it to me
I: did you trust your husband over the period of four months when you were waiting for this award?
R: Yes, I trusted him
I: And were you able to do sex without using any protection?
R: No, we didn't use condom even for a single day
I: Did you talk with him that he is a man and he can move around and bring diseases and that he should use condom when you are doing sex?
R: Yes, I was sensitizing him all the time
I: Did he listen to you and implement what you told him?
R: I hope he listened and implemented what I told him and perhaps that is why today I tested negative –Woman, low value award group, Round 2

While the data provide some examples of implementation of traditionally effective strategies such as abstinence and having one faithful partner, more frequently what arose was that ineffective and inconsistent implementation of strategies may have been a factor influencing the effectiveness of the cash incentive component of the intervention. Lack of trust in relationships coupled with widespread infidelity and negative associations toward condom use within marriage make it difficult to effectively avoid infections despite the promise of cash for success.

4. How the Money Is Spent

In the CCT HIV prevention trial that was conducted in Malawi, the authors found that receipt of the cash resulted in riskier sexual behavior among men (as measured one week post-award) and less risky behavior among women (R. Thornton, Kohler, H.P., 2009). In the Tanzania CCT trial, awards were given three times over the period of a year. If among those in the treatment group, some participants decreased their risk behaviors after receiving the cash award, but others increased theirs, this could offset the overall effect of the cash incentive. This section explores the degree to which participants thought that the money might result in worse or more risky behavior, and how that might influence the results of the study. People in the cash award group might be more likely to report that the money will not result in bad behaviors, both because they are members of the group who are eligible to receive the award, and because they do not want to give the study staff any reason to think they should not be providing the cash incentive. Certainly when people are asked directly about how the cash might influence their behavior, they are unlikely to report that they will use it to engage in risky behaviors (as was supported by the quantitative data on this topic). However, when asked how others might use the money, respondent's tended to be more willing to report that some bad might come of the extra money. Those testing STI-positive might be more likely to report that they money is being used for more risky behavior, especially if they see themselves and their positive test as a result of a partner engaging in such behavior.

During the qualitative interviews participants were asked how they thought people might use the money, how the study might change things differently for men and women, and what bad

things, if any, might arise from giving people this extra money in the form of the cash award. Generally, participants did indicate that some people would use the money to engage in more risky behaviors, such as having more partners and buying alcohol, but others would not. This woman in the control group was so concerned that the money would be used for bad behavior that she suggests that the intervention not include the award, but only the testing:

I: Will people avoid getting any sexually transmitted infections in order to get the money?
R: They won't avoid...The money will be a big temptation.
I: So, you think if a person gets the money will behave badly and perform careless sex?
R: Yes... Because he/she will be confident that he/she has money so he/she will go to such people.
I: So, what do you think we should do?
R: I think we should continue to test people and they should continue to get treatment, we can succeed.
I: Without giving them money?
R: Yes ---Woman, control group, Baseline

There also seems to be a sense that whether or not the money is used for good or bad purposes is almost pre-determined by what type of behaviors a person engaged in before enrolling in the CCT trial. As this man in the control group pointed out at his baseline interview, there are good people and bad people and it is predictable based on priors who will use the money how.

This study is a good idea for those who understand but for those who don't they will think it is a bad idea. We take for example a person gets 20,000/= or 50,000/= but he/she doesn't know the importance of his/her health; as he/she gets the 50,000/= he/she will use it for adultery. And the one who likes his/her health as he/she gets Tshs 50,000/= or 20,000/= he/she will know how to improve his/her health not to be tempted to perform careless sex.--Man, control group, round 1

Another woman in the treatment group reiterates this idea--she says, "*If someone is a thief he will continue with his behavior even if you give him one million shillings. He will not change. He will just take the money and go to drink in the bar or clubs."* A gender dichotomy relating to the propensity to spend money on more risky or bad behavior was less apparent in responses to questions about the money, although a few participants spoke about how men and women might use the money differently. This married man in the control group had clear ideas that women would use the money carefully while men would use the money for bad behaviors.

Let us take an example of those who will get award for those who are stable and they tune their brain for that, they will use the money carefully, to invent small projects to be able to get money and not to do careless and get infections. And for men's side those who will get award can use their money badly, money can be a temptation. A man can think so and so refused my proposal, I can get her through this money. Those who are stable know that I avoided this, I should use this money well to strengthen my health —Man, control group, Baseline

Others were less clear that men would always be the ones to use the money in a less careful manner. This woman in the control group, for example, discussed how one man might use the money for alcohol and another might use it for doing business. One woman might waste the

money to buy a kanga (piece of cloth material) while another would use it to start a small business and improve her life.

