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**Money, Sex, and Power: An Analysis of Relationship Power in the Context of
Conditional Cash Transfer Interventions to Reduce Risky Sex in Tanzania**

By

JAN ERLANDA COOPER

A dissertation submitted in partial satisfaction of the
requirements for the degree of
Doctor of Philosophy
in
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in the
Graduate Division
of the
University of California, Berkeley

Committee in charge:
Professor Lia C.H. Fernald, Chair
Professor Ann C. Keller
Professor Sandra I. McCoy
Professor Emily J. Ozer

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Abstract

Money, Sex, and Power: An Analysis of Relationship Power in the Context of Conditional Cash Transfer Interventions to Reduce Risky Sex in Tanzania

By
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Doctor of Philosophy in Health Services and Policy Analysis

University of California, Berkeley

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The success of Conditional Cash Transfer (CCTs) program in several health and social domains has led to recent experiments testing CCTs for sexual and reproductive health. However, this approach has yielded mixed results and has been understudied. My dissertation explores whether sexual relationship power - the power women have to decide if and when to have sex, with whom, and with or without a condom - influences the effectiveness of CCTs to reduce STIs, and additionally, if these CCTs influence relationship power. If we can answer these questions, researchers will be better able to design CCT interventions to reduce the spread of STIs and HIV.

My overall hypotheses are: (1) CCTs given to women with high baseline relationship power are more effective at reducing STIs than CCTs given to women with low baseline relationship power (Chapter 1); and (2) that the CCT itself changes the relationship power of those enrolled in the intervention (Chapter 2). A relevant example of women's power to negotiate safer sex is female sex workers' interactions with their clients. Therefore, in chapter 3, I draw on theoretical models and previous literature related to the determinants of safer sex among commercial sex workers to analyze qualitatively how Female Sex Workers (FSWs) respond to a novel pilot study using CCTs to incentivize safe sex (Chapter 3).

To test these hypotheses, I conducted three studies: The first explores the effect modification of baseline relationship power on the impact of CCTs to reduce STIs; the second is an intent-to-treat analysis of the effect of the CCT on relationship power; and the third is a qualitative analysis of how female sex workers respond to a pilot CCT intervention to incentivize safe sex. Chapters 1 and 2 draw on data from the RESPECT study in Tanzania and Chapter 3 draws on data from the RESPECT II Pilot study to reduce STIs and HIV among female sex workers in Tanzania.

My analysis reveals that women's relationship power significantly modifies the effect of the CCT on STIs. In addition, I show that a CCT improved women's relationship power, but whether or not women were eligible to receive a high, low, or no cash transfer had little relative impact on changes in their relationship power. Finally, I identify the salient domains of power for female sex workers that are necessary to meet the conditions of a CCT intervention.

Taken together, acknowledging and addressing both the degrees of relationship power and domains of relationship power that women experience when enrolled in a CCT will improve the outcomes of these interventions in the context of STIs and HIV.

Acknowledgements

I gratefully acknowledge the Tanzanian women and men who gave their time to participate in the RESPECT study and the women who participated in the RESPECT II pilot study.

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Many thanks to Will Dow and Damien de Walque for their support and the opportunity to be part of the RESPECT II study team, and to Ray Catalano for his encouragement throughout my time in the Health Services and Policy Analysis program.

I have been fortunate to be among a wonderful group of doctoral students who made my time in the Health Services and Policy Analysis program both enriching and enjoyable.

There are no words to express my gratitude for my family. To honour my parents, Linda and Ellis, I will devote myself to the pursuit of intellectual curiosity, rigorous work, joy, and the wellbeing of the world around me.

"What do we live for, if it is not to make life less difficult for each other?"
- George Eliot (Middlemarch)

I dedicate the work of my dissertation to my sister,
Hannah

INTRODUCTION

Researchers have known for years that HIV and STIs are spread through sexual contact and the exchange of body fluids. Consequently, HIV prevention campaigns have encouraged the use of condoms, abstaining from sex, and avoiding multiple concurrent partners. Unfortunately, these campaigns have had little effect on changing risky sexual behaviors and the HIV epidemic continues to spread. A closer look at the HIV epidemic reveals two critical social determinants of the spread of the disease: poverty and women's negotiation power in their sexual relationships.¹ Therefore, we need newer approaches to prevent STIs and HIV that address these structural determinants of poverty and gender inequity in relationships; targeting existing anti-poverty and gender-equity programs to HIV hold promise. Poverty alleviation programs take the form of unconditional cash transfers (gifts) or microcredit programs (loans), while gender equity programs aim to increase a woman's decision-making and control within her social and sexual relationships. In my dissertation, I examine the interplay between women's relationship power and two conditional cash transfer interventions to reduce STIs and HIV in Tanzania.

The HIV epidemic continues to affect largely those living in poverty and in the world's poorest countries. In particular, women living in poverty face hard challenges when trying to avoid contracting HIV by negotiating safer sex. This has led some to investigate Conditional Cash Transfers (CCTs), shown to be effective in other health and social domains, as incentives to reduce risky sexual behaviors. However, these experiments report mixed results; why these studies yield mixed results remains unanswered. Several studies, reviewed in the following chapters, explore the influences of cash or lack of cash (poverty) on risky sexual behavior, while other research shows the correlation between relationship power and risky sexual behavior. Importantly, there is some evidence that the receipt and control of cash affects relationship power;^{2,3} but surprisingly, the synergistic impact of these dynamics in the context of CCTs designed to reduce risky sexual behavior has not yet been analyzed.

My dissertation explores whether sexual relationship power - the power women have to decide if and when to have sex, with whom, and with or without a condom - influences the effectiveness of CCTs to reduce STIs, and additionally, if these CCTs influence relationship power. If we can answer these questions, researchers will be able to more effectively design and target CCT interventions to reduce the spread of STIs and HIV. My overall hypotheses are: (1) CCTs given to women with high baseline relationship power are more effective at reducing STIs than CCTs given to women with low baseline relationship power (Chapter 1); and (2) that the CCT itself changes the relationship power of those enrolled in the intervention (Chapter 2). A relevant example of women's power to negotiate safer sex is female sex workers' interactions with their clients. Therefore, in Chapter 3, I draw on theoretical models and previous literature related to the determinants of safer sex among commercial sex workers to analyze qualitatively how Female Sex Workers (FSWs) respond to a novel pilot study using CCTs to incentivize safe sex (Chapter 3). To test these hypotheses, I conducted three studies: The first explores the effect modification of baseline relationship power on the impact of CCTs to reduce STIs; the second is an intent-to-treat analysis of the effect of the CCT on relationship power; and the third is a qualitative analysis of how female sex workers respond to a pilot CCT intervention to incentivize safe sex. Chapters 1 and 2 draw on data from the RESPECT study in Tanzania and Chapter 3 draws on data from the RESPECT II Pilot study to reduce STIs and HIV among female sex workers in Tanzania.

The RESPECT Study in Tanzania

The RESPECT study in Tanzania, a study designed to reduce STIs and HIV using CCTs, and the focus of chapters 1 and 2 of my dissertation, randomized 2400 men and women to one of 3 groups as follows: eligible for \$60 over 1 year, eligible for \$30 over 1 year, or control group receiving no incentive. Participants were tested for STIs three times over the course of one year. Importantly, after one year, 9% of those eligible for the \$60 incentive had an STI compared to 12% among the control group.⁴ While the RESPECT study reduced STIs after one year, the incentive did not have a significant effect on STI incidence at the 4- or 8- month study visits, nor was there a significant difference between STI incidence among those in the low-award arm compared to the control group.

Chapter 1: Determine whether women's baseline relationship-power modifies changes in STI rates in a CCT to reduce STIs.

This chapter explores the effect of a CCT to incentivize safe sex on STI outcomes, stratified by women's baseline relationship power. Specifically, my secondary analysis uses the same dataset used by de Walque et al. for the RESPECT study and examines the modifying effect of baseline relationship power on the CCT-STI relationship after one year in the CCT study by analyzing the additional, combined effect of relationship power and randomization status on STI rates at month 12. I am testing the hypothesis that CCTs given to women with high baseline relationship power are more effective at reducing STIs than CCTs given to women with low baseline relationship power.

Chapter 2: Determine the effect of the CCT on women's relationship power.

This chapter examines the effect of being randomized in the CCT on women's relationship power. Specifically, I conduct an intent-to-treat analysis using randomization status to test the effect of the RESPECT CCT study on women's relationship power using a differences-in-difference estimation approach. I test the hypothesis that there is a dose-response relationship between incentive level and relationship power, where larger incentives confer greater increases in relationship power.

The RESPECT II Pilot Study in Tanzania

In Sub-Saharan Africa, as elsewhere, commercial sex workers have the highest prevalence of STIs and HIV and are seen to be a core population in the transmission of STIs and HIV to the larger population.⁵ Therefore, reducing infection rates among commercial sex workers is an important part of reducing STIs and HIV. Since commercial sex workers are economically motivated, it seems plausible that the offer of a CCT should change risky behaviors. However, even without a CCT, commercial sex workers face a strong economic incentive to remain infection-free: having a visible STI is bad for business. And yet, STI rates among commercial sex workers remain high. These high rates of STIs, driven by commercial sex worker's inability to insist on condom use, are attributed to economic forces and client preferences, the use of alcohol and drugs among the CSWs and their clients, violence from clients, and social norms among the peer networks.

Therefore, drawing on the lessons learned from the RESPECT study, we designed a pilot investigation using CCTs to reduce STIs and HIV among 100 female sex workers in Dar es Salaam. Preliminary results from the pilot indicate that the CCT was effective in reducing STIs in this population. In-depth interviews with 20 of the 100 women enrolled in the pilot suggest

that participating in the CCT intervention changed risky sexual behaviors with clients through both economic and non-economic pathways.

Chapter 3: Qualitative Analysis of Female Sex Workers enrolled in the RESPECT II Pilot study in Dar es Salaam, Tanzania.

Understanding what motivates people in this complex interplay between economic factors (cash incentives) and health (STI reduction) can be enriched using qualitative analysis. Therefore, my overall goal in chapter 3 is to explore how female sex workers respond to a CCT to reduce STIs. I conducted a qualitative analysis of the completed in-depth interviews of the 17 participants administered at the 4-month follow-up visit of the RESPECT II Pilot study. I explored the pathways through which the conditional cash transfer worked. The primary focus of my analysis in chapter 3 is relationship power of female sex worker in the intervention. Specifically, I explore how their power with clients could have influenced the effect of the pilot intervention, or how the pilot intervention might have influenced female sex worker power with their clients.

Anticipated Contribution

My research will add to the emerging field of applying CCTs to reduce STIs and HIV in the regions most affected by the epidemic. I highlight the role of one pathway not yet explored: women's sexual relationship power. Taken together, ideally my work will help improve the targeting and implementation of conditional incentives to promote safer sex.

CHAPTER 1

Women's relationship power modifies the effect of a conditional cash transfer intervention to reduce risky sex in Tanzania

Abstract

Background

Recent experiments have tested the use of conditional cash transfer interventions (CCTs) to reduce the spread of STIs and HIV. However, there are often a complex set of determinants that shape the risky behaviors that lead to the transmission of STIs and HIV. For instance, while some women are able to negotiate safer sex with their partners, many other women have limited control over whether they have protected, safer sex. By conditioning the cash on negative STI tests, these CCT experiments might be predicating the condition on an outcome over which some women have very little control. Some CCT experiments did not reduce STI incidence, while other experiments using CCTs have reduced STI incidence. The RESPECT study in Tanzania, the focus of this analysis, has determined that participants randomized to the high-value CCT had a 12% reduction in new STIs compared to the other participants in the study. Yet, research has shown that women with higher relationship power are better at avoiding new STIs compared to women with low relationship power. Therefore, our purpose is to determine if CCTs given to women with high baseline relationship power are more effective at reducing STIs than CCTs given to women with low baseline relationship power.

Methods

We used logistic regression to report the odds ratios of having an STI at 12 months for each study arm to test our hypothesis that baseline relationship power modified the effect of randomization status on STI incidence in the RESPECT study

Results

We found that for women with high relationship power, randomization status influenced the odds of having an STI, where women in the high cash arm had decreased odds of testing positive for an STI and women in the low cash transfer arm had increased odds of testing positive for an STI.

Discussion

Taken together, we find that relationship power modifies the effect of the CCT on STI incidence for women in the RESPECT study. Designing new CCT interventions that account for the range of control that women have in their intimate relationships could be a promising approach to improve the effectiveness of CCTs to reduce STIs and HIV.

Introduction

There are numerous studies on anti-poverty programs that give or loan cash to the poor. Most programs share the goal of breaking the cycle of poverty by providing small amounts of cash for individuals or households to meet the immediate constraints of poverty as well as provide capital to start an income-generating activity.⁶ These anti-poverty, cash-transfer programs come in a variety of forms and are implemented in a variety of ways. For example, Unconditional Cash Transfer (UCT) programs give cash directly to the poor, usually based on specific inclusion criteria such as poverty level, orphaned or vulnerable children within the household, or if the head of the household is female. Conditional Cash Transfer (CCT) programs are more complex since participants must meet the conditions attached to the cash in order to receive it. Conditional incentives have been successful in targeting a variety of health behaviors for early childhood

health, nutrition, maternal and child health, smoking cessation and drug addiction.^{7 8} This has led to a growing interest in using CCTs for other health behaviors, including risky behaviors that lead to the spread of STIs and HIV.

