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Cash transfers, young women's economic well-being, and HIV risk: Evidence from HPTN 068

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Abstract

Despite the large interest in economic interventions to reduce HIV risk, little research has been done to show whether there are economic gains of these interventions for younger women and what intermediary role economic resources play in changing participants' sexual behavior. This paper contributes to this gap by examining the impacts of a conditional cash transfer (CCT) for young women in South Africa on young women's economic resources and the extent to which they play a role in young women's health and behavior. We used data from HIV Prevention Trials Network (HPTN) 068 study, which provided transfers to young women (in addition to their parents) conditional on the young woman attending at least 80% of school days in the previous

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month. We found that the CCT increased young women's economic well-being in terms of having savings, spending money, being unindebted, and food secure. We also investigated heterogeneous effects of the program by household economic status at baseline because the program was not specifically poverty targeted and found that the results were driven by young women from the poorest families. From these results, we examined heterogeneity by baseline poverty for other outcomes related to HIV risk including sexual behavior and psychosocial well-being. We found psychosocial well-being benefits in young women from the poorest families and that economic wellbeing gains explained much these impacts.

Introduction

Globally, young women and adolescent girls are disproportionately affected by poverty [1,2]. Girls that grow up in poor contexts encounter more discrimination and violence and have less access to education and health services than their male counterparts [3]. They also have limited opportunities for economic advancement since they typically lack access to and control of economic resources including assets and financial capital [1]. Social norms such as early marriage and exclusion from economic institutions like formal banking all work to further entrench these economic asymmetries between men and women [2]. Poverty's disproportionate burden on young women has been recognized as an important risk factor in their increased vulnerability to HIV [4–6] and one reason for high sustained HIV rates among young women in sub-Saharan Africa (SSA) despite declining HIV rates across the general population [7–9].

For young women and adolescent girls in high-poverty contexts, economic vulnerability influences and interacts with gendered power imbalances in sexual relationships to increase their risk of HIV [10,11]. Across poor rural and urban areas in SSA, young women often seek out sexual partnerships to increase their economic and social capital [10, 12–14]. With these goals in mind, young women may choose to partner with older men who are better able to provide them money and gifts [15,16]. Partnerships with older men that are primarily transactional in nature enhance the gendered power imbalances within the relationship and it is men who tend to dominate sexual decision-making such as whether to use a condom [17–19]. Evidence shows that age and economic asymmetries play an important role in young women's HIV vulnerability as they are associated with riskier sexual behaviors [10,17]. Further, age-disparate sex and transactional sex are associated with an increased risk of HIV acquisition [19,20]. Young women have little power to challenge men's dominance in sexual decision-making because their economic vulnerability works to reinforce their low bargaining power [10]. Therefore, the pathway through which poverty is believed to increase young women's vulnerability to HIV is by furthering their dependence on men and constraining their relationship power such as their ability to refuse sex, negotiate safe sex, or leave risky relationships [5,21].

In response to this evidence, structural interventions to increase economic resources and opportunities for young women and girls have been prioritized as an HIV prevention strategy in SSA because they are hypothesized to empower women and influence risk attitudes and behaviors [5,22–25]. The economic theory underlying this reasoning is that individuals in

poverty make decisions with survival or immediate gratification in mind rather than thinking and planning for their future. However, when subjected to the conditions of poverty such as chronic hunger, material deprivation, and social exclusion, these decisions, including sexual decisions that put individuals at greater risk of HIV, can be seen as logical based on the reality of available economic opportunities [26,27]. Interventions that work to change the opportunities available to young women in poverty by increasing economic resources such as credit, savings; and financial capital, may empower young women to make decisions more amenable to the future rather than immediate needs. Programs that enhance economic security and future expectations of young women may also increase self-esteem, self-efficacy around communication and negotiation skills, and enhance decision-making [21,22]. Therefore, 'economic empowerment' interventions are hypothesized to reduce sexual risk behaviors by building 'resistance' to risky situations and 'resilience' to face economic shocks [28].