I: In your opinion, will being enrolled in the study change things differently for men and women.
R: Depending on one's brain, one can get the award and run roughly while one can run a project and improve his/her life.
I: For example we start with men; which changes will happen from this project?
R: Some men can start business another one a drunkard can lose the money in his habit.
I: And for women, what are the changes that will emanate from this study?
R: And to women, they can be the same. The one who understands can start any business and improve her life but the other one can say let me take only this to buy something like kanga just for dressing, they say it is a memory [of the study]. But the one who understand more can start business as a memory of a research Corporation [the study] which assisted me; I started a certain business--Woman, control group, Baseline

The dominant theme emerging here is that some will use the money for good and some will use it for bad purposes, and that the response to receiving the extra money is entirely dependent on the type of person who receives it. However, as one man in the control group astutely points out, because the next round of awards is contingent upon continually protecting oneself from infection, this may limit the effect that was seen in the Malawi CCT trial, where a one-time payment resulted in riskier sexual behaviors among men.

I: What kind of change do you think it [the money] might bring?
R: That many young men will be cured. Whoever understands will understand that there is such a thing. If I do, it will be bad or good, so I better do it to be good. That can be one of the advantages of this study. Because the study wants you to protect yourself in order to get its profit, it benefits you as you live a safer life without having any STIs. --Man in control group, Baseline

Interestingly, most of the excerpts from the qualitative data that speak to the notion that some people will use the money to engage in risky behavior are from participants in the control group. It is possible that those in the control group were more likely to respond in this way because they are upset about not being eligible for the money. That said, the qualitative data do not give us a clear picture as to whether differential responses to the money in terms of risk behaviors may have diluted the effect of the cash incentive component of the intervention. While these data do point to existing differences in response to receiving the cash, we do not come away with a clear sense of the frequency or distribution of these differential responses. Data from the structured questionnaire that were available at the time of writing also do not clarify the picture. During the structured interview that was administered at Round 3 of the study, participants who had received the award at Round 2 of the study were asked how they used the money. One of the possible responses was "used for girlfriends". Of the 925 participants responding to this question, only one chose "use for girlfriends" as his response (data not shown). The Tanzanian CCT study includes a follow-up at 24 months. At this visit, participants will be re-tested and interviewed again using the structured questionnaire. Data collected at this final study visit may further clar-

ify whether a differential response to receipt of the cash award might have diluted the overall effect of the cash incentive on STI incidence.

Repeat STI Testing and Counseling

In this section, we discuss the second major component of the intervention employed in the RESPECT study, the repeat STI testing and counseling, and provision of free treatment if infected. All participants (control and treatment groups) were tested a total of five times as part of the RESPECT study: at baseline (no cash award), 4-months (cash award), 8-months (cash award), 12 months (cash award) and 24 months (no cash award). Participants in both the cash award and control groups mentioned the importance of this repeat testing and treatment frequently during the qualitative interviews.

Participants in the qualitative study were asked at each round of the study what they thought motivated them most to change their sexual behavior, the lottery, the testing/treatment and knowledge of health status, or the cash award (for those eligible). The testing/treatment and opportunity to know one's health status were mentioned most frequently. However, it should be noted first, that we found that there was some level of discomfort in admitting that the money was the primary motivator for changing behavior. We repeatedly asked about motivation for change because we recognized this to be an issue early on in the study (we were alerted to it by our Tanzanian interviewers, who told us that discussing the importance of money in one's life was uncommon). While some were adamant that the money could not motivate change, others, when pressed, admitted that money did play a role in helping them stay safe from infections. Second, even if participants mentioned that the testing was most influential in changing their behavior, this does not preclude the possibility that the cash incentive had an additive effect on behavior change. The purpose of this analysis is not to say that testing was more effective than cash or vice versa, but simply to highlight the importance of the testing as revealed by the study participants during the in-depth interviews. In fact, if pointing to the cash as motivating is taboo, but testing negative is an avenue to the award, participants may instead talk about the importance of the testing in motivating behavior change, thus artificially elevating the centrality of testing in motivating behavior change.