Little is known about the relevance of CCTs in targeting other types of sexual and reproductive health behaviors, including sexual debut, risky sex, selection of sexual partners, and condom negotiation, and the pathways through which CCTs can work to produce sustained reductions in risky behavior have not yet been established. Recent experiments have tested the use of CCTs to reduce the spread of STIs and HIV. Researchers have tried different methods to pinpoint the most efficacious use of CCTs in this context. For example, some CCT interventions have conditioned the cash on the upstream determinants of STIs and HIV such as education where beneficiaries receive the cash transfer when they remain in school. In Malawi, Baird and colleagues found that compared to a control group, girls randomized to receive either the conditional or unconditional cash reported a decrease in relationships with older partners and a decrease in coital frequency and the unconditional cash group had fewer pregnancies in the short term; however, there was no difference among the cash transfer groups and the control group in reported use of condoms.⁹ Importantly, for girls in school at baseline, these effects disappeared 2 years after the intervention was completed, yet girls who had dropped out of school at baseline had lower rates of marriage and fertility 2 years after the intervention was completed.¹⁰ In South Africa, two recent interventions provided cash transfers conditional on school attendance or grades.^{11 12} While neither intervention reduced HIV, one did find a 30% lower HSV-2 incidence for both boys and girls randomized to receive a conditional cash incentive compared to boys and girls randomized to the no-incentive, control group. Furthermore, boys in conditional cash incentive group had a 40% reduction in HSV-2 incidence and girls in conditional cash incentive group had a 24% reduction in HSV-2 incidence compared to children in the no-cash control group, based on analysis of matched-pairs of schools, not individual students.¹²

Other CCT interventions have conditioned the cash on downstream indicators - negative STIs and HIV tests. For instance, an intervention in Malawi randomized participants to receive amounts ranging from no cash to an equivalent of about 4-month's pay which participants received for remaining HIV-negative for 1 year and found there was no difference in reported risky behaviors based on the amount of money participants were eligible to receive.¹³ On the other hand, an intervention in Lesotho randomized participant to receive a lottery ticket of approximately 50\$ or \$100 every 4 months when they tested negative for STIs and HIV, revealed a decrease in STI incidence by 21.4% over two years.¹⁴

In the RESPECT study in Tanzania, the focus of this analysis, participants were randomized to three study arms: T1) the control group, T2) a low-value cash transfer arm or T3) a high-value cash transfer arm. Those in the cash transfer arms (T2 and T3) received the incentive when they tested negative for STIs and HIV. After 12-months, those randomized to the high-value cash transfer arm (T3) had a 9% STI incidence compared to a 12% incidence in the low-value cash transfer arm and the control group, which was significant at the 5% level. There was no difference in STI incidence between the low-award group and the control group at 12 months (T2 v. T1).⁴

STIs and HIV transmission is shaped by a variety of proximate and social determinants.¹⁵ One such social determinant is a woman's sexual relationship power, that is, the power to decide when to have sex, with whom, and whether or not her partner will use a condom. While some women are able to negotiate safer sex with their partners, many other women have limited control over their intimate, sexual relationships.^{16 17} Women with higher relationship power are

better able to avoid new STIs through condom use and other modern contraceptives compared to women with low relationship power.^{18 19} Also, a study in Tanzania demonstrated a correlation for women of being HIV positive and intra-partner violence, an extreme example of a woman's lack of power.²⁰

Taken together, it is possible that interventions that condition the cash on negative STI tests might be basing the condition on an outcome over which some women have very little control. The main analysis for the RESPECT study found an effect of randomization status on STIs when men and women were analyzed together, but did not find an effect when men and women were analyzed separately⁴. Given this, here our purpose is to analyze the data from the RESPECT study to determine if CCTs given to women with high baseline relationship power are more effective at reducing STIs than CCTs given to women with low baseline relationship power.

Methods:

The conceptual framework for our analysis is shown in Figure 1. We draw on the Proximate Determinants Framework¹⁵ and the Theory of Gender and Power¹⁷ to outline the sequence of factors and specific proximate determinants (partner choice, coital frequency, and condoms) that leads to STI incidence.

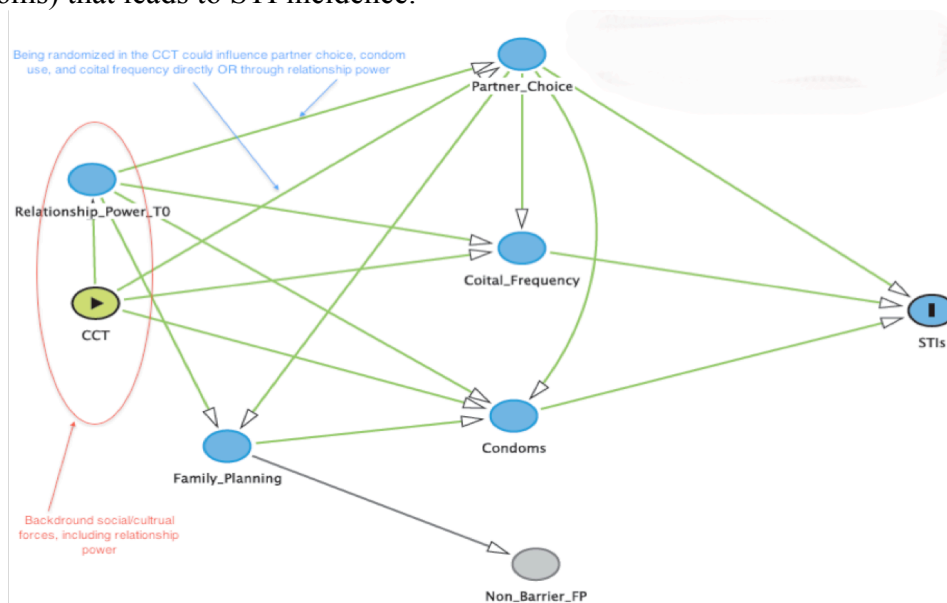


Figure 1 Conceptual Framework for Aim 1: Determine whether the effect of CCTs on STI incidence differs by a woman's baseline level of relationship power.

We highlight these proximate determinants as the 3 loci where both the CCT and baseline relationship power could reduce STIs.

Study Overview:

The present study is a secondary analysis of data from the Rewarding STI Prevention and Control in Tanzania (RESPECT) Study, a year-long intervention conducted in 10 randomly-selected villages in the Kilombero/Ulunda districts in South-Western Tanzania (methods described previously).⁴ We analyzed data from the women enrolled in the intervention to

estimate whether baseline relationship power modified the effect the CCT has on STI outcomes at month 12.

Intervention – The RESPECT Study:

The RESPECT study recruited young men and women aged 18-25 into the study and who were randomized at the individual level to either a no-cash control group (T1), a low-cash award group (T2), or a high-cash award group (T3). Participants were single, married, living in a union as if married, divorced, or widowed. Married couples and those living in a union as if married were enrolled together to the same randomization group, but each partner received the cash transfer individually based on their STI results. The low-cash (T2) and high-cash (T3) groups were eligible to receive a cash award if they tested negative for STIs at every study visit: the low-cash group (T2) could receive 10.00 USD and the high-cash group (T3) could receive 20.00 USD each time, for a total of 30.00USD or 60.00USD over the year, respectively. These amounts were chosen based on focus group discussions prior to the start of the study to identify amounts large enough to incentivize behavior change and be scalable, but not large enough to increase the risk of coercion; the low award represented approximately 5% of the average Tanzanian income and the high award represented approximately 10% of the average Tanzania income. Those in the control group did not receive a cash transfer. Participants were tested for STIs 4 times over the course of one year (baseline and month 4, 8, 12) and received the cash transfer at each study visit (excluding the baseline visit), conditional on testing negative 7 STIs. Those randomized to either of the two award arms (high award & low award) had 3 opportunities to receive the cash transfer (at months 4,8, and 12). Those who had a STI at one study round and did not receive the cash transfer were still eligible to receive the cash at subsequent rounds. Participants could also take part in monthly group counseling sessions in each village that focused on relationship-skills training based on the Stepping Stones curriculum.²¹

Study Population:

Participants in our analysis were all women enrolled in the RESPECT study. While the age of inclusion in the RESPECT study was 18-30 years old, individuals who had a partner under 18 years old but over 16, or partners older than 30 were eligible to participate. Thus, women in the RESPECT study were between 17 – 38 years old. All women resided in 1 of the 10 study villages where the RESPECT study was carried out. A total of 988 women were included in our analysis from the 1,204 women analyzed in the RESPECT intervention. We excluded women who were missing STI results at month 12 or who were missing data about relationship power. Participants who did not attend the 12 month study visit were coded as missing and dropped from the analysis. The RESPECT study was designed with the statistical power to do a subgroup analysis by gender to detect differences in STIs incidence in the cash transfer arms compared to the control group when STI incidence was assumed to be 20%.

Data Collection:

At every study visit, participants completed questionnaires about demographic characteristics, socio-economic status, sexual behavior, spending and savings, sexual partners, sexual relationship power, intra-relationship power, intra-partner violence, and depression, and had individual pre- and post-test counseling in accordance with Tanzanian guidelines. Participants were screened for chlamydia, gonorrhea, trichomonas and *M genitalium*, at every study round. Screening for HIV, Herpes simplex virus 2, and syphilis was conducted baseline and month 12.

Outcomes:

The outcome of interest is STI incidence at month 12. STIs were tested by nucleic acid amplification (NAAT) and serology. We use a combined measure for any STI (tested by NAAT or serology) at month 12 as the primary outcome for our analysis. Participants testing positive for a STI at earlier study rounds but who were cured at the 12 month study visit were counted as negative for a STI.

Measurement of Relationship Power:

Relationship power was measured at baseline with a subset of 6 questions from the Sexual Relationship Power Scale, a validated scale measuring sexual decision-making and control in relationships.²² Eight relationship power questions were asked (which represented only part of the scale) and we therefore used Principle Components Analysis (PCA), a data-reduction technique for isolating individual factors from multiple, interconnected factors, to reduce 6 sexual-relationship power questions into one factor, whereby higher scores reflected higher power. The six questions included in our measure of relationship power asked about whether: the respondent had power to use condoms; a partner would be angry if asked to use condoms; the respondent must always do what her partner wanted; if she was not allowed to wear certain things; if her partner always had to know where she was; and who had the overall power in the relationships. We dropped one question about the power to decide when to have sex, and one question about whether a partner would become violent if asked to use a condom because these questions yielded cells with a N of 0 in the correlation matrix, indicating that they did not add any additional information. Our composite measure of relationship power had a mean value of 0.4, and a range from -0.04 – 0.96. We created a dichotomous variable for relationship power where high relationship power refers to the respondents with the top 25% scores and low relationship power refers to the respondents with the bottom 75% scores (Appendix 1).

Statistical Methods:

We analyzed all women included in the RESPECT intervention according to their randomization status. We reported sample means at baseline for all variables included in our analysis. We used logistic regression to report the odds ratios of having a STI at 12 months for each study arm and empowerment group to test our hypothesis that baseline relationship power modified the effect of study arm on STI incidence. To test our hypothesis we first estimated the effect of study arm on STI incidence:

$$(1) STI\ positive = \beta_0 + \beta_1\ high\ cash\ arm + \beta_2\ low\ cash\ arm + \varepsilon$$

Next, we included a measure of relationship power in our model:

$$(2) STI\ positive = \beta_0 + \beta_1\ high\ cash\ arm + \beta_2\ low\ cash\ arm + \beta_3\ high\ relationship\ power + \varepsilon$$

Here, we assessed the explanatory power of relationship power using a Wald test for the β_3 term.

Finally, to assess whether the effect of study arm of STI incidence is modified by relationship power we used the following model:

High cash arm:

$$(3.a) STI\ positive = \beta_0 + \beta_1\ high\ cash\ arm + \beta_2\ relationship\ power + \beta_3\ high\ cash\ arm \times high\ relationship\ power + \varepsilon$$

Low cash arm:

(3.b) $STI\ positive = \beta_0 + \beta_1 \text{ low cash arm} + \beta_2 \text{ relationship power} + \beta_3 \text{ low cash arm} \times \text{high relationship power} + \varepsilon$

We estimated an unadjusted model and an adjusted model accounting for age, education, marital status, self-ranked SES status, income and baseline STI status. We included the term for the interaction between randomization arm and baseline relationship power to test our research question about the effect heterogeneity of relationship power level on the effect of the cash transfer on STI incidence. In addition, we use a Wald test to determine the additional explanatory power of the β_3 interaction term, where a statistically significant test indicates that including the interaction term in the model is a better fit of the data. To interpret the β_3 term and assess STI incidence according to randomization arm for women with high relationship power compared to women with low relationship power, we conducted a post-hoc estimation of effect size using the `lincom` command in Stata v11.2 to calculate the exponentiated value of $(\beta_1 + \beta_3)$, that is, the odds of testing STI positive for women with high relationship power in the analyzed study arm compared to the odds of testing STI positive for women with low relationship power in the analyzed study arm (β_1). We clustered standard errors at the sub-village level to account for the probability of selection into the intervention and the possible correlation between women at the sub-village level. All statistical analyses were performed using Stata v. 11.2 (Stata Corp).

Results

Descriptive Characteristics

A total of 988 women were included in the analysis. Baseline data for the demographic variables included in the analysis (table 1) shows a balanced distribution across study arms. Most participants had primary education or less and were married at baseline. About half of the participants ranked themselves as low socioeconomic status.

Table 1 Summary Statistics at baseline by intervention arm of women in the RESPECT Intervention in the Kilombero/Ulanga District of Tanzania from 2009 to 2010

	(1) Control	(2) High-value CCT	(3) Low-value CCT	P
Age	25.62 (3.765)	26.25 (3.50)	26.05 (3.75)	0.43
Education				
None	76 (16.63%)	35 (13.67%)	50 (18.18%)	0.33
Primary	352 (77.02%)	205 (80.08%)	205 (74.55%)	0.32
Secondary	29 (6.35%)	16 (6.25%)	20 (7.27%)	0.86
Married	379 (89.93%)	221 (86.33%)	221 (80.36%)	0.26
Low SES	222 (48.58%)	140 (54.69%)	152 (55.27%)	0.13
Chlamydia	9 (1.97%)	8 (3.13%)	8 (2.91%)	0.57
Gonorrhoea	4 (0.88%)	6 (2.34%)	4 (1.45%)	0.27
Trichomonas	64 (14.00%)	46 (17.97%)	41 (14.91%)	0.36
Herpes simplex virus 2	194 (42.45%)	119 (46.48%)	119 (34.27%)	0.57
Syphilis	5 (1.09%)	3 (1.17%)	5 (1.82%)	0.69
HIV	20 (4.38%)	7 (2.73%)	12 (4.36%)	0.51
High Relationship Power (Top 25%)	115 (25.16%)	77 (30.07%)	68 (24.72%)	0.28
N	457	256	275	

Data are presented in n (%) or means (SD)

Low SES refers to self-reported position on the lowest two categories on a socioeconomic scale from 1-7

P refers to the p-value calculated by one-way ANOVA or Pearson's chi-square test between the control group, the high-value CCT

Logistic Regression Results

Table 2 presents odds ratios of testing positive for a STI at month 12 among women in the high-value CCT arm (T3), estimated by an unadjusted model and an adjusted model that included demographic control variables. Women in the high-value CCT arm (T3) with high relationship power had reduced odds of having a STI at month 12, and the interaction between randomization arm (T3) and relationship power was significant in the adjusted model at the 0.1 level (unadjusted OR 0.772; 0.35 – 1.70, 95% CI, p= 0.512; adjusted OR 0.411; 0.15 – 1.15, 95% CI p= 0.09). The Wald test for the interaction term between randomization arm and relationship power was statistically significant in the adjusted model. Therefore, we rejected the null hypothesis that the interaction between randomization arm and relationship power equals zero and concluded that including the term in the model was a statistically significant better fit

Table 2 Odds ratios for having a STI at month 12 calculated from logistic regression for women in RESPECT CCT study randomized to the high-value CCT arm.