Despite the theory that empowering aspects of a woman's economic resources can result in reduced risk of HIV acquisition, evidence to-date is mainly observational and does not show a clear pattern [29–31]. One recent study found more positive associations between individual economic resources and protective sexual behaviors among sexually active young women in South Africa [31] while others have been more mixed [29,30]. In Cameroon, women (aged 15–49) with greater economic resources displayed more protective factors such as greater HIV knowledge and more condom use but were also more likely to test positive for HIV and to engage in riskier sexual behaviors such as having multiple partners in the past 12 months [30]. Poor women that participated in a microfinance intervention in South Africa had greater asset ownership at the end of the study compared to the control group, but participants were older women (aged 34–49) and self-selected into the program [32]. Some evidence also exists from economic empowerment interventions for adolescents but focuses on the impacts of economic resources on sexual risk-taking intentions, also finding mixed results [33,34].

Although there is mounting experimental evidence from structural HIV prevention interventions on sexual behaviors and HIV for young women [11, 25, 35–39], these studies rarely examine economic empowerment directly or how it functions as the pathway underlying program effects. Specifically, we know little about the impacts of interventions on 1) individual economic outcomes and 2) the mediating role of economic well-being on sexual decision-making or attitudes that influence decision-making.

This paper fills this gap by using longitudinal data from a randomized conditional cash transfer program (CCT) for HIV prevention (HPTN 068) to assess its impact on individual economic well-being and the role economic empowerment had on program outcomes related to HIV risk. The CCT was targeted to young women attending high school in a poor, rural area of South Africa and provided monthly cash transfer to young women and her parents, conditional on continued school attendance. While there was no effect of the CCT intervention on HIV incidence, there were some improved sexual behaviors and a large reduction in the risk of intimate partner violence [39]. An analysis of baseline data also showed that individual economic resources among the study sample were associated with a number of HIV preventive practices including periodic sexual abstinence, having fewer

sexual partners, and consistent condom use [31]. Further, a qualitative analysis by MacPhail et al (2017), found young women in the treatment group experienced a number of benefits due to the cash itself, including enhanced status with peers and feelings of independence, which may have consequently affected their sexual risk-taking behavior and psychosocial well-being [40]. We therefore examine whether economic well-being went on to contribute to other program impacts on sexual behavior and subjective measures of well-being. While the HPTN 068 cash transfer experiment took place in a poor, rural area of South Africa, the program was not poverty targeted. Therefore, in addition to the total effect on the economic empowerment of young women, we also examined the heterogeneity in program effects by assessing the role of household socio-economic status at baseline.

Methods

Data

Study site and design—Participants for this study were recruited from villages within the Agincourt Health and Socio-Demographic Surveillance Systems (HDSS) catchment area in Mpumalanga province, South Africa near the Mozambique border. This rural area is characterized by high poverty and HIV prevalence [Kahn et al 2012; Gomez-Olive et al, 2012]. Many households are food insecure and rely on government support in the form of non-contributory grants like the Child Support Grant and the Old Age Pension. Migration for work is also common for men and increasing for younger women leaving older women to care for children [41]. The most recent HIV prevalence survey in 2010 indicated a prevalence of 5.5% among girls aged 15–19 and 27% among young women aged 20–24, with peak prevalence at 46% among women aged 35–39 [42]. The HPTN 068 trial found incidence among young women during the trial of around 2% (per person-year) [39].

HPTN 068 (or Swa Koteka) was an individually randomized CCT intervention for females aged 13–20 attending high school designed to test whether CCTs are an effective HIV prevention strategy. It was hypothesized that cash would reduce HIV acquisition by helping keep girls in school. Study participants in the treatment arm received financial support in the form of monthly cash transfers, conditional on regular school attendance (at least 80% of school days in the previous month) while the control arm received no transfers. Participants continued to receive transfers for up to three academic years (as long as they met the attendance criteria) or until they graduated high school. In addition to the direct transfer for the young woman, Swa Koteka also included a monthly transfer to the parents (or guardians) of participants, which was also conditional on the young woman's school attendance. Cash transfers for both the young woman and the parent or guardian were deposited directly into their respective bank accounts. Monthly cash transfers amounted to 300 Rand (R), R100 for the young women and R200 (roughly US\$ 10 and US\$ 20 using 2012 conversion rates) for the parent or guardian. This total amount was chosen to be on par with the income from the Child Support Grant and represented a significant proportion of household consumption since monthly per capita household expenditure was R295 at baseline.