Several reasons for the importance, centrality and influence of repeated testing and free treatment on the lives of study participants emerge from the qualitative data. First, testing gives people knowledge that they did not have previously. Having test results in hand can improve relations with family and bring a new level of trust to a relationship that was previously plagued by uncertainty. Testing is often the only way for people to have a confidence in their relationships because infidelity and multiple partnerships are so pervasive. As a result, the thought process is often as follows: while I trust my husband/wife/partner, I cannot know what my husband/wife/partner is doing. Test results give confirmation in a context where there is little trust and much uncertainty. Here is an example of testing and results promoting trust in a relationship:

I: I just want to know if this study has changed the way you think about your health
R: Yes, it has changed...when you know that your health is OK you stay healthy but when you don't know your health you don't feel happy
I: What makes you happy or depressed?

R: You stay depressed if you feel that maybe your health is not OK. Once you know your health status you stay happy. When I know about my HIV and STI status I feel so happy but if I had HIV I would be so unhappy. I would not eat well.
I: Now that you have known your HIV and STI status do you think this has changed your life?
R: Yes, it will change my life because I will be happy and I will stay safe. Even my husband will know that he is safe and he will settle and discuss –Woman, cash award group, Baseline

Of course STI test results can promote distrust as well, but because distrust is already so pervasive, having a positive result often promotes discussion between partners where there was no discussion previously--and may ultimately lead to safer behavior either in the form of leaving a partner (separating or divorcing) or having safer behaviors within the partnership or marriage. This woman in the cash award group received a positive STI test result at Round 2 of the study, and did not receive her cash award. She talks here about how now that she has tested positive she will try to convince her partner to use condoms, but most likely she thinks she will have to leave him because he will refuse.

I: Do you have any strategy at the moment to ensure that next time you test negative for STIs in order to receive the reward?
R: Yes…to use condom
I: Do you think your partner will accept to use condom?
R: He will not accept
I: At the beginning you told me that if he refuses to use condom you will leave him. Do you think it will be easy to do this?
R: Yes –Woman, cash award group, Round 2

The second reason for the importance of testing that emerges from the qualitative data is that testing gives people reason to want to protect their health if they know that their health is good, and they are free of infections. Or, if they find that they are infected, they can receive free treatment for the problem, and know that they will be tested again to ensure that treatment worked, and that they are now in good health. This points to the importance not just of the testing, but of the offer of free treatment for all study participants. These two excerpts from the in-depth interviews, one from a married woman in the control group, and one from a married man in the control group, illustrate the importance in knowing your health status, and protecting your health once you know your status is good.

I: Has the lottery made come back for the second round?
R: No, it is because of my health...staying well and safe, you stay strong because you know you don't have diseases, therefore, you continue protecting yourself –Woman, control group, Round 2

I: Is the lottery what made you come back for round two?
R: It is not the lottery. Even if I don't get money I will still take care of my health. This is because I didn't start checking my health here. I had a tendency of checking my health after three months even before this study started. But I am happy because it has reduced the cost of going to Ifakara for check up after three months...I have been doing this from time to time because knowing my health status is better than not knowing it

I: Do you think money can make you change your behavior?

R: As a youth money cannot make me change my behavior; but through training I can change my behavior even if I don't get money. Knowing the status of my health is more important than getting money--man in the control group, Round 2

The third reason for the importance of testing and treatment in the study population is simply that knowledge of health status can bring lasting change. Repeated testing allows for repeated and regular knowledge of health status, and from the perspective of the participants, this knowledge seemed to be an important catalyst for change.

This married man in the control group explains that first, a person needs to have an understanding of the importance of their health and protecting their health. Only then can the money be meaningful--money is not a base from which a person can change.

For the ones who don't understand, he/she will be happy because he/she gets award, but as I said the award as it is--if you rejoice without knowing how you improve your health it won't be meaningful. I'm happy because I came to check my health, I now know where I am. From now, although I'm not in award group, I shall know how to arrange myself. One advantage I got is to know that money is not a base. --Man, control group, Round 1

One interpretation of this excerpt is that this man is suggesting that there is more integrity in his motivation to stay healthy since he is not responding to cash as a motivator. This interpretation, along with the reported aversion to discussing the role of cash in prompting behavior change suggests that there may actually be an almost cultural aversion to changing behavior in response to a cash incentive; rather, study participants see value in having more "pure" motives for behavior change.