	Basic Model		Basic Model With Relationship Power		Interaction Model	
	Unadjusted	Adjusted	Unadjusted	Adjusted	Unadjusted	Adjusted
High-value CCT	0.946 (0.161)	0.937 (0.196)	0.952 (0.163)	0.952 (0.199)	1.02 (0.202)	1.178 (0.281)
High Relationship Power Group			0.870 (0.150)	0.744 (0.156)	0.933 (0.187)	0.938 (0.226)
High-value CCT * High relationship power group					0.772 (0.301)	0.411* (0.207)
Wald Test Prob>F			0.65 0.425	1.97 0.1699	0.44 0.5119	3.11 0.0879
Observations	988	883	988	883	988	883

Robust standard errors in parentheses clustered at the sub-village level

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

Adjusted odds ratios calculated from logistic regression models controlling for education, age, marital status, income, socioeconomic status, subvillage and baseline STIs

STIs tested by NAAT: Chlamydia, gonorrhoea, trichomonas, Mycoplasma genitalium.

STIs tested by serology: HIV, herpes simplex virus 2, syphilis.

Table 3 presents the odds ratios of testing positive for a STI at month 12 among women in the low-value CCT arm (T2), estimated by an unadjusted model and an adjusted model that included demographic controls. Women in the low-value CCT arm (T2) with high relationship power had an increased odds of testing positive for a STI at month 12, and the interaction between randomization arm (T2) and relationship power was significant in the adjusted model at the 0.05 level (unadjusted OR 1.249; 0.57 – 2.71, 95% CI, p= 0.57; adjusted OR 2.695; 1.03 – 7.05, 95% CI, p= 0.04). The Wald test for the interaction between randomization arm (T2) and relationship power was not statistically significant. We were therefore unable to reject the null hypothesis that the unadjusted models were a statistically significant better fit if the relationship power parameter or the interaction parameter equaled zero.

Table 3 Odds ratios for having a STI at month 12 calculated from logistic regression for women in RESPECT CCT study randomized to the low-value CCT arm.

	Basic Model		Basic Model With Relationship Power		Interaction Model	
	Unadjusted	Adjusted	Unadjusted	Adjusted	Unadjusted	Adjusted
Low-value CCT	1.041 (0.171)	1.059 (0.209)	1.038 (0.171)	1.053 (0.208)	0.983 (0.187)	0.832 (0.184)
High Relationship Power Group			0.868 (0.150)	0.743 (0.156)	0.817 (0.166)	0.555** (0.141)
Low-value CCT * High relationship power group					1.249 (0.478)	2.695** (1.270)
Wald Test Prob>F			0.67 0.4189	2.01 0.1661	0.34 0.5659	4.43 0.5659
Observations	988	883	988	883	988	883

Robust standard errors in parentheses clustered at the sub-village level

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

Adjusted odds ratios calculated from logistic regression models controlling for education, age, marital status, income, socioeconomic status, subvillage and baseline STIs

STIs tested by NAAT: Chlamydia, gonorrhoea, trichomonas, Mycoplasma genitalium.

STIs tested by serology: HIV, herpes simplex virus 2, syphilis.

To interpret the interaction term, we calculated the effect of study arm on STI incidence at month 12, stratified by the high relationship power group and the low relationship power group (Table 4). Both the unadjusted and adjusted OR estimates indicate that for women with high relationship power, study arm influences the odds of having a STI, where women in the high cash arm (T3) have lower odds of testing positive for a STI and women in the low cash transfer arm (T2) have higher odds of testing positive for a STI. For women with low relationship power, those in the high cash transfer arm (T3) and low cash transfer arm (T2) had similar odds of a STI at month 12; unadjusted estimates for women with low relationship power in the high cash transfer arm (T3) were OR 1.02 (0.68 – 1.52, 95% CI, p= 0.92) and adjusted estimates OR 1.18 (0.82 – 1.92, 95%, p= 0.5) and unadjusted estimates for women with low relationship power in the low cash transfer arm (T2) were OR 0.98 (0.67 – 1.45, 95% CI, p=0.93) and adjusted estimates were OR 0.83 (0.53 – 1.31, 95% CI, p=0.41). However, for women with high relationship power, those in the high value cash transfer arm (T3) had a reduced odds a STI at month 12, while those in the low value cash transfer arm (T2) had an elevated odds of a STI at month 12: unadjusted estimates for women with high relationship power in the high value cash transfer arm (T3) were OR 0.79 (0.40 – 1.56, 95% CI, p > 0.48) and adjusted estimates were OR 0.48 (0.20 – 1.20, 95% CI, p > 0.11) and unadjusted estimates for women with high relationship power in the low value cash transfer arm (T2) were OR 1.23 (0.63 – 2.40, 95% CI, p= 0.57) and adjusted estimates were OR 2.24 (0.95 – 5.30 CI, p= 0.07) (Figure 1).

Table 4 Adjusted outcomes: Odds ratios for STI outcomes calculated from logistic regression for women in RESPECT CCT study, stratified by relationship power and controlling for education, age, marital status, income, socioeconomic status, subvillage and baseline STIs.

Intervention arm	No. of women	Unadjusted ORs, 95% CI in parenthesis	Adjusted ORs, 95% CI in parenthesis
Any STI			
Women with low baseline relationship power			
High value CCT	179	1.02 (0.68 – 1.52) p= 0.92	1.18 (0.72 – 1.92) p= 0.5
Low value CCT	209	0.98 (0.67 – 1.45) p= 0.93	0.83 (0.53 – 1.31) p= 0.41
Women with high baseline relationship power			
High value CCT	77	0.79 (0.40 -1.56) p= 0.48	0.48 (0.20 – 1.20) p= 0.11
Low value CCT	68	1.23 (0.63 – 2.40) p > 0.57	2.24* (0.95 – 5.30) p= 0.07

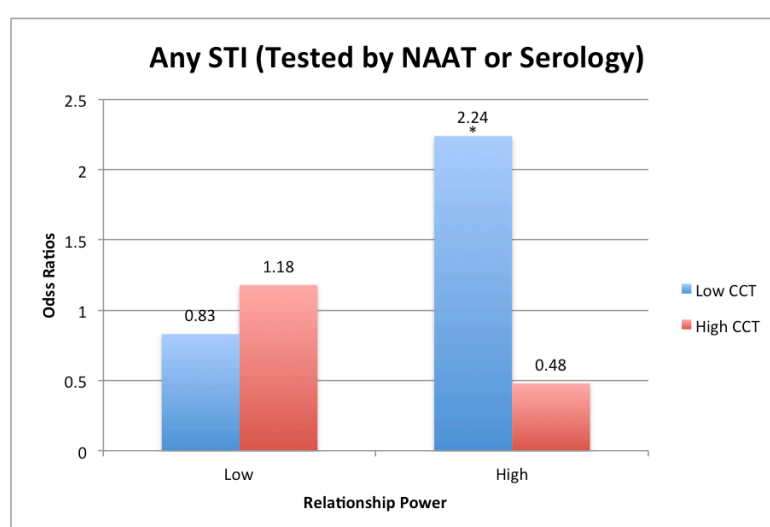


Figure 1 Adjusted outcomes: Odds ratios for STI outcomes calculated from logistic regression for women in RESPECT CCT study, stratified by relationship power and controlling for education, age, marital status, income, socioeconomic status, subvillage and baseline STIs

Discussion:

In this study, we found that women’s relationship power significantly modifies the effect of the CCT on STIs. Specifically, for women with high relationship power, randomization status influences the odds of having a STI, where women in the high cash arm (T3) have lower odds of testing positive for a STI and women in the low cash transfer arm (T2) have higher odds of testing positive for a STI. These results do not support our hypothesis that women with high relationship power in both cash transfer arms would have lower incidence of STIs after 12 months in the RESPECT study. Although the main analysis for the RESPECT study did not find an effect of either CCT value on STI incidence for women,⁴ among women with high relationship power, we identified significantly increased odds of having a STI at month 12 for women in the low cash arm (T2) compared to the control group (T1). The effect of the CCT was similar among women with low relationship power in both cash transfer arms (T2) and (T3), where women had an odds close to 1 of testing positive for a STI at month 12. To our knowledge, this is the first study that analyzes the impact of women’s relationship power on the effectiveness of a CCT to reduce STIs and HIV.

Our findings highlight that women's relationship power modifies the effect of a CCT on STI outcomes. While women with high relationship power in the high value cash arm (T3) had a lower odds of a STI at month 12, women with high relationship power in the low value cash transfer arm (T2) had a higher odds of a STI at month 12; also, the amount of the CCT played a less important role in reducing STIs for women with low relationship power than it did for women with high relationship power. It is possible that for women with low relationship power and likely little control over their sexual relationships, a conditional cash transfer does not offset other structural determinants that influence risky sex that leads to STIs and HIV. One possibility is that these women lacked sufficient control over their sexual relationships to avoid contracting a STI and receive the conditional cash transfer but that an unconditional cash transfer might have conferred more bargaining power over decisions, including decisions about risky or less risky sex. Further experiments are needed to determine whether unconditional cash transfers compared to conditional cash transfers could be more effective in overcoming the structural determinants that put women with low relationship power at high risk of contracting STIs and HIV.

By contrast, our findings suggest a different story for women with high relationship power. It is puzzling that women in the low-cash transfer arm had an increased odds of having a STI at the 12 month study visit. One explanation could be that the relative amount of cash, rather than the absolute amount of cash, motivated behavior change - that women in the low cash arm were less motivated by the incentive because they knew that other women received an incentive double the size of theirs. The women in the low cash arm might have been more motivated by the incentive had everyone received an incentive of equal size. Researchers know little about how large a conditional cash transfer is necessary to reduce STIs, and about whether it is the absolute or relative amount offered that motivates a change from riskier to less risky sex.^{4 9 13 14} Our results for women with high relationship power are consistent with the overall results for the RESPECT study that found a reduction in STI incidence for participants in the high-value cash transfer arm. Taken together, the present analysis and the analysis from the RESPECT study provide support for the possibility that the relative size of the conditional cash transfer is important in reducing STI incidence.

An alternate explanation for the increased risk of a STI among women with high relationship power in the low cash transfer arm (T2) could be that our measure of relationship power identified a more narrow aspect of power than a broader measure of control in relationships. Specifically, it is possible that our measure of relationship power identified the types of independence women experience in newer and more casual sexual relationships, where partners are less involved in each other's lives. In other words, it is possible that women who we identified as having high levels of relationship power could be women who are in newer partnerships, indicating that they could be women who change partners frequently, or women in casual sexual relationships, ones where either or both partners could have multiple concurrent partners; both scenarios are situations where women could have an elevated risk of contracting a STI since frequent new partners and having multiple, concurrent partners increases the risk of contracting and spreading a STI. Therefore, it is possible that the women who are identified as having high relationship power are engaging in riskier sex because of the nature of their relationships. If this is the case, then our findings suggest that for women in riskier sexual relationships, the high value cash transfer (T3) was effective at lowering STI incidence, while the low value cash transfer (T2) had little effect since the STI incidence among women with high relationship power in the low value arm is consistent with the STI incidence for women in riskier sexual relationships.

Our analysis carries with it some limitations. First, some STIs were curable, and it is possible that the reduction of these STIs resulted from participants seeking treatment for infections before coming to the study visit (to get the cash payment) rather than by practicing less risky sex. In this way, it is theoretically possible that the CCT incentivized treatment-seeking behavior rather than incentivizing safer sexual behaviors, such as using condoms and reducing the number of sexual partners. Moreover, the RESPECT study was not powered to detect changes in individual STI incidence; therefore, our interpretation of the impact of the CCTs is inferred using the composite measure of STI incidence. However, these STIs are proxies for HIV since they are linked with riskier sexual behavior. Similarly, the RESPECT study was not powered to detect STI incidence below 20% when analyzed by gender; therefore, our analysis has limited ability to detect changes in STI outcomes among women. Nonetheless, we detected statistically significant differences in the odds of having a STI according to study arm for women with high relationship power in the adjusted model. Moreover, the RESPECT study currently provides one of the best sources of longitudinal, randomized-controlled data to measure the effects of a CCT on STI outcomes. Finally, our measure of relationship power was based on a sub-set of questions drawn from the Sexual Relationship Power Scale, the standardized questionnaire to measure relationship power²² and may not fully reflect the nuances of control that exist in sexual relationships. However, the Sexual Relationship Power Scale has been successfully used in a reduced, modified form in other analyses²³ and our set of questions, when reduced via a factor analysis as conducted here, has been determined to accurately reflect the overall scale.²⁴

Despite these limitations, our findings provide an important contribution to our knowledge of how CCTs can reduce the spread of STIs and HIV. Naturally, there is a wide spectrum of intimate relationships and the control women have over the nature of their sexual encounters. Our study shows that the variability of control that a woman has in her intimate relationships modifies the effect of a CCT to reduce risky sex. Designing new CCT interventions that account for the range of control that women have in their intimate relationships, such as interventions that provide unconditional transfers to women with lower relationship power, or provide the same level incentive to all women, is a promising approach to improve the effectiveness of CCTs to reduce STIs and HIV.

Chapter 2

The effect of a CCT to reduce STIs and HIV on women's power in their sexual relationships

Abstract

Introduction

One important determinant of women's relationship power is the receipt and control of cash, yet the evidence on the effect of cash on relationship power yields mixed results. Furthermore, studies have shown that additional money can increase power for some subgroups of women, but not for others. Conditional Cash Transfer programs have been used to improve health outcomes by providing cash transfers to participants when they perform specific health behaviors. Therefore, it is possible that being enrolled in a CCT intervention and having the chance to receive the cash transfer changes the power women have in their intimate relationships. Given this, here our purpose is to determine if the amount a participant is eligible to receive in a CCT changes the relationship power of women enrolled in the intervention.

Methods

We analyzed data from the RESPECT study, which provided rich, longitudinal data comparing 2 incentive levels to a control group and used a validated measure of relationship power at baseline and month 12. We conducted an intent-to-treat analysis using treatment arm to test the effect of the CCT on relationship power at month 12. A difference-in-differences estimation was used to report relationship power after 12 months for each study arm to determine whether participation in a CCT changes relationship power.

Results

All three study arms reported increases in relationship power from baseline to month 12. In the adjusted model containing demographic control, the coefficient for the interaction between study arm and time (month 12) for the "any cash" group was 0.003, -0.03 for the high-value CCT arm, and 0.03 for the low-value CCT, and these estimates were not statistically significant for any of the 3 groups.

Discussion

Our results demonstrate that women in the intervention experienced an increase in relationship power, yet there were no differences in the change in relationship power scores between the cash transfer arms and the control arm from baseline to month 12. This analysis - the first to use a validated measure of sexual relationship power as an outcome of a CCT to reduce STIs and HIV - will help inform HIV prevention research aimed at increasing women's relationship power with conditional cash transfers.