Some participants highlighted the repeated nature of the testing specifically as being particularly beneficial, while others discussed its importance because there is a lack of STI testing available at local health centers, and there is little anonymity in the HIV testing that is available. For these reasons, participants were particularly appreciative of these services and of the knowledge they were able to gain about their own health. The following excerpt is from a 19 year-old single man in the cash award group. He explains that the testing services available at the health center are not reliable and that treatment is not always available. But the testing as part of the CCT study has allowed participants to be confident in the services and treatment offered.

I: What about if you are in a group that is not receiving the award. Do you think is also motivated you to be safer with your partner?

R: Since I have got results it could motivate me and my partner to stay safe because we have got tests because tests are a big problem here…therefore we went to these normal stations and they told us…when you go there today they tell you to go back tomorrow…tomorrow, tomorrow. People don't get correct tests. When these researchers came and told people to show up for check up people showed up and we have tested and this is why we are confident, had I remained safe I would continue doing safe sex --Man, cash award group, Round 3

This excerpt indicates that it is not just the testing itself, but the professionalism associated with the testing as part of the CCT study that is important in motivating change. Provision of testing is

not helpful if the clientele have no confidence that they will receive the results in a timely manner. This was supported by anecdotal reports from study staff who told us that villagers who were not enrolled in the study would often come by the study station and ask just to be tested. These villagers saw an opportunity for anonymous, reliable testing (for both HIV and STIs) and did not want to miss out.

When participants were asked directly during the in-depth interviews what aspect of the study they thought would motivate them most to change their behavior, answers were more ambiguous. For example, a common response for those in the cash award groups was that they were most motivated by the testing and knowledge of health status; when pressed, they admitted that they were also motivated in part by the money, but were quick to say that knowledge of health status was most important. It may have been that participants were hesitant to admit that money was influencing them in some way, and that they knew the more acceptable response was to say that they are most motivated by knowledge of health status. This explanation supports the notion that the effects of the repeat testing and the cash incentive may be additive. The following excerpt from a 20 year-old single male in the cash award group is an example of how participants frequently responded to the question of what is most important in motivating change:

I: Did you tell your partner about the money that goes along with the study? The money that you received today, did you tell her about it?
R: I have talked with her about the award and we have agreed that if I get it I will give some to her also
I: Has the tuzo [award] motivated you to stay safe? It sounds like you were staying safe and now you are staying safe. So can you tell me how does the award help you to stay safe?
R: It has just motivated me, I am OK and I will continue staying safe so as to get other awards in the future
I: What if you were in the group that is not eligible for the award? Would you have been able to stay safe these past four months?
R: Yes, it could motivate me to stay safe. I feel good to stay safe even without the promise of an award
I: So award does not motivate you?
R: The award has not motivated me. Only my results —Man, cash award group, Round 2

Others were unequivocal about how the money might influence them,—for example the diary entry presented in the first section of the paper portrayed a man as being very motivated by the cash award, and considering the cash payment as "subsidiary employment." However, most interview respondents placed more weight on the incentive created by knowing their health status. In general, these data point to the importance of anonymous (in that the people administering the test were not from the village), reliable, repeated STI testing and treatment as a catalyst for behavior change in this population.

When participants were asked about how those in the village who were not enrolled felt about the study, many responded that these people wanted to be part of the study because of the testing (and in some cases, inconvenience fee that came with the testing). For example one woman in the control group talked about how the community sees the study during her Round 2 interview, alluding to the importance of having an opportunity to know one's health, "*In the Idete community, most of those who are enrolled in this study, many people are coming here in order to know their health status. That is why they are coming in big numbers. Even those who*

are not enrolled in this study, they want to come in but this is not possible. Therefore, this makes a few who are enrolled to this study motivate others who are not enrolled to this study." Some of the diary entries also supported this; those wishing that they were enrolled discussed the missed opportunity for testing. This diary entry is from one of the female diarists, recorded in February 2009, just as the study was beginning enrollment:

I met with a boy who is angry, saying those who are coming here to check the people's health they have bad behavior. Why are they choosing people to go there to check their health, how are they choosing the people? Because others who have been chosen are my friends and are the same age as me, and also we do our activities together. Why don't they give me a chance also? Because I want to know my health, even though they can't give me 2000 [Shillings], it's ok. Because I don't need it, the thing which I need is only to know that I am fit or am affected.

While the discussion of the importance of testing and knowing one's health was pervasive in the interview data, these results do not preclude the notion that the cash incentive could have been effective motivation for behavior change above and beyond the testing and treatment that was offered to all study participants. The possibility that the testing came through as a more important motivator than the cash incentive purely because of a deep-seeded cultural aversion to changing behavior in response to a cash incentive should be explored further in future research.

Discussion

This paper used qualitative data to explore how the two major intervention components of the RESPECT study, the cash incentive and the repeat STI testing and free treatment, might work to motivate behavior change. If both the cash and the STI testing are effective methods of changing behavior and thus of decreasing STI prevalence, the question remains as to whether the cash and the testing together have an additive effect. The data presented here do not make this determination; rather they provide a more nuanced explanation of how the cash might have worked to motivate change, and of how the study participants perceived the relative importance of the cash and testing as incentives to avoid infection.

In terms of the cash incentive component, the qualitative data suggest that the amount of money awarded was adequate and the timing of the award was appropriate to effectively motivate behavior change. Less clear are the effectiveness of risk reduction strategies implemented in order to remain STI-negative and whether or not the money was used by some to engage in more risky behavior, thus offsetting the potential effect of the cash incentive. The results of the trial will reveal whether the cash incentive was effective in decreasing STI prevalence in the study population. Even if no effect is found, the qualitative data presented here provides a framework for hypotheses as to why: receipt of the cash award led to risky behavior even if the promise of the award discouraged risky behavior, there is a deep-seeded aversion to changing behavior in response to a cash incentive--study participants see value in having more "pure" motives for behavior change, and risk reduction strategies that were implemented were not effective in preventing infection.

These data also suggest that the repeat STI testing, counseling and free treatment were important motivators of behavior change in both the treatment and control groups of the study. Repeat STI testing and availability of free treatment may be of central importance to the lives of study participants for several reasons. First, previous research has shown that Africans living in regions with high HIV prevalence have a tendency to overestimate the transmission rates of HIV

(Anglewicz & Kohler, 2009; Bignami-Van Assche, Chao, Anglewicz, Chilongozi, & Bula, 2007; Watkins, 2004). This is relevant because it makes every opportunity to know health status all the more important. Despite the fact that the repeat testing as part of the CCT trial was STI testing and not HIV testing (HIV testing was provided only at baseline and 12 months), it nonetheless provided a window into the risk a participant may be facing in his or her current marriage or partnership.

Second, repeat testing may be of central importance because of the level of uncertainty that exists in many marriages and partnerships for participants in this study. Uncertainty coupled with the lack of condom use within marriage leaves married participants with limited options for reducing risk. Repeat testing eliminates some of this uncertainty, may provide an alternative to convincing a partner or spouse to use condoms, and can provide "proof" of suspected fidelity or infidelity within a partnership.

Third, the testing provided through the CCT trial was anonymous (in that village outsiders were administering the tests and providing the counseling), reliable and trustworthy. Participants could receive HIV and STI testing without having to go to the local health center specifically because they thought they were at risk, and without the concern that others in the village would find out.

This study brings with it some limitations. As with any study that includes self-reported sexual behavior as a data source, there is the possibility that unsafe sexual behaviors were underreported. Plummer et al report on the validity of the collection of sexual behavior data using five different methods from a study done in Northern Tanzania (M. L. Plummer, Ross, Wight, Changalucha, Mshana, Wamoyi et al., 2004). 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. Because there was some overlap in the questions being asked in the qualitative and quantitative interviews, we have been able to compare responses to some degree, and found some inconsistencies in reported behavior change. Even with this added benefit, we face the limitation that respondents may have incentive not to be completely forthright with the information provided during the in-depth interviews or the structured interviews. In fact, as we found in the baseline in-depth interviews, participants may have had incentive to answer questions with the "correct" response, rather than applying the question to what was currently happening in their lives. 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. To overcome this, for the Round 2 in-depth interviews, interviewers were trained to repeatedly assure participants that there was no right or wrong answer and that we were interested in hearing about what was actually going on in their lives, not what they learned in counseling.

A third limitation relates to the translation and transcription of audio-taped interviews. There is the potential for the content of the interview to lose meaning and nuance during the transcription and the translation process. We addressed this limitation to some degree by having one of our study interviewers (who is bi-lingual) review the transcripts and translations within two weeks of the actual interview, and revise the transcripts as necessary. This method still suf-

fers from a secondary but related limitation; that is the revised translated transcripts are an interpretive process, wholly dependent on the perception of the interviewer.

Finally, the proposed research is potentially limited by systematic loss to follow-up. Those who were in the control arm and those in the low-value treatment arm, and those testing positive for STI and HIV at baseline were all more likely to drop out of the study after the first visit. 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. That said, the loss of participants in the qualitative study was small—only seven of the 66 participants interviewed at baseline did not return for Round 2 of the study, and no participants who were recruited for the qualitative portion of the study refused to be interviewed.