Introduction

A close look at the HIV epidemic reveals two critical social determinants of the spread of the disease: poverty and women's negotiation power in their sexual relationships. In particular, women living in poverty face many challenges when trying to avoid contracting HIV by negotiating safer sex when they are financially dependent on their partners; if one partner has significantly less power than the other, they are left unable to negotiate with whom they have sex, how often, and whether or not it includes a condom – all proximate determinants of the spread of HIV. New research suggests that women have more control in their sexual relationships when they have an increase in income. Briefly, specific programs such as

microcredit, unconditional cash transfers (UCTs), and conditional cash transfers (CCTs) provide cash to women who meet the program's enrolment criteria, and several studies (reviewed below) have examined the impact of these programs on the primary relationships of the beneficiaries. Other studies (also reviewed below) have examined women's increased earnings through employment and how this influences their negotiating power with their male partners. It is challenging to compare these studies because definitions of relationship power (sometimes referred to as "empowerment") vary, and in addition, some studies look at different manifestations of power imbalances between male and females ranging from intimate partner violence to women's ability to negotiate condoms and refuse sex. Our interest here is in relationship power that confers the ability to make sexual decisions.

Overall, increased income through both cash transfers and employment have heterogeneous impacts on relationship power and are influenced largely by contextual and social factors as well as women's baseline relationship power.² In addition, increasing control over her income can be beneficial to a woman with enough baseline power and external employment options to allow her to leave a problematic marriage.² However, if a woman has low power initially and few other options, her increased income can be seen as a threat to her husband's control, exacerbating the power imbalance between them.² The national CCT program, *Bolsa Familia*, found that providing women with cash transfers increased their decision-making power regarding contraception. Interestingly, this was a heterogeneous outcome driven by the change in power noted only among women in urban settings; women in rural settings did not experience the same increase in decision-making power.²⁵ Qualitative research of women participating in national CCT programs in Peru, Ecuador, and Bolivia explored the effect of these programs on gender equity and empowerment.²⁶ Although "empowerment" had different meanings to different sub-populations in the analysis, all reported that the cash from the CCT programs only partially affected their empowerment, particularly since these programs were seen to target the well-being of their children and was not seen to improve the well-being of the women themselves.²⁶ In Ecuador, an analysis of a UCT given to mothers found that the UCT did not affect emotional and physical violence but diminished controlling behaviors from male partners.²⁷ Further, a review of 24 articles on economic empowerment and women's risk for intimate partner violence highlights the mixed results of many key studies, most of which used cross-sectional data which makes it difficult to understand the causal factors that leads to intra-partner violence. Yet some studies find that economic empowerment is protective, for example, the IMAGE intervention in South Africa where women reported a reduction in intra-partner violence, while other studies report mixed results. For example, the heterogeneous impacts of microcredit programs in Bangladesh suggest that women with more baseline relationship power experienced less violence compared to women with less power.²⁸ Therefore, it is difficult to predict if cash transfer programs will confer an increase in women's relationship power.

With the variability in the definitions and experiences of relationship power and decision-making, and the heterogeneity in the effects of increases in cash on relationship power, it is difficult to determine if a CCT intervention to reduce STIs and HIV could change women's relationship power. Taken together, the literature reveals that entrenched socio-cultural forces can determine if increases in cash confers any increase in sexual decision-making power. Furthermore, it appears that additional money can increase power for some subgroups of women, but not for others. However, it is not clear whether conditional cash transfers change relationship power. The objective of our analysis is to address this question in the context of the RESPECT study.

Methods:

Theoretical Framework

Our analysis is informed by the Theory of Gender and Power, which suggests that gender produces differences in the risk of acquiring HIV.¹⁷ This theory emphasizes the consequences for women of the sexual division of labor, power, and sociocultural norms of partnerships, and allows for an analysis of the ways in which women are at increased risk for HIV, as well as opportunities for effective interventions. Labor (economic) dynamics include unemployment, lack of education, living in poverty, and working in high-demand and low-controlled environments. Power (relationship) dynamics include a woman's history of physical and sexual abuse, having a partner who disapproves of safer sex practices, steady high-risk sexual partners, alcohol and drug abuse. Sociocultural norms of partnerships involves having relationships with an older male partner; a desire to conceive; family influence; mistrust of the medical system; conservative gender and cultural norms; limited HIV knowledge; negative beliefs about condoms; and lower perceived risk of contracting HIV/AIDS.¹⁷

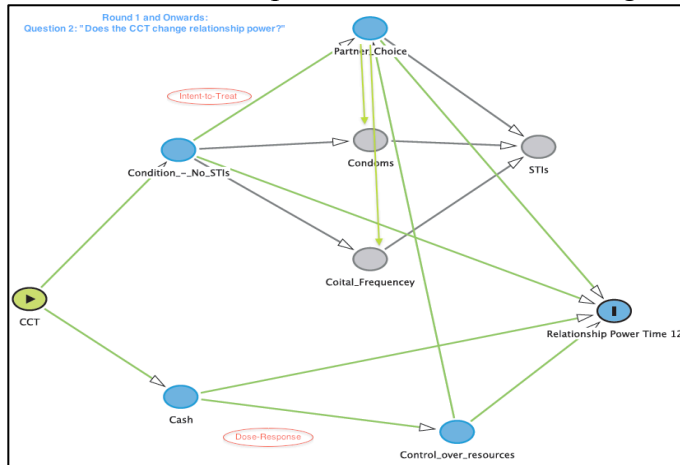


Figure 1 Conceptual Framework to determine the effect of the CCT on women's relationship power.

Figure 1 shows the conceptual framework for our analysis. We conducted an intent-to-treat analysis using study arm to test the effect of the CCT on relationship power at month 12. The condition or the cash could influence women's relationship power at month 12 directly, or through intermediate outcomes such as choosing new partners with whom they have equal decision-making, or having increased control over resources.

Intervention – The RESPECT Study:

Our analysis uses data from the Rewarding STI Prevention and Control in Tanzania (RESPECT) Study, a year-long intervention conducted in 10 randomly-selected villages in the Kilombero/Ulanga districts in South-Western Tanzania.⁴ The methods have been previously described by de Walque et al.,⁴ and in chapter 1 of this dissertation. Briefly, young men and women aged 18-25 were recruited into the study and were randomized at the individual level to either a no-cash control group (T1), a low-cash award group (T2), or a high-cash award group (T3). The low cash group (T2) and high cash group (T2) were eligible to receive a cash award if they tested negative for STIs at every study visit: the low-cash group could receive 30.00 USD and the high-cash group could receive 60.00 USD each time. These amounts were chosen based on focus group discussions prior to the start of the study to identify amounts large enough to

incentivize behavior change and be scalable but not large enough to increase the risk of coercion. Those in the control group did not receive a cash transfer. Participants were tested for STIs 4 times over the course of one year (baseline and month 4, 8, 12) and received the cash transfer conditional on testing negative for a 7 curable STIs. Those randomized to either of the two award arms (T2 and T3) had 3 opportunities to receive the cash transfer (at months 4, 8, and 12). Those who had a STI at one study round and did not receive the cash transfer were still eligible to receive the cash at subsequent rounds. At every study visit, participants completed questionnaires about demographic characteristics, socio-economic status, sexual behavior, spending and savings, sexual partners, sexual relationship power, intra-relationship power, intra-partner violence, and depression, and had individual pre- and post-test counseling in accordance with Tanzanian guidelines. Participants also could take part in monthly group counseling sessions in each village that focused on relationship-skills training based on the Stepping Stones curriculum.²¹

Participants:

We analyzed all women enrolled in the RESPECT intervention, and included all women who were never married, married, living with a partner as though they were married, divorced, or widowed. The women in our analysis were between 17 – 38 years old. All women resided in 1 of the 10 study villages where the RESPECT study was carried out.

Sample Size:

A total of 988 women were included in our analysis from the 1,204 women analyzed in the RESPECT intervention. We excluded 64 women who were missing STI results at month 12 in the study 152 who were missing results to questions about relationship power at baseline or at month 12.

Outcomes:

The outcome of interest in Aim 2 is relationship power at month 12. Relationship power was measured with a subset of 6 questions from the Sexual Relationship Power Scale, a validated scale measuring sexual decision-making and control in relationships.²² Only part of the scale was included in the RESPECT study, and we therefore used Principle Components Analysis (PCA), a data-reduction technique, described in detail in chapter 1 of this dissertation, for isolating individual factors from multiple, interconnected factors, to reduce 6 sexual-relationship power questions into one factor, whereby higher scores reflected higher power. We used these scores to measure relationship power at month 12 using a continuous variable.

Statistical Methods:

We analyzed all women included in the RESPECT intervention according to the study arm to which they were randomized. We reported sample means at baseline for all variables included in our analysis. We used a difference-in-differences estimation to report changes in relationship power at month 12 for each study arm to test our hypothesis that study arm changes relationship power. To test our hypothesis that study arm affects relationship power we used the following model:

$$(3) \textit{Relationship Power} = \beta_0 + \beta_1 \textit{randomization arm} + \beta_2 \textit{time} + \beta_3 \textit{randomization arm} * \textit{time} + \varepsilon$$

The coefficient of interest is the coefficient for the β_3 term, the interaction between randomization arm and participation in the intervention for 1 year (month 12). The measure of

relationship power reflects relationship power scores at 2 time points: at baseline and month 12. The randomization arm variable is a dummy variable coded as 1 for the treatment arm of interest and 0 if not in the treatment arm, and the time variable is a dummy variable, which takes the value of 1 for month 12 and 0 at baseline. We estimated a reduced-form model to test each treatment arm separately. For each model, the randomization arm was a binary variable that took a value of 1 for either the low value cash arm (T2), high value cash arm (T3), or both arms together (T2 +T3), and 0 for the comparison arms.

We estimated an unadjusted model and an adjusted model accounting for age, education, marital status, self-ranked SES status, income and baseline STI status. We estimated the effect of the treatment arm for the high award arm (T3), low award arm (T2), and for both arms together (T3 + T2), called the ‘any cash’ group. We used a Wald test to determine the additional explanatory power of the β_3 interaction term, where a statistically significant test indicates that including the interaction term in the model is a better fit of the data. We clustered standard errors at the sub-village level to account for the probability of selection into the intervention and the possible correlation between women at the sub-village level. All statistical analyses were performed using Stata v. 11.2 (Stata Corp).

Results

Descriptive Characteristics

A total of 988 women were included in our analysis. We present summary statistics of the baseline characteristic of the sample in table 1, which indicates balanced distributions across the three treatment arms.

Table 1 Summary Statistics at baseline by intervention arm of women in the RESPECT Intervention in the Kilombero/Ulangu District of Tanzania from 2009 to 2010

	(1) Control	(2) High-value CCT	(3) Low-value CCT	P
Age	25.62 (3.765)	26.25 (3.50)	26.05 (3.75)	0.43
Education				
None	76 (16.63%)	35 (13.67%)	50 (18.18%)	0.33
Primary	352 (77.02%)	205 (80.08%)	205 (74.55%)	0.32
Secondary	29 (6.35%)	16 (6.25%)	20 (7.27%)	0.86
Married	379 (89.93%)	221 (86.33%)	221 (80.36%)	0.26
Low SES	222 (48.58%)	140 (54.69%)	152 (55.27%)	0.13
Chlamydia	9 (1.97%)	8 (3.13%)	8 (2.91%)	0.57
Gonorrhoea	4 (0.88%)	6 (2.34%)	4 (1.45%)	0.27
Trichomonas	64 (14.00%)	46 (17.97%)	41 (14.91%)	0.36
Herpes simplex virus 2	194 (42.45%)	119 (46.48%)	119 (34.27%)	0.57
Syphilis	5 (1.09%)	3 (1.17%)	5 (1.82%)	0.69
HIV	20 (4.38%)	7 (2.73%)	12 (4.36%)	0.51
Relationship Power Score	0.39 (0.27)	0.43 (0.26)	0.40 (0.26%)	0.86
High Relationship Power (Top 25%)	115 (25.16%)	77 (30.07%)	68 (24.72%)	0.28
N	457	256	275	

Data are presented in n (%) or means (SD)

Low SES refers to self-reported position on the lowest two categories on a socioeconomic scale from 1-7

Relationship Power Scores ranged from -0.12 – 1.03

P refers to the p-value calculated by one-way ANOVA or Pearson’s chi-square test between the control group, the high-value CCT

The majority of women in the RESPECT study were married and had a primary education or less. About half of the women ranked themselves on the lowest two categories of the socioeconomic position scale.

Difference-in-differences analysis

Table 2 presents the unadjusted and adjusted difference-in-differences estimates of the effect of treatment arm on relationship power at month 12, respectively. The outcome of interest is the coefficient on the interaction between treatment arm and time (month 12) presented in the interaction model column. The coefficient represents the change in differences in relationship power scores between the treatment arms and the control arm from baseline to month 12

Table 2 Difference-in-differences estimation of the effect of randomization arm on relationship power at month 12 for women in the RESPECT intervention. Total N in unadjusted model= 837, measured at 2 time-points: baseline and month 12; Total N in adjusted model = 571, measured at 2 time-points: baseline and month 12.

	<u>Month 12 relationship power for both high-value and low-value CCT</u>		<u>Month 12 relationship power for high-value CCT</u>		<u>Month 12 relationship power for low-value CCT</u>	
	Unadjusted Model	Adjusted Model	Unadjusted Model	Adjusted Model	Unadjusted Model	Adjusted Model
Randomization arm	0.0162 (0.0184)	0.0240 (0.0234)	0.0334 (0.0214)	0.0577** (0.0240)	-0.0117 (0.0201)	-0.0295 (0.0238)
Time variable (month 12)	0.0677*** (0.0187)	0.0646*** (0.0224)	0.0701*** (0.0146)	0.0732*** (0.0182)	0.0675*** (0.0144)	0.0579*** (0.0171)
Randomization arm * time variable (month 12)	0.00309 (0.0245)	0.00289 (0.0306)	-0.00306 (0.0266)	-0.0281 (0.0329)	0.00657 (0.0265)	0.0302 (0.0345)
Wald Test	0.02	0.01	0.01	0.73	0.06	0.77
Prob>F	0.9003	0.9252	0.9090	0.3993	0.8057	0.3861

Robust standard errors in parentheses clustered at the sub-village level

Randomization arm refers to a binary variable with the value of 1 for the treatment arm and 0 for the comparison groups.

Relationship Power scores at month 12 ranged from -0.12 – 1.03

Wald Test refers to the test of interaction term between treatment arm and time.

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

While relationship power improved over time for all treatment groups, (figure 2), this improvement was the same in all groups and did not differ by treatment arm. The unadjusted models indicate that for all three treatment groups (the any cash group (both high-value and low-value CCT), the high-value CCT, and low-value CCT) there was no difference in change in relationship power score: the difference in the change in relationship power between each treatment arm over time was 0.003 (-0.05 – 0.05, 95% CI, p= 0.9) for the any cash group, -0.003 (-0.06 – 0.05, 95% CI, p= 0.9) for the high-value CCT arm, and 0.007 (-0.05 – 0.06, 95% CI, p= 0.8) for the low cash arm. These estimates were not statistically significant when both study arms were analyzed together (the any cash group), or when study arms were analyzed separately. The Wald tests were not significant for the interaction between study arm and time (month 12). When adjusting for covariates, we found similar results: the coefficient for the interaction between randomization arm and time (month 12) for the any cash group was 0.003 (-0.06 – 0.06 CI,

p= 0.9), -0.03 (-0.9 – 0.4 CI, p= 0.4) for the high-value CCT arm, and 0.03 (-0.04 – 0.1 CI, p=0.4) for the low-value CCT, and these estimates were not statistically significant for any of the 3 groups. The Wald tests were not significant for the interaction between study arm and time (month 12).

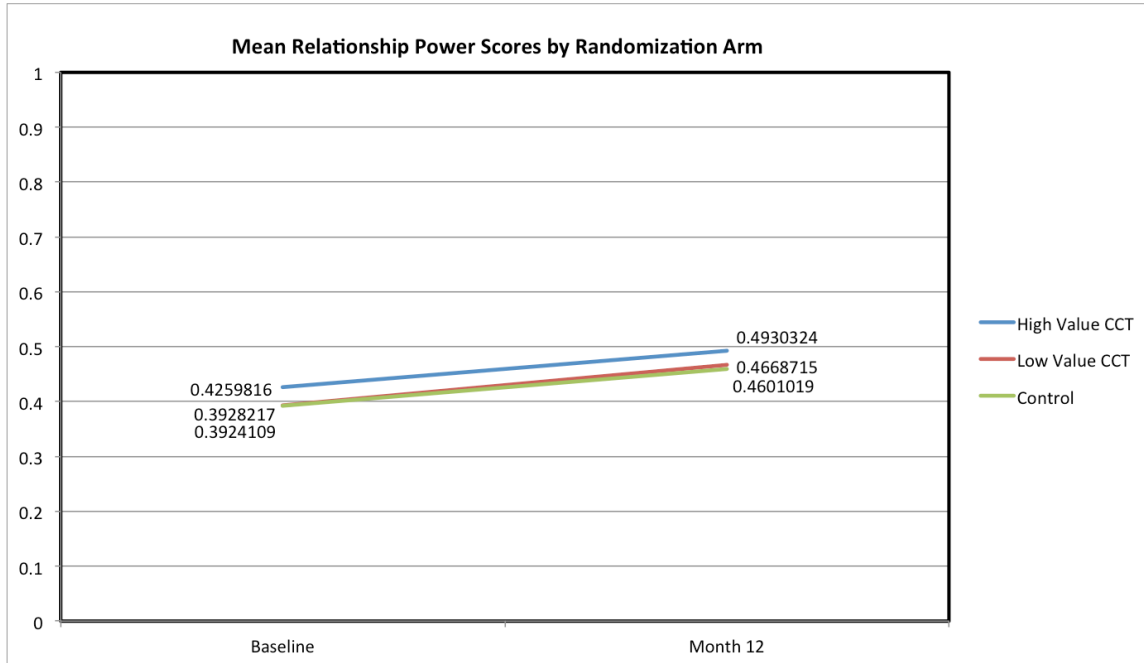


Figure 2 Mean relationship power scores by treatment arm at baseline and month 12 in the RESPECT intervention

Figure 2 provides a visual representation of the relative gains in relationship power for each treatment arm. While the mean relationship power score increased for all treatment arms, there was no difference in the slopes for the lines of each treatment arm. The change in slope for the lines of each treatment arm is represented in our analysis by the coefficient on the β_3 interaction between treatment arm and month 12.

Discussion

Our analysis suggests that there was no change in the difference in relationship power from baseline to month 12 between women randomized to receive cash compared to women in the control group. While women in all three treatment arms reported an increase in relationship power over the course of the 1-year intervention, from a mean score of 0.40 at baseline to a mean score of 0.47 at month 12, no treatment arm experienced a greater or smaller change compared to the others. These findings indicate that an intervention to reduce STIs and HIV with a CCT improved women’s relationship power, but whether or not women were eligible to receive a high, low, or no cash transfer had little relative impact on changes in their relationship power.

There are several explanations for our findings. Since individuals were randomized to the same incentive level as their partners, married women had the same potential of cash as their husbands. Therefore, a woman’s potential of gaining and controlling cash was the same relative to her husband’s. It is possible that the potential of cash confers an increase in women’s relationship power only when potential earning reduces the income disparity between women and their partners.

The literature suggests that increases in cash do not increase women's relationship power for women whose baseline power is very low², and that increases in earning can trigger more repressive behaviors from male partners who perceive women's access to cash as a threat to their control.² In Chapter 1, we observed that 75% of women in the RESPECT study had low to medium power in their relationship power at baseline. Therefore, another possible explanation of our findings is that many women lacked sufficient power in their relationships to leverage the potential of cash in a way that increased their power.

A third interpretation of our findings is that it took several study rounds for participants to trust the mechanism of the CCT, which could have delayed the effect that the potential cash had on sexual behaviors. The main analysis for the RESPECT study found that the CCT only reduced STI incidence in the high-value CCT arm at month 12 and the authors speculated that it took several study rounds for the participants to believe the promise of the conditional cash transfer and modify their risky sexual behaviors accordingly.⁴ Similarly, it may have taken several study rounds for the potential of cash to have an influence on women's relationship power. Alternately, it is possible that the benefit of participating in the intervention masked any potential effect based on treatment arm. Further studies of longer duration are needed to determine how different amounts of a conditional cash transfer might lead to differences in women's relationship power.

We used a composite measure of relationship power that was based on a series of six questions about relationship dynamics and sexual negotiation. While the questions are drawn from the Sexual Relationship Power Scale and are not meant to be analyzed individually, examining responses at baseline and month 12 reveal some emerging trends. A preliminary, exploratory analysis of these responses suggests that women experienced an increase in sexual decision-making in their relationships but a possible decline in non-sexual decision-making over the course of the intervention. While it is notable that women reported an increase in sexual decision-making yet a decrease in non-sexual decision-making, there did not appear to be a differential magnitude in these trends between the treatment groups. These preliminary results highlight the need for future research on the domains of relationship power most relevant for reducing STI and HIV incidence with a CCT.

Our study carries with it some limitations. First, our outcome of interest, relationship power, was based on a series of questions drawn from the validated Sexual Relationship Power Scale, a standardized series of questions designed to measure sexual relationship power among women in sub-Saharan Africa.²² We did not have the entire validated scale in the questionnaire. Furthermore, it is possible that different dynamics of sexual relationship power exist and are modified in the context of a conditional cash transfer intervention, particularly an intervention that conditions the cash on the outcomes of sexual behavior. Therefore, there is a chance that some dimensions of power were not captured by our measure of sexual relationship power. However, the Sexual Relationship Power Scale has been successfully adapted and implemented across a variety of context²³, which give us confidence that our measure of relationship power is robust and retains validity in our analysis. Second, 152 women were dropped from the analysis due to missing data on relationship power at month 12 or on the demographic controls included in the model. However, the population dropped from the analysis is not statistically different from the population analyzed (Appendix 2), indicating that that excluding this population

does not bias our results. Finally, the small number of women included in our study makes it difficult to detect changes in relationship power between randomization arms. Therefore, given our sample size, we are unable to determine if we did not observe an effect of the treatment arm on relationship power because it does not exist, or because the sample was not large enough to measure an effect. However, the RESPECT study currently provides one of the best sources of longitudinal, randomized-controlled data to measure the effects of a CCT on STI outcomes and related behaviors, and our analysis provides important data on the social and behavioral influence of CCTs used to reduce STIs and HIV.

This analysis is the first to use a validated measure of sexual relationship power as an outcome of a CCT to reduce STIs and HIV. Relationship power increased for all women in the intervention, but randomization status did not influence the magnitude of the increase. Our findings highlight several promising avenues of research to better understand the impact of CCTs on relationship power in the context of HIV prevention. In particular, distinguishing the effect of study arm on relationship power for married women compared to unmarried women, and for women with high baseline relationship power compared to low relationship power could enrich our understanding of how a CCT could confer relationship power.

Chapter 3

Female Sex Workers use power over their day-to-day lives to meet the condition of a Conditional Cash Transfer intervention to incentivize safe sex

Abstract

Female Sex Workers are a core population in the HIV epidemic, and interventions such as conditional cash transfers (CCTs), effective in other health domains, could be a promising new approach to reduce the spread of HIV. Here we investigate how a population of female sex workers, though constrained in many ways, experience and use their power in the context of a CCT intervention to incentivize safe sex. We analyzed 20 qualitative in-depth interviews with female sex workers enrolled in such a CCT program, and found that while such women have limited choices, they do have substantial power over their work logistics that they leveraged to meet the conditions of the CCT and receive the cash award. It was through these decisions over work logistics, such as reducing the number days and clients, perhaps more than decisions over condom use, that the CCT intervention had its greatest impact on modifying Female Sex Workers' behavior.

Introduction

Conditional Cash Transfers (CCTs), shown to be effective in several health and social domains, have recently been tested as a new approach to prevent HIV and STIs. CCTs could be promising for women in particular since cash or lack of cash (poverty) influences engagement in risky sexual behavior among women and their partners.^{9 25 29 30} We expect that women living in poverty who are financially dependent on their male sexual partners could use the cash transfer to bolster their decision-making power over with whom they have sex, how often, and whether or not they use a condom – all important determinants of STI transmission. Some evidence reveals a correlation between power dynamics in intimate relationships and risky sexual behavior,²³ and that receiving and controlling cash affects relationship power.¹⁸⁻²⁰ Yet, we know little regarding the synergistic impact of poverty, receipt of cash, and intimate relationship power in the context of CCTs designed to reduce risky sexual behavior. The present study examines how a population of sex workers in Tanzania experienced and exercised power with clients in the context of a cash transfer intervention.

Several recent experiments have used CCTs to reduce the incidence of HIV and STIs among high-risk groups, with mixed results. Many studies provide cash once those enrolled in study engage in a targeted behavior like attending school.^{9 11 25} These studies suggest a protective effect, but were not designed to determine the relative strength of unconditional versus conditional cash transfers in preventing HIV and STIs. A smaller number of studies have conditioned the cash directly on STI or HIV outcomes to test how this might reduce risky sexual behaviors, as well as STI and HIV incidence. These studies have yielded differing results; for example, an analysis in Malawi found an increase in reported risky behaviors among men,¹³ while in Tanzania the CCT reduced STI incidence among both men and women who were eligible to receive the largest possible cash transfer,⁴ and in Lesotho, a conditional lottery ticket reduced STI most among women and those randomized to receive a larger amount of money through the lottery.¹⁴ While these are encouraging findings, we still know little about the

pathways through which CCTs work to change sexual and reproductive health behaviors, including sexual debut, risky sex, selection of sexual partners, and condom negotiation. Further, there has been no research to date regarding how a woman's control over her intimate relationships could shape how she responds to a CCT intervention. Furthermore, there is limited evidence about whether such interventions shape the control she has in these domains.

Drivers of Risky Sex in Commercial Sex Work

The limited success of behavioral interventions to reduce HIV in Sub-Saharan Africa has been attributed by McCoy, MacPhail, Padian and others to overlooking the relative lack of control that many young women have over how and with whom they have sex.³¹ Two potential pathways through which this lack of control might function are the cultural forces and gender expectations that leave women unable to negotiate safer sex, including partner choice and condom use. Female sex workers, a core population in the spread of HIV, are important to study yet we know little about how they exert control in their work to practice safer sex with their clients.⁵ Perhaps implicit in many interventions that target commercial sex workers is the view that sex workers are disempowered and degraded by a lack of choice and control over their bodies. However, in sub-Saharan Africa, the culture of selling or purchasing sex and transactional sexual relationships are part of a nuanced social fabric of relationships ties, and women in transactional sexual relationships, including sex workers, possess several domains where they can exert their control.³² While female sex workers are constrained in many ways and a very specific type of power relationship exists in a commercial sexual transaction that may not be generalizable to power dynamics in other sexual relationships, understanding sex workers' power with their clients may be key to reducing the harm associated with commercial sex work - away from unprotected sex toward safer, protected sex.

i) Economic forces and client preferences

High rates of STIs among sex workers globally, driven in part by low rates of condom use in commercial sex transactions, are attributed to several factors. Specifically, economic forces and client preferences decrease condom use because clients are willing to pay more for unprotected sex since they prefer sex without a condom.³³⁻³⁵ For example, an analysis of the market for unprotected sex in Mexico found that sex workers charge an additional 23% for unprotected sex.³⁶ A cross sectional study of this phenomenon in Democratic Republic of Congo found that among 136 commercial sex workers, 25% engaged in unprotected sex for additional money. According to this analysis, sex workers who had unprotected sex with clients for additional income were more likely to live in lower socio-economic regions of Kinshasa, have a young child to care for, and knew other sex workers who also had unprotected sex for more money.³⁷ Similarly, in Tanzania, an analysis conducted by the National AIDS Control Program found that among sex workers who reported not using condoms with their most recent client, 68% did so because the client offered more money for unprotected sex. What these data suggest is that the financial constraints faced by commercial sex worker operate in conjunction with client preferences for sex without a condom, resulting in unprotected sex that increases the transmission of HIV and other STIs.³⁸

ii) Alcohol and drug use

Alcohol and drug use among sex workers and their clients make it harder for sex workers to effectively insist on condom use. A 3-year study of 608 Tanzanian women found that unprotected sex was 5 times more likely if either partner had been using alcohol.³⁹ In Mongolia,

a mixed methods analysis of 48 female sex workers found that 83% used alcohol before having sex with a client, and that 70% did not use condoms consistently.⁴⁰

iii) Violence from clients

Violence from clients often leaves commercial sex workers unable or unwilling to negotiate safer sex. An analysis of 106 female, 26 male, and 4 transgendered sex workers among four African countries found that clients acted as though they had ‘full ownership’ over the sex worker, entitling them to act violently and insist on unprotected sex.⁴¹ Krishnan’s analysis of intimate partner violence among couples enrolled in the RESPECT study in Tanzania found that intimate partner violence is connected to discordant views within a couple about empowerment and sexual decision-making, and that reports of violence declined over the 1-year intervention.⁴²

iv) Cultural and peer norms

The behavior of peers within the social network of commercial sex workers influences condom use. An analysis of 562 sex-workers in China found that condom use increased with the perception that their peer group was pro-condom and that condom use was the norm,⁴³ and in Mongolia, violence towards commercial sex workers from clients was shaped by cultural norms and narratives about violence.⁴⁰ In South Africa, a cross-sectional analysis of 21 female sex workers found that their peer network helped them construct positive social identities that enabled them to enforce condom use among clients.⁴⁴

Pilot CCT intervention to reduce risky sex among female sex workers

Current experiments that use CCTs to reduce STIs and HIV have yielded mixed results. Female sex workers are both a core population in the spread of HIV and engage in sex for economic reasons. Therefore, it is reasonable to expect that a CCT to reduce STIs and HIV would be particularly promising among this population. Specifically, the literature shows that sex workers will have unprotected sex for more money, work in riskier environments where they are more vulnerable to violence, and accept clients who seem less amenable to using condoms. Offering a conditional cash transfer to commercial sex workers could offset the premium on unprotected sex, and allow sex workers to be more selective about where they work and who they accept as clients by providing an alternative, additional source of income. However, if this economically motivated, high risk group responds to a CCT, then we should be cautious in assuming that this type of intervention would be effective in a more general population.