Despite the limitations inherent in the data, the results of this analysis and the questions it has generated will guide not only future research, but also the determination whether the intervention package implemented in the RESPECT study should be brought to scale. The results of the trial will reveal whether the cash incentive had an independent effect on STI prevalence in the study population. If the cash incentive did not have an independent effect, but it is clear that the intervention package as a whole (cash, repeat STI testing, counseling) did decrease STI prevalence, then a scaled-up version of the intervention package might include only the repeat testing, counseling and treatment intervention. Significantly, this paper raises the potential that, even if the cash incentive did have a marginal effect over the effect of the repeat STI testing, it may be that the STI testing is the dominant driver of change and therefore adding the cash incentive component to the intervention package upon scale-up would not be cost effective. It is also important to consider the inherent political difficulties in bringing a cash incentive program based on sexual behavior to scale. Given the political feasibility issues, if the cash incentive is only marginally beneficial, it might make sense to exclude the cash component from the intervention package, and focus on the repeat testing, counseling and treatment. It could be that the results of the RESPECT study show through both the qualitative and quantitative data that an intervention package including repeat testing plus counseling alone, is all things considered, a better package than one that includes the cash incentive. Based on these analyses, future research must consider the possibility that cash transfers might be used by some to engage in risky behaviors, how to promote risk reduction strategies that fit in with the complex and dynamic lives of those living in high HIV prevalence settings, and the relative cost-effectiveness of repeat STI testing and cash incentives as HIV prevention interventions.

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Figure 1: Qualitative Interviews at Each Study Round

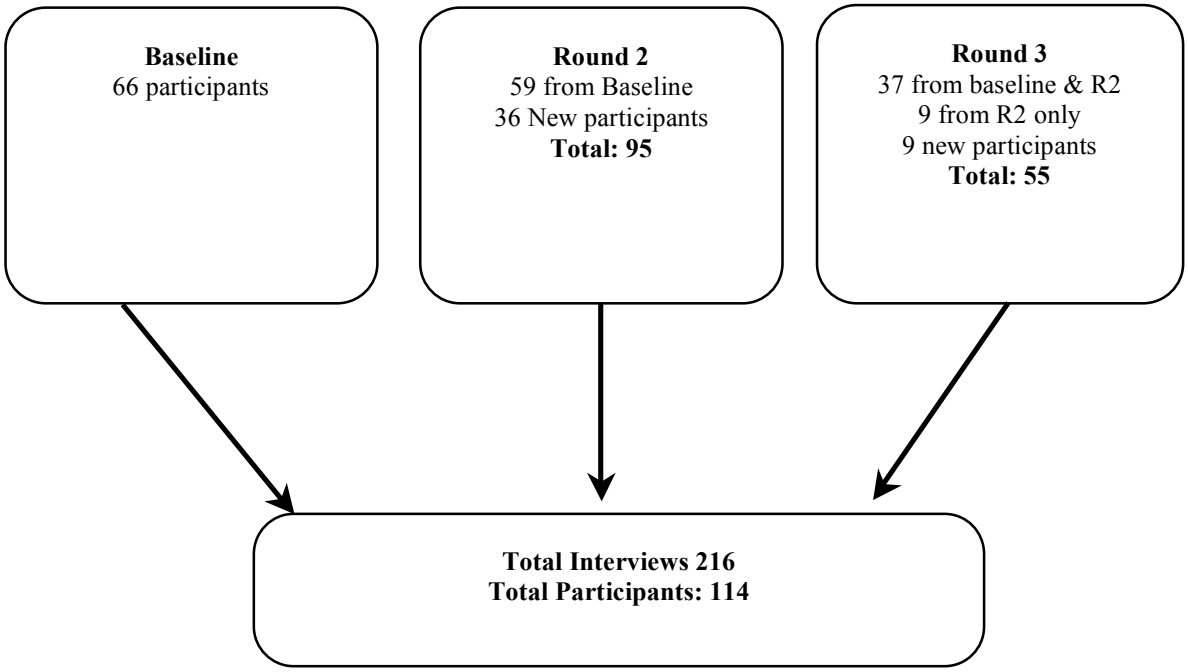

Table 1: Descriptive Statistics--Overall Study Population and Qualitative Study Population

Demographic	Total Population at Baseline (N=2420)	Qualitative Study Population (n=114)	p-value
Female	1221 (50.5)	67 (58.8)	0.07
Age (mean)	26.5 (se: 0.18)	25.7 (se: 0.41)	0.17
Single	500 (21.0)	31 (27.7)	
Married	1501 (63.1)	55 (49.1)	
Living Together	276 (11.6)	16 (14.3)	
Divorced	98 (4.1)	8 (7.1)	
Widowed	4 (0.2)	2 (1.8)	<0.01
No Education	265 (11.1)	12 (10.5)	
Some Primary School	1859 (78.1)	88 (77.2)	
Some Secondary School	254 (10.7)	14 (12.3)	0.99
Muslim	913 (38.4)	50 (44.6)	
Catholic	1037 (43.6)	51 (45.5)	
Other Christian	411 (17.3)	11 (9.8)	0.8
Treatment-High Value	615 (25.4)	37 (32.5)	
Treatment - Low Value	659 (27.3)	42 (36.8)	
Control	1124 (46.5)	34 (29.8)	<0.01
Ever had HIV Test	1266 (53.6)	55 (49.1)	0.34
Chance of having HIV (mean score 1-10)	2.16 (sd: 1.81)	2.18 (sd: 1.87)	0.92
Partner makes decisions about sex	908 (40.6)	49 (47.6)	
Both partners decide equally	603 (27.0)	29 (28.2)	
Respondent decides	719 (32.2)	25 (24.3)	0.181
STI-positive at baseline (any STI)	1051 (43.6)	54 (47.4)	0.41
HIV-positive at baseline	85 (3.5)	6 (5.3)	0.34

Table 2: Among those in the cash award groups, money as a motivator for behavior change

Money Motivates Behavior Change	Men (n=521)	Women (n=534)	p-value
Very Much	252 (48.4)	258 (48.3)	
Somewhat	86 (16.5)	88 (16.5)	
A little	42 (8.1)	57 (10.7)	
None	141 (27.1)	131 (24.5)	0.46
Mean	2.14 (sd: 1.28)	2.11 (sd: 1.25)	0.76

Note: Values of degree that cash was motivating ranged from 1 to 4, 1=very much, 4=none

Table 3: Among those in the cash award groups, money as a motivator for behavior change, by amount of award

Money Motivates Behavior Change	High-value (n=537)	Low-value (n=519)	p-value
Very Much	317 (59.0)	194 (37.4)	
Somewhat	67 (12.5)	107 (20.6)	
A little	38 (7.1)	61 (11.8)	
None	115 (21.4)	157 (30.3)	<0.01
Mean	1.91 (sd: 1.23)	2.35 (sd: 1.26)	<0.01

Note: Values of degree that cash was motivating ranged from 1 to 4, 1=very much, 4=none

Conclusion

This dissertation presents three papers drawing on qualitative and quantitative data from a CCT HIV prevention trial conducted in Tanzania. These three papers result in three separate but related conclusions. In summary, these three conclusions are as follows: First, within the context of the conditional cash transfer trial in Tanzania, perceived risk is an important driver of sexual behavior change. As the level of perceived risk changes for a participant through receipt of HIV test results and repeated STI test results, so does the risk reduction strategy. Exposure to new and unexpected opportunities in the form of receipt of a positive STI test or being eligible for the cash award influences perceived ability to engage in risk reduction behaviors and thus increases the likelihood of reported behavior change.

The second conclusion relates to strategies implemented in an effort to avoid infection, and finds that, a) temporary abstinence, though limited in its effectiveness, appears at least as likely as condom use as a risk reduction strategy; b) certain situations provide increased leverage for sexual negotiation, and these situations serve as a means to opportunistically implement risk reduction strategies; c) the opportunity to learn one's health status, in this context through repeat STI testing, occupies an important space in the repertoire of available risk reduction strategies, and the combination of inconsistent condom use, testing and treatment are sometimes implemented as a three-pronged approach to decreasing risk of infection.

The third paper finds that from the perspective of the participants, the amount of money awarded as part of the CCT was adequate and the timing of the award was appropriate to motivate behavior change. Less clear were the effectiveness of risk reduction strategies implemented in order remain STI-negative and whether or not some participants used the money to engage in more risky behavior, thus offsetting the potential effect of the cash incentive. These data also suggest that the second component of the package, repeat STI testing, counseling and free treatment, were critical motivators of behavior change in both the treatment and control groups of the study.