To test the idea that sex workers might use cash to offset the premium on unprotected sex or otherwise reduce their risk, we designed a four-month pilot investigation, *RESPECT II*, using CCTs to reduce STIs and HIV among 100 female sex workers in Dar es Salaam that provided cash incentives to female sex workers who tested negative for STIs and HIV. From the 100 sex workers in the *RESPECT II* pilot study, we recruited 20 to participate in in-depth interviews at their final, 4-month study visit. Here, we present the qualitative analysis of these 20 in-depth interviews to assess how sex workers responded to this novel CCT intervention to reduce HIV and STI incidence.

Theoretical Framework

Conditional cash transfer interventions are consistent with a variety of theoretical models including Behavioral Economic theory,⁴⁵ which helps predict individual responses to increases in cash as well as responses to the conditions imposed on the cash in CCTs. Conditional Cash Transfers employ contingent rewards to motivate changes in health behaviors.⁷ Often, the more

immediate gains in pleasure or well-being in the present outweigh the choices that benefit us in the more distant future; health decisions can be particularly vulnerable to this type of ‘present bias’. Importantly, CCTs increase the short-term benefit by providing cash dependent on the performance of behaviors that will be beneficial in the future. In this way, meeting the conditions of the program and receiving the cash shift the calculus of short-term benefit at the expense of long-term gain to make long-term beneficial decisions more palatable in the short-term.⁴⁶

The present investigation is also informed by Social Cognitive Theory (SCT), which situates an individual’s behaviors in the context of their social, physical, and cultural milieu. Social Cognitive Theory highlights the importance of self-efficacy, a person’s belief that he or she can actually enact desired behaviors and habits.⁴⁵ According to Social Cognitive Theory, self-efficacy functions with health goals, expectations of the outcomes of health behavior, and perceptions of impediments and facilitators that influence our ability to achieve these goals⁴⁵. Self-efficacy is strengthened through mastery experiences – experiences where an individual learns a new behavior – and through mastery modeling – experiences where an individual can practice a new behavior and receive feedback. Importantly, an individual must also feel motivated to enact a new behavior, and can be motivated by external, or internal sources.

In the context of CCT interventions to reduce STIs and HIV, principles of Social Cognitive Theory would predict that a conditional cash transfer would function as rapid reinforcement and feedback on a participant’s safer or risky sexual behaviors. In this way, the CCT can help modify a person’s health behaviors by providing a motivator to try new, safer sexual behaviors; changing both outcome expectations and by modifying goals surrounding safer sex. A cash transfer could be a perceived facilitator in achieving the goal of safer sex, particularly if an individual leverages the possibility of the cash when negotiating safer sex with a client or avoiding clients willing to pay more for risky sex. Taken together, social cognitive theory illuminates how the incentive encourages participants to try practicing safer sex, providing them the opportunity to learn and master the behaviors needed for safer sex, thereby strengthening their self-efficacy related to successful negotiation and practice of safer sex.

Objectives

Our analysis contributes to the current literature on commercial sex work and on behavioral change interventions to encourage safer sex by proposing novel conceptual categories to classify power among commercial sex workers. One objective of our investigation was to document how sex workers define and experience relationship power in their sex work and examine the factors that enhance or limit sex workers’ power with clients. Our second objective was to examine whether sex workers experience relationship power in a way that enables them to meet the conditions of a CCT. Specifically, we ask if sex workers have sufficient power with clients to change their risky sexual behaviors in order to receive a cash transfer that is conditioned on negative STI tests. Third, we explored how sex workers manage and use their power while enrolled in this CCT intervention.

Methods:

Research Site and Study Population of Pilot CCT study

The present qualitative study was conducted in the context of the larger *RESPECT II* pilot study conducted in Dar es Salaam, Tanzania from June, 2013 – November, 2013. Tanzania, located in East Africa, is a country of 49.25 million people.⁴⁷ Overall HIV prevalence in Tanzania is 5.3%,

yet 31.4% of Female Sex Workers are infected with HIV.⁴⁸ The purpose of the *RESPECT II* pilot study was to test whether a CCT in a high-risk, core population could reduce the spread of HIV. The study site was located in a house dedicated to the study activities, located in a central neighborhood of Dar es Salaam, and was accessible by public transit. The study site had private, closed rooms for interviews and STI tests. Study visits took place in the afternoon to accommodate the sex workers' nighttime work schedules. The *RESPECT II* pilot study included 3 study visits: a baseline visit, a 2-month follow-up visit, and a 4-month final follow-up visit. At baseline, eligible participants were randomly assigned to receive either a high-amount cash transfer of \$40 or a low-amount cash transfer of \$20, and this randomization assignment was fixed for all study rounds. At the end of the baseline visit, those testing negative for both syphilis and trichomonas STIs received the CCT, either the \$20 or \$40 amount in cash, according to their randomization assignment. At the 4-month, final study visit, participants were again tested for trichomonas and syphilis, and received the CCT in cash if they had negative results for both STIs.

Qualitative Study

The data presented in this manuscript are from qualitative interviews conducted with a subset of women in the parent pilot study *RESPECT II*. Every 5th participant on the list of study IDs was invited to participate in two sessions of one-on-one in-depth interviews; the first was held at baseline and the second at the last study visit, 4 months later. If the participant declined the interview, the next consecutive participant was invited to participate in the qualitative sub-study. Once a participant consented to the in-depth interviews, she scheduled a time with the interviewer to return to the study site within a few days of the study visit to conduct the interview. Participants received compensation for travel to the study site and for their time. At the time of both interviews, participants had received their STI test results for that study round and, if negative, received the cash transfer based on these negative results.

In-depth interviews were conducted in Kiswahili by one interviewer, a local Tanzanian with a Master's degree in social work and extensive experience working with (and interviewing) populations at high risk for HIV and marginalized, high risk populations. The semi-structured interview guide asked about: (i) the participant's background relating to commercial sex work, (ii) negotiating condom use in their sex work, focusing on challenging situations where the respondent had difficulty insisting on condoms with a client, and descriptions of how they persevered or why they ended up not using condoms, (iii) condom use in their personal life with main, romantic partners, (iv) experiences with the individual aspects of the *RESPECT II* intervention, as well as in the pilot as a whole, (v) income and spending of CCT, sex worker income, and other income. These topics reflect behavior change strategies to avoid a new STI (Appendix 3). The interviews took approximately 1 hour to complete. Twenty participants completed the in-depth interviews at baseline and 17 returned and completed in-depth interviews at round 3, 4 months later. Baseline interviews were reviewed to inform the content of the interview guide at round 3 but were not included in the analysis. One participant was not a current commercial sex-worker; therefore, 16 transcripts from the month-4 interviews were included in this analysis.

Data Analysis

Our analysis explores how sex workers experienced and exercised power with clients in the context of a cash transfer intervention. To this end, we combined deductive and inductive

coding: We developed deductive codes for relationship power based on the literature, and a conceptual framework that identified the loci of intersection between sex workers' relationship power and the influence of the CCT on their behavior (Appendix 3). We then generated sub-codes to illustrate the mechanism or strategy surrounding our deductive codes.

Inductive codes emanated from the narrative themselves. For example, most participants discussed the relevance of the education and training component of the intervention and we developed codes to capture this experience. Two members of the research team, one PhD candidate and one MPH student with experience in behavioral health interventions, independently coded the interviews to reduce researcher bias and ensure that we consistently applied the codes. Our codes were verified and we addressed discrepancies in weekly research meetings. We deliberately sought out narratives that did not fit our chosen theoretical frameworks to test whether our analytic framework was appropriate, that our overarching theoretical frameworks did not bias our analysis, and to test alternate explanations. Of the 44 codes included in the codebook, 14 codes were used the most frequently. These codes were used in 14 or more of the 16 transcripts included in the analysis.

Table 1 : Frequently Used Codes

Code	Description of Discussions	Examples
Main Partners	Respondent's personal, regular, partners outside of the respondents' CSW.	"Yes, I have (a permanent lover) He knows that I don't want a child for now, so we always use condom."
Condoms	Condom use or nonuse.	"It's normal and customers agree to condoms without any terms"
Social Norms	Norms in sex worker's peer group.	"I just told them to have protected sex. Some care about money more than condoms, but I told them you can use money you receive but still you be infected with sexual transmitted diseases"
Peer Social Support	Ways that respondents do or do not provide/receive various forms of social support with peers.	"We talk about challenges for using condom... at least we understand each other."
Strategies with Clients	Way sex workers negotiate price or condoms with clients	"I show him my documents that I am tested and if he is tested like me we can do without condom but if not he better go away so he agreed."
Substances AND Condoms	Condom use in context alcohol/drug use.	"Those who doesn't like to use alcohol like to use condom"
CSW Income	Income from sex work	"That day I got only 5000 tsh for two customers."
Other Income	Income from other sources/other business	"I also have a small business... I sell clothes on credit."
Education/ Training	Educational & training about condoms and STI protection provided in the intervention.	"I get education. (Before,) I was only know that HIV its transmitted by blood. But (now I know) sperms also can transmit HIV. Without coming here, I only know that condom only prevent pregnancy, so I would swallow pills and have unsafe sex"
STI Testing	The impact of STI testing provided in the intervention.	"When I get tested and find out that I don't have HIV, I continue to protect myself. Today I came for another test I found out that I am still doing fine."
The Cash	The conditional cash transfer in the study, but not necessarily about the conditionality of this cash.	"I pay school fees with the cash transfer."
Thoughts of the Study	When the respondents thought about the study during day-to-day life.	"Yes, I remember (the study) because if I come back in good heath, I'll get a gift. So yes, I remember that

		and the training I got.”
Relationship Power: Condoms with clients	The power to use condoms with clients.	“I lecture them about advantages of using condoms and disadvantages of not using condoms.”

The central research question of this analysis focuses on relationship power. We used six codes to capture the nature and extent of the power participants had in the context of their commercial sex work. Specifically, we used individual codes for relationship power to reflect a sex worker’s power to: use condoms with clients; set prices with clients; decide when to work; decide on the number of clients as well as which clients to accept and any other preferences in their sex work.

We used a broad code to designate each component of the pilot intervention, and a cluster of specific, sub-codes was used to document the thoughts and experiences of sex worker for each component. For instance, broad codes were created for the conditional cash transfer component in the pilot intervention to capture the cash received (*The Cash* code) and the conditional nature of the cash component (*Conditionality of Cash* code). The *Thoughts of the Study* code relates to when respondents remembered the study during their day-to-day lives.

Results

Our analysis included 16 female sex workers at the low end of the socioeconomic spectrum for sex workers in Dar es Salaam.³⁸ Sex workers in our sample were 18 year or older, with a mean age of 30.5 years old. We refer to sex workers who find clients in bars as “bar-based” sex workers, those who find clients in the streets as “street-based” sex workers, and those who work in brothels as “brothel-based” sex workers.

The first goal of our analysis was to document how sex workers experience relationship power in their commercial sex work. A second goal of our analysis was to determine if respondents had sufficient power within their sex work to avoid new STIs, thereby meeting the conditions of the CCT.

Overall, sex workers reported experiences of power (or the lack of it) in several, distinct domains. Based on these reports, we identified conceptual domains to classify experiences of power at the “socio-economic”, “logistical”, or at the “interpersonal” level. The socio-economic level refers to the sex worker’s power to decide whether or not to be a commercial sex worker, the logistical level refers to the sex worker’s power to decide where and when to work and which clients to accept, and the interpersonal level refers to the sex worker’s power with individual clients to decide the nature of the sexual transaction, the price of sex, and whether or not to use a condom.

Table 2 illustrates the classification of sex worker relationship power.

Table 2. Classification of Relationship Power Among 16 Sex Workers in the *RESPECT II* Pilot

Domain of Power	Description	Example	Number of Respondents Who Discussed the Domain of Power
Socioeconomic	Power to decide whether or not to be a sex worker.	<i>“Those who do sex work they do because of life problem not because they like it.”</i>	11
Logistical	Given that a woman engages in sex work, her power to decide when and where to work, and which clients to accept.	<i>“The (cash transfer) helps me reduce the number of customers in my sex work.”</i>	12
Interpersonal	Power with individual clients to decide the nature of the sexual transaction, the price of sex, and whether or not to use a condom.	<i>“He didn’t want to use condoms. I told him that we have to protect ourselves (from disease) ... He was still forcing, and (therefore) I opened the door and went away.”</i>	15

Socioeconomic Power

In the socio-economic domain, eleven respondents discussed whether they had the ability to leave commercial sex work. Of these eleven, nine respondents reported feeling powerless to leave sex work since they were in extreme poverty and could not find other income sources. While four of the respondents described attempting to leave sex work, they returned because they needed money. For example, a widowed mother of two (Respondent 11) found clients in bars and stated:

It is an income crisis (that makes me continue sex work). Because I get no other means of finding income, its better for me do this as I get some money for my needs such as school fees. If I could have something else to do (to make money), I could do it to reduce (my sex work).

This illustrates the common theme expressed that limited options made it difficult, if not impossible, to leave commercial sex work. Of the 11 respondents who discussed leaving sex work, two stopped working because they had a new male partner or fiancé who provided enough financial support for them. However, no respondent indicated having sufficient means on her own to leave sex work regardless of whether or not they received the conditional cash transfer. While respondents were not able to use the cash transfer at the socioeconomic level to leave sex work, they could exert their power at the other two levels to reduce their risk of a new STI.

Logistical Power

At the day-to-day, logistical level, all respondents had a considerable amount of power over when and where to work. No respondents reported having pimps or ‘mamas’ who coordinated their work, nor did they report having strong rules within their network of sex workers that they were forced to obey. Two respondents, however, reported that they give a portion of their income to the owner of the bar where they find clients. Rather, all respondents reported almost complete control over how they ran their commercial sex work business, choosing their hours, locations, and clients. In this way, they exert a specific aspect of relationship power: the power to choose with whom they have sex, how many clients to accept, and when to have sex. As a typical example of this type of choice, Respondent 8 who has two

children and started sex work in 2005 described her decision to go to a new club rather than her regular one: *“I want to meet with different people because a regular customer does not pay well.”* Furthermore, all respondents reported the power to choose which clients to take and how many clients to take in a given night.

Since almost all respondents exhibited some logistical power (the control over when and where they worked), they had three potential strategies to meet the condition of the intervention. They could limit the number of partners, choose different partners who may seem less risky, and/or reduce the frequency of commercial sex work (Table 3). Indeed, some participants reported working less over the duration of the pilot study, or travelling to their home villages during the study. For example, a mother of 3 children who had been a street-based sex worker for one year (Respondent 12) and was randomized to the low award group, took a break from sex work: *“I stopped sex work from October to November ... [I] just wanted to give rest to my body. I went back [to sex work] because I didn’t have money.”* This suggests that given other opportunities for other sources of income, such as a CCT, some have the power to change the frequency of when they work. Along these lines, a respondent who raised the orphan of a friend and began sex work eight years previously reported: *“The counseling and the cash transfer will help the women in the project reduce the number of customers they meet per day.”* This comment reflects a general theme that emerged from the data about how the intervention influences the participants’ sex work. Importantly, many respondents did exert their power at the logistical level and reported that they engaged in less sex work.