Synthesizing the findings from the individual papers, we can derive some overarching conclusions. The first of these is the importance of STI and HIV testing and the resulting knowledge of health status in this context. In part, the centrality of testing that emerged so frequently from the data may have been because in the context of the CCT study, participants had a reason to test other than that they might be at risk for infection. Enrollment in the study provided both a structure for testing and payment for testing (the inconvenience fee) and thus endowed participants with a rational, non-stigmatic reason to get tested and an opportunity to know their health status.

Centrality of testing as a risk reduction strategy was also a result of the lack of trust and uncertainty that existed in many of the relationships that participants discussed during their in-depth interviews. The pervasiveness of extramarital sex, the aversion to condom use, especially within marriage, and the reluctance to discuss both of these issues with partners contribute to this uncertainty and lack of trust. Testing and having a partner tested served as a means to bring a bit more certainty into these relationships, and in some cases as a means to build trust between partners. Test results also provided a starting point from which to move forward. If participants were uninfected and healthy, they discussed wanting to protect themselves and invest in their own health going forward to the best of their ability. If infected (with an STI) participants discussed the desire to treat the infection, then protect and invest in their health going forward. While the role of condoms, partner reduction and abstinence need not be abandoned as HIV prevention

strategies, these results suggest that more efforts need to be made to increase effective implementation of these strategies. One such approach might be to build trusting sexual relationships where frequent partner testing for STIs is a component of a healthy committed relationship

The second overarching conclusion relates to the importance of the finding that participants often seized on opportunities that gave them increased ability or leverage to change their own or their partner's sexual behavior. This finding supports previous research indicating that Africans are actively trying to reduce their risk—the problem is not lack of knowledge or low initiative, rather that the tools and opportunities to use the knowledge are not always available. Repeat STI testing and receipt of the cash (for those in the intervention group) in the context of the CCT study served as examples of these tools and opportunities. If new and unexpected opportunities are revising the perceived ability of participants to change behavior attention should be turned to 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.

The third conclusion is that two of the results discussed in the three papers—the importance of testing and the indication from the quantitative data that the cash incentive did not predict reported behavior change--beg the question of the effectiveness of the cash as an incentive as compared to the effect of receipt of the cash. It could be that the incentive piece may not be effective in motivating behavior change, but that having the cash in hand could be helpful, especially for women who rely heavily on their relationships with men for economic survival. In the quantitative analysis, because we only analyzed data from baseline and Round 2, we were unable to examine the effect of receipt of the cash, only the effect of the promise of the cash. It did come through in the qualitative data as we were able to use data through Round 3 of the study, after the participants had received cash at Round 2 and had four months to understand how receipt of the cash changed things for them. What emerged was that the money was helpful for some women to leave partners and start a small business on their own, selling vegetables, for example. The inconvenience fee was even enough in some cases for women to make a change in their lives. It is possible that the receipt of the cash could be more influential for women because their life goals are simply more modest—starting a small vegetable business compared to, for example, supporting a family or building a home or buying land for farming for men.

Finally, the results from the three papers suggest areas that need further research and help to guide discussions relating to scale-up of a CCT program if proven effective, and of structural interventions generally. The political feasibility of scaling up a cash incentive for avoiding unsafe sex needs to be assessed, and questions of sustainability and of whether a country like Tanzania could support such a program infrastructurally or financially should be addressed. If the cash incentive did not have an independent effect, but it is clear that the intervention package as a whole (cash, repeat STI testing, counseling) did decrease STI prevalence, then a scaled-up version of the intervention package might include only the repeat testing, counseling and treatment intervention. Significantly, the results from these papers raise the potential that, even if the cash incentive did have a marginal effect over that of the repeat STI testing, it may be that the STI testing is the dominant driver of change and therefore adding the cash incentive component to the intervention package upon scale-up would not be cost effective. Given the political feasibility issues, if the cash incentive is only marginally beneficial, it might make sense to exclude the cash component from the intervention package, and focus on the repeat testing, counseling and treatment. It could be that the results of the RESPECT study show through both the qualitative and quantitative data that an intervention package including repeat testing plus counseling alone, is all things considered, a better package than one that includes the cash incentive. If testing occu-

pies an important space as a risk reduction strategy as indicated by these data, then such an intervention would also potentially address the trust and uncertainty issues that exist in many sexual relationships in this context, and at the same time, provide opportunities for increased leverage (even if temporary) and thus increased ability to change sexual behavior or convince a partner to change his or her behavior.