Intra-Personal Power

At the interpersonal level, once respondents are actually with clients in commercial sex work situations, they reported variability in their control over condom use and the nature of the transaction. At the interpersonal level, participants had two potential strategies to meet the condition of the intervention: they could use condoms with their clients, and/or have fewer sex acts with the same number of partners. While seven respondents report only having clients who agreed to using condoms, the nine others report resistance from some clients. Respondent 08, who has been a sex worker since 2005, was randomized to the high award group and finds clients in bars, but reports refusing ones who do not accept condoms. She provided example of how sex workers describe successful condom negotiations:

At the beginning I didn’t know anything about this, but after the training and being tested I start to change... I lecture (clients) about advantage of using a condom and disadvantages of not using condoms. This technique helps me.

Similarly, a street-based sex worker randomized to the low-award arm (Respondent 12) describes a negotiation with a new client:

He denied (condoms) at first but I told him that condoms are necessary since he didn’t know me and I was new there, so we better use condoms for our health. He understood and next time when he came, he brought his condoms.

Typically, successful condom negotiation depended on a combination of the sex workers articulating reasons for condoms and the client accepting these reasons.

Among women who reported being occasionally unable to negotiate condom use, some respondents were able to leave without having sex with the client. However, seven respondents reported being unable to negotiate condom use and unable to leave because they needed the additional money or because they feared violence from their client, and therefore had unprotected sex.

Further, four respondents reported violence or feared violence from clients if they refused to have unprotected sex, and thus had sex without a condom. This type of power dynamic is described below by Respondent 9, an unmarried woman without children who had been a sex worker for 10 years :

We went in a room, but he refused to use condoms. He said he already paid for the room; he was furious and hungry. I told him I couldn't do it without condoms. He started squeezing me, so we did it without condoms.

At the interpersonal level, when women were in actual sexual negotiations with their clients, some participants reported that they could exert power while others reported that they occasionally lacked the ability to negotiate safer sex with clients. Some respondents talked specifically about using their control over their work and client negotiations to meet the conditions of the CCT. These respondents' narratives demonstrated strategic creativity in negotiating with clients in order to meet the condition of the CCT. For example, an HIV negative woman with one child who came to Dar es Salaam to become a sex worker (Respondent 17) shared:

I frightened him and said I was HIV positive. He said: "but how will I know that you are HIV positive?" I told him let's go home and see the medicines I am using and he said, "is it true that you are HIV positive" then let's use condom. Also, he said even condom has viruses (laughing) but I convinced him and he accepted to use condoms.

Taken together, sex workers' discussions of the pilot CCT intervention, *RESPECT II*, suggested that some features of the interventions were most effective at certain levels of relationship power. Specifically, while respondents were not able to use the cash transfer at the socioeconomic level to leave sex work, they could use their power at the other two levels to reduce their risk of a new STI. Furthermore, sex workers discussed using different strategies to meet the condition of the intervention (no new STIs); these strategies reflected the degree of power they could leverage in each power domain.

Table 3. Classification of Relationship Power Among 16 Sex Workers in the *RESPECT II* Pilot CCT and strategies to meet the condition of the intervention

Domain of Power	Description	Example	Number of Respondents Who Discussed the Domain of Power	Hypothesized strategies to meet the conditions of the intervention (no new STIs)
Socioeconomic	Power to decide whether or not to be a sex worker.	<i>"Those who do sex work they do because of life problem not because they like it."</i>	11	<ul style="list-style-type: none"> • Leave commercial sex work.
Logistical	Given that a woman engages in sex work, her power to decide when and where to work, and which clients to accept.	<i>"The (cash transfer) helps me reduce the number of customers in my sex work."</i>	12	<ul style="list-style-type: none"> • Limit number of partners • Choose different partners (who may have different risk profiles). • Reduce the frequency of commercial sex work.
Interpersonal	Power with individual clients to decide the nature of the sexual	<i>"He didn't want to use condoms. I told him that we have to protect"</i>	15	<ul style="list-style-type: none"> • Consistently use condoms • Fewer sex acts with the

	transaction, the price of sex, and whether or not to use a condom.	<i>ourselves (from disease) ... He was still forcing, and (therefore) I opened the door and went away."</i>		same number of partners.
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Impact of the intervention components on how sex workers experienced and used their power

The third goal of our analysis was to assess the impact of the *RESPECT II* pilot intervention on how sex workers use their power in their sex work. The pilot intervention was a multi-faceted program with several distinct components: STI testing, education about negotiating safer sex, and the conditional cash transfer. Therefore, we analyzed separately the impact of each component on how sex workers experienced and used their power. Our interviews focused on situations where the respondent faced challenges in her sex work, specifically when negotiating condoms with clients. These narratives shed light on which aspects on the intervention were most relevant to changes in the amount of power or the way sex workers reported using their power in their sex work.

Table 4. Classification of Relationship Power Among 16 Sex Workers in the *RESPECT II* Pilot CCT and strategies to meet the condition of the intervention

Domain of Power	Description	Example	Number of Respondents Who Discussed the Domain of Power	Hypothesized strategies to meet the conditions of the intervention (no new STIs)	Potential component of the intervention most relevant
Socioeconomic	Power to decide whether or not to be a sex worker.	<i>"Those who do sex work they do because of life problem not because they like it."</i>	11	<ul style="list-style-type: none"> • Leave commercial sex work. 	Cash transfers could address the severe financial constraints of participants and their lack of financial power to choose to leave sex work.
Logistical	Given that a woman engages in sex work, her power to decide when and where to work, and which clients to accept.	<i>"The (cash transfer) helps me reduce the number of customers in my sex work."</i>	12	<ul style="list-style-type: none"> • Limit number of partners • Choose different partners (who may have different risk profiles). • Reduce the frequency of commercial sex work. 	(i) Cash transfer could reduce the financial pressures of the sex worker, allowing her to work less, be more selective in which clients she takes, and limit her number of partner. (ii) The education and training could increase her knowledge of the risks of unprotected sex which may translate to reducing the frequency or work, or increasing the use of condoms.
Interpersonal	Power with individual clients to decide the nature of	<i>"He didn't want to use condoms. I told him that we have to</i>	15	<ul style="list-style-type: none"> • Consistently use condoms • Fewer sex 	(i) The education and training could provide strategies to

	the sexual transaction, the price of sex, and whether or not to use a condom.	<i>protect ourselves (from disease) ... He was still forcing, and (therefore) I opened the door and went away."</i>		acts with the same number of partners.	negotiate condom use with clients. (ii) The cash transfer could enable the sex worker to engage in fewer sex acts with each client.
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STI education and condom-use training

The STI education and condom-use training was the most discussed aspect of the intervention, compared to the STI testing and the CCT. Interestingly, while the education and training was most reported to be salient at the interpersonal-level of power where respondents learned condom negotiation skills with clients, it seemed to be less influential at the logistical or socioeconomic levels of power for sex workers. For instance, several respondents described negotiating condoms with clients by educating them about the risks of unprotected sex and the advantages of using a condom. Respondent 08 gave an example, saying that before the STI education she would accept clients without condoms, but now she shares what she learned with clients as a strategy to negotiate condom use: *"I always tell them without condom we can't do anything because nowadays you can't trust any one. Some agree, others disagree. [For those who disagree], they left"*. This suggests that respondents used the knowledge reinforced in the education and training component of the intervention. It seems that the knowledge of the risks of sex without a condom was a tool used by sex workers to leverage their power with clients and exercise their control over the use of condoms.

STI testing

The STI testing was viewed positively by respondents, and was cited by five sex workers in their narratives about challenging situations faced in their work. Specifically, respondents reported value in "knowing my health" since female sex workers in Dar es Salaam rarely use the STI testing provided at government hospitals. Moreover, seven respondents indicated specifically that knowing they were STI-free motivated them to use condoms and avoid acquiring an infection, as reflected in this comment by a mother of 3 who started sex work a few months prior when her husband died (Respondent 17):

"The difference is because I already know my health, I force the customer to use condoms even if he gives me small amount of money. But I am safe instead of being given large amount and then find out I am infected."

As noted above, strategies for avoiding a new infection manifested most often at the logistical power levels, by working less and accepting fewer clients, as well as in some cases at the interpersonal power level by requiring condoms or ending negotiations with clients who refused condoms.

Conditional Cash Transfer

Respondents often referred to the conditional cash transfer provided as a secondary benefit of participating in the intervention. While respondents directly and frequently discussed the benefit of receiving the education and training and STI tests, there was considerable variability in frequency and narratives surrounding the cash transfer. On the one hand, five respondents spoke directly about the conditional cash transfer, stating that the conditionality of the cash incentivized them to change their risky sexual behavior with clients. A woman who

came to Dar es Salaam to become a sex worker (Respondent 06) a brothel-based sex worker, illustrated this sentiment:

I know if I will be infected with any sexual transmitted diseases I will not get that (cash transfer) and am trying to be safe so that I can get this (cash transfer) again. The (cash transfer) helps me reduce the number of customers in my sex work.

On the other hand, some respondents stated that the cash transfer made no difference to their behavior, and suggested that the conditionality of the cash was not relevant to their decision-making in their sex work. A woman who supported her three children by working in a brothel (Respondent 01) and was in the high award group provided a statement reflecting this sentiment: “*I don’t think this cash transfer is enough to help me not to have unsafe sex...It will not reduce the number of customers I have.*” Further, while some respondents reported that the cash transfer was a benefit of the pilot intervention, it did not come up in interviews when they discussed the decisions they made about their sex-work, nor did they discuss specifically the conditionality of the cash transfer.

Discussion

To our knowledge, our study is the first to document how a sex worker’s ‘logistical,’ day-to-day power can be a productive dimension of behavior change in this population. We found that while sex workers are constrained in many ways, they do report meaningful power over their work logistics, enabling some to meet the conditions of the conditional cash transfer intervention and receive the cash award. This suggests that interventions focused on when to work and which clients to accept may be promising avenues to pursue. For example, cash transfers in conjunction with training on *how* to trade sex less often are relatively unexplored avenues of research.

Sex workers in our study reported a range of strategies in response to the CCT intervention, including reducing the frequency of sex work, finding clients in more lucrative locations, and using the cash transfer to start other side businesses. Since these side businesses provided alternate sources of income, study participants often chose to engage in sex work for fewer days. With boosts in their self-efficacy to determine their daily sex work schedules, and the goal of remaining STI-free to be eligible for the conditional cash transfer, some sex workers in our study appear to be well suited to use their ‘logistical’ relationship power to meet the conditions of the CCT intervention.

All respondents exhibited limited power at the ‘socioeconomic’ level. Moreover, few respondents were able to describe or identify how to leave commercial sex work. Theoretically, then, respondents had very low perceived self-efficacy, in addition to few financial resources, for leaving commercial sex work, highlighted by the several sex workers who were unable to articulate the necessary factors required for leaving sex work and those who described commercial sex work as “not a choice”, but due to “life’s hardships”. Interestingly, while respondents did not describe the cash they received as helping them leave commercial sex work, several respondents did use the cash for other income-generating businesses, which may have increased their self-efficacy in managing their work logistics and income. This suggests that CCT interventions paired with training on running a business could be a more promising approach than CCTs paired with training on condom use.

Those who started other businesses, however, did not view the income from these side businesses as sufficient for leaving commercial sex work completely. This highlights the need to manage the broader economic constraints faced by this population.

Implications

Our findings suggest new opportunities for HIV prevention among female sex workers. Currently, the prevailing approach to reducing HIV transmission among sex workers has been to promote consistent condom use between sex workers and their clients; yet this approach alone has had limited success.^{5,49} Importantly, sex workers in our study reported varying degrees of ‘interpersonal’ relationship power with clients even after the training on negotiation skills and with the potential of a cash reward – the domain where they negotiate condoms use. This heterogeneity in the degree of relationship power that sex workers experience when negotiating condom use could account for the limited success of current HIV prevention interventions in this key population. Clearly, programs providing STI information and condoms will be less effective if sex workers lack the power to insist on condoms with clients. Our findings suggest that when interpersonal power was low and sex workers could not consistently use condoms with clients, they used their greater degree of power over work logistics to employ other strategies to meet the condition of the intervention, such as limiting the number of clients, choosing less risky clients, and reducing the amount they engaged in commercial sex. This is consistent with other cash transfer interventions for HIV and STI prevention that find effects on partner selection, but little effect on increased condom use¹⁶ as well as research on risk-reduction in the general population³². Further studies are needed to determine how to best target CCTs to this population enabling them to leverage their relationship power over their work logistics to decide when to find clients, how often, and where to find them in a way that reduces their risks of contracting a new STI.

Limitations

Several limitations of this research should be noted. First, regarding sampling, it is possible that very marginalized women under the control of pimps or others who organize their work were not permitted to join our study. However, we acknowledge that while we were not able to reach all female sex workers, we were successful in enrolling a diverse sample of ‘low-end’ sex workers who receive very little pay and are likely to respond to the size of the cash-transfer that we offered. Second, we rely on self-reported behavior, which could be subject to social desirability bias, where some respondents misrepresented what elements of the intervention contributed most to their behavior change. In particular, respondents might have felt that it was socially desirable to diminish the role of the cash transfer and emphasize the role of the education. However, the main focus of this analysis is relationship power and it is unlikely that the data contain a systematic bias in how relationship power is experienced and reported in our study population. Finally, our interviews were transcribed and translated from Kiswahili, which introduces the possibility that some of the nuances of the interviews were lost in translation into English. We note, however, that the interviewer also conducted the transcriptions and translations, promoting the likelihood that the English transcripts reflected the meaning of the interviews.

Summary

In conclusion, our analysis indicates that sex workers in our study population experience several nuanced levels of power in their relationships with clients. While sex workers are seriously constrained in several dimensions of their working lives, they possess significant power and control in decision-making over work logistics. The ‘logistical’ power identified in our analysis

provides a promising avenue for behavior change in sex worker populations, and further research can identify how sex workers can use this power to reduce their risk of HIV and STIs.

Conclusion

What distinguishes HIV from other diseases is its transmission via sexual contact between partners; if one partner has significantly less power than the other, he or she is unable to negotiate with whom to have sex, how often, and whether or not it includes a condom – all proximate determinants of the spread of HIV. The continued high rate of HIV among women is perhaps the single-most striking statistic that reveals women's persistent inequality. Women, particularly poor women, have many challenges when negotiating safer sex.

A closer look at the HIV epidemic reveals two critical social determinants of the spread of the disease: poverty and women's negotiation power in their sexual relationships. Therefore, to prevent HIV and other Sexually Transmitted Infections (STIs), we need approaches that address these structural and economic determinants of poverty and gender inequity in relationships. Programs that target poverty and gender-equity hold promise in combatting the spread of HIV.

A series of recent experiments have investigated Conditional Cash Transfers (CCTs), shown to be effective in other health and social domains, as incentives to reduce risky sexual behaviors. My dissertation focuses on the RESPECT study and the RESPECT II pilot study, randomized, controlled trials that investigated the effectiveness of cash rewards, conditional on participants having tested negative for STIs, to prevent risky sexual behaviors among young adults in Tanzania. My dissertation explores whether sexual relationship power - the power women have to decide if and when to have sex, with whom, and with or without a condom - influences the effectiveness of CCTs to reduce STIs, and additionally, if these CCTs influence relationship power.

In chapter 1, I demonstrate that women's relationship power significantly modifies the effect of the CCT on STIs. Specifically, among women with high relationship power, we identified significantly increased odds of having a STI at 12 months for women in the low cash arm (T2) compared to the control group (T1). The effect of the CCT was similar among women with low relationship power in both cash transfer arms (T2) and (T3), where women had an odds close to 1 of testing positive for a STI at month 12. To our knowledge, this is the first study that analyzes the impact of women's relationship power on the effectiveness of a CCT to reduce STIs and HIV.

Chapter 2 analyzes the effect of each treatment arm on changes in relationship power for women in the RESPECT study. My analysis suggests that there was no change in the difference in relationship power from baseline to month 12 between women randomized to receive cash compared to women in the control group. While women in all three treatment arms reported an increase in relationship power over the course of the 1-year intervention, no treatment arm experienced a greater or smaller change compared to the others.

The qualitative analysis of the RESPECT II pilot study in Chapter 3 indicates that sex workers in our study population experienced several nuanced levels of power in their relationships with clients. While sex workers are seriously constrained in several dimensions of their working lives, they possess significant power and control in decision-making over work logistics. The 'logistical' power identified in our analysis provides a promising avenue for behavior change in sex worker populations, and further research is necessary to identify how sex workers can use this power to reduce their risk of HIV and STIs.

My research helps advance our understanding of how CCTs can be successful in this context by *i)* elucidating how differences in women's relationship power influence the effectiveness of CCTs in reducing STIs and HIV, *ii)* analyzing how the CCT changes women's

relationship power, and *iii*) identifying the salient domains of power for female sex workers to meet the conditions of a CCT intervention. Acknowledging and addressing both the degrees of relationship power and domains of relationship power that women experience when enrolled in a CCT will improve the outcomes of these interventions in the context of STIs and HIV.

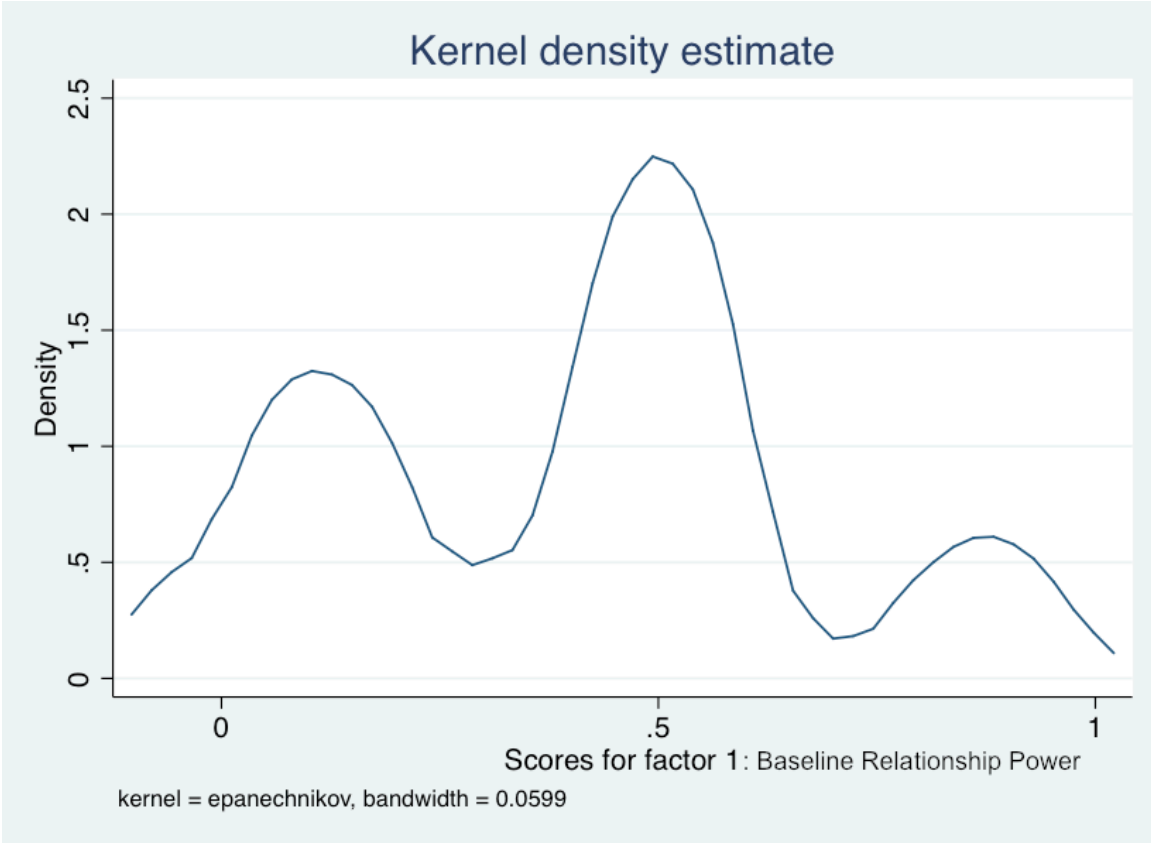
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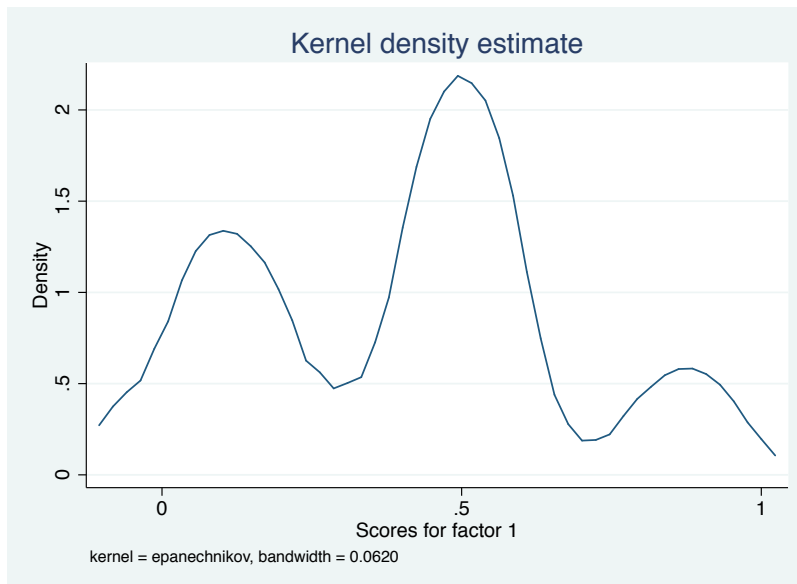
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Appendix 1 Kernel Density Curve of Baseline Relationship Power for Women in the RESPECT CCT in Tanzania

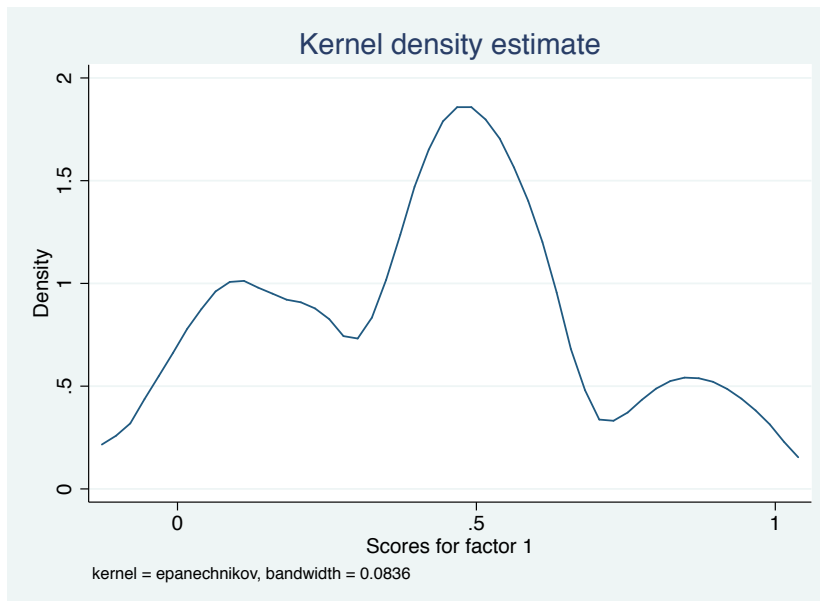


Appendix 2

Non Attrited N=837, Mean Relationship Power Scores at Baseline



Attrited N= 152, Mean Relationship Power Scores at Baseline

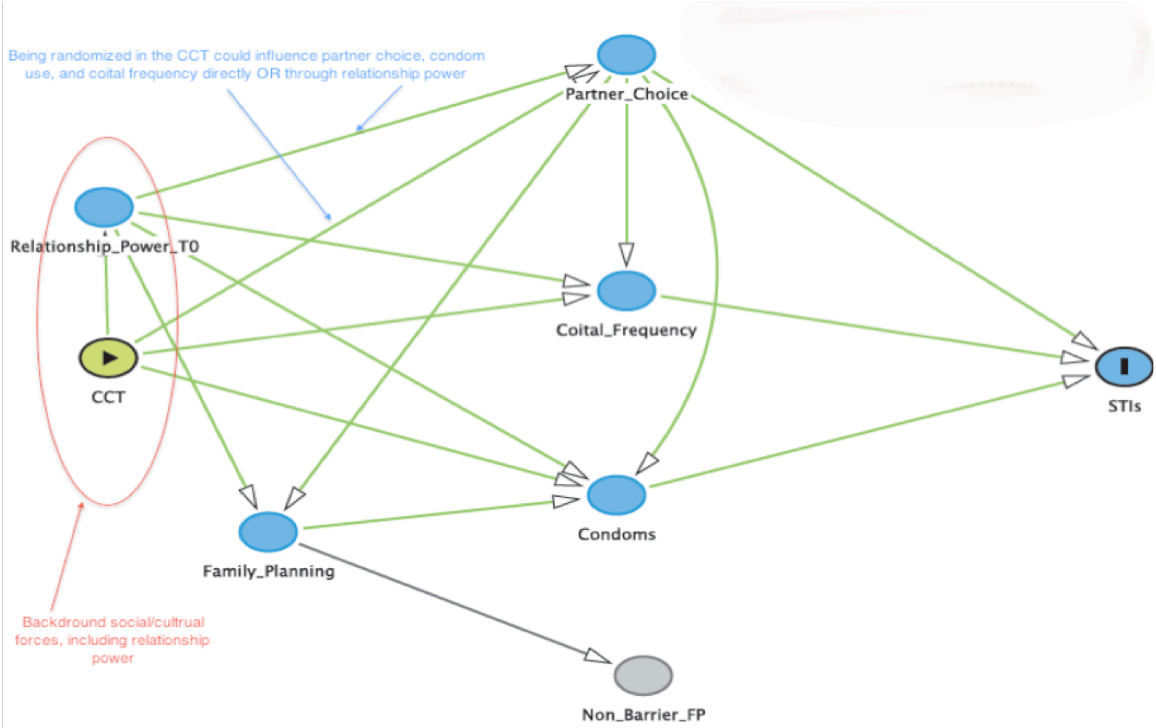


ANOVA:

Source	Analysis of Variance			F	Prob > F
	SS	df	MS		
Between groups	.0391543	1	.0391543	0.56	0.4525
Within groups	66.8385356	964	.069334581		
Total	66.8776899	965	.069303306		

Bartlett's test for equal variances: $\chi^2(1) = 0.0080$ Prob> $\chi^2 = 0.929$

Appendix 3 Conceptual Framework for Behavior Change in a CCT Intervention to Reduce STI Incidence



Appendix 4: RESPECT II Pilot Study Design

Drawing on the RESPECT study findings,¹³ where STI incidence among the high award groups decreased compared to the other study arms, the purpose of the *RESPECT II* pilot study was to test a CCT in a high-risk, key population in the spread of HIV. We used respondent driven sampling to identify eligible sex workers defined as: To be eligible to take part in the study, participants had to fulfill several criteria including: self-identify as a commercial sex worker, be 18 years old or older, have exchanged sex for money in the past six months, be living in Dar es Salaam, self-report as not being pregnant, be HIV-negative at baseline, be able to adequately provide informed consent, and possess a valid recruitment coupon. Recruitment coupons were distributed via Respondent-Driven Sampling (RDS), a technique for accessing hard-to-reach and hidden populations.³⁶ RDS is a chain-referral method designed to approximate a probability-based sample and reduce bias associated with other chain-referral methods.

The study site was located in a house dedicated to the study activities, located in a central neighborhood of Dar es Salaam, and was accessible by public transit. The study site had private, closed rooms for interviews and STI tests. Study visits took place in the afternoon to accommodate the sex workers' nighttime work schedules.

Intervention Design and Data Collection

The *RESPECT II* pilot study included 3 study visits: a baseline visit, a 2-month follow-up visit, and a 4-month final follow-up visit. At baseline, eligible participants were randomly assigned to receive either a high-amount cash transfer of \$40 or a low-amount cash transfer of \$20, and this randomization assignment was fixed for all study rounds. At baseline, participants were tested for HIV, syphilis, and trichomonas. Those who tested positive for HIV were ineligible for the study and were referred to a nearby care and treatment center while those testing positive to trichomonas or syphilis received treatment vouchers and were eligible for the study. At the end of the baseline visit, those testing negative for both STIs received the CCT, either the \$20 or \$40 amount in cash, according to their randomization assignment. At baseline, trained counselors administered a structured survey. All participants received HIV pre-test counseling, addressing how the HIV test worked, ways HIV is transmitted, common misconceptions about HIV and HIV transmission. Importantly, part of the HIV pre-test counseling included a section to help participants develop a plan to reduce HIV risk in the future. At the second study visit, 2-months after baseline, participants were again tested for trichomonas and syphilis, and if negative, again received the CCT in cash at the end of the study visit. At the 2-month visit, a selection of 24 participants took part in an in-depth HIV prevention counseling discussion session, focusing specifically on the combined challenges of reducing HIV risk in the context of alcohol and drug use. At the 4-month, final study visit, participants were again tested for trichomonas and syphilis, and received the CCT in cash if they had negative results for both STIs.