Beginning in March 2011, study participants were recruited and by the end of 2012, 2,537 were found eligible and enrolled into the study. To be eligible for the study, young women had to be enrolled in a participating high school in the study location and be 13–20 years

old. Other eligibility requirements included not being married or pregnant, living with at least one parent or guardian, being able to read, having or being able to open a bank or post office account, and be willing to take an HIV and herpes simplex virus (HSV)-2 test. After being recruited to the study, participants completed an Audio Computer-Assisted Self-Interview (ACASI) and HIV and HSV-2 tests, which included pre and post-test HIV counselling. Once baseline assessments were completed, young women (and their parent or guardian) were individually randomized (1:1) to either the treatment or control arm.

Follow-up visits occurred annually at 12, 24, and 36 months or until the participant graduated from high school. A flow diagram of study participants over the trial has been previously published [39]. At each follow-up visit, young women completed an ACASI, HIV and HSV-2 testing (if negative at the previous visit), and pre and post-test HIV counselling. Parents or guardians also completed a household survey at baseline and each follow-up visit. Consent for study participation was obtained at the home visits with written informed consent from both young women and her parent or guardian. Written assent was obtained for female participants under 18 years old. Institutional Review Board approval for this study was obtained from the University of North Carolina at Chapel Hill and the University of the Witwatersrand Human Research Ethics Committee as well as the Provincial Department of Health's Research Ethics Committee.

Measures

Economic well-being was measured at both the household level and the individual level of the young woman. Dependent variables at the household level include total and food per capita household consumption. Economic well-being outcomes for the young woman include measures of economic and food security—food worry, borrowed any money (from anyone outside her household), and paid work—as well as access to economic resources—savings, bank account, and spending money. To assess the overall impact of the CCT on young women's economic well-being, we created an index measure that consists of four indicators coded to represent greater well-being: 1) food secure (no food worry past 12 months), 2) always had spending money (past 12 months), 3) never borrowed money (past 12 months), and 4) had savings. We excluded access to bank accounts in our analysis since opening a bank or post office account was an eligibility requirement in order to safely transfer the cash to young women in the treatment arm. We also excluded paid work in our main index measure for economic well-being because it is uncertain whether engaging in paid work signifies greater well-being in our sample of school-attending young women. Participating in paid work could instead be a consequence of economic deprivation and demand time away from school.

Additional outcome measures include young women's sexual behaviors and psychosocial well-being to further examine whether baseline poverty status and individual economic well-being affected the CCT impacts on these measures. The importance of individual resources for young women's psychosocial well-being is becoming increasingly clear in the literature [43–45] including among these young women, as evidenced from both qualitative and quantitative data [40].

Psychosocial constructs include perceived power in sexual relationships, mental health, and hopefulness. Power in sexual relationships was measured using the 12-item sexual relationship power scale (SRPS), adapted for South Africa [46,47]. Mental health was measured using the 20-item Center for Epidemiological Studies Depression scale (CES-D) [48]¹ and hopefulness was measured using a 13-item Hope scale developed and validated for this population [49]. Each of the scales were scored on a four-point Likert scale, summed, and rebased to zero. Higher scores reflect greater power in relationships for the SRPS, greater depressive symptoms for the CES-D, and greater feelings of hope for the Hope scale. To compare effects of these varyingly scaled measures, we standardized outcomes so that each of the coefficients represent the effect change in standard deviations (z-scores). In addition, we tested for differential treatment effects for sexual behaviors that we hypothesized could be affected by individual economic resources including having any sexual partner, and for sexually active young women, having an older partner (5+ years difference) and having any transactional sex (exchange of sex for money and/or gifts).

Estimation Strategy

Since the Swa Koteka CCT program was not poverty targeted, we hypothesized that the money may have had a stronger economic benefit for young women from the poorest households. To understand this relationship, we first investigated the association between our outcomes of interest and relative baseline poverty, defined as being from the bottom 50% of the sample in terms of total per capita household consumption. We choose this cutoff as nearly half of the sample's total consumption fell below the South African food poverty line at baseline and this created large enough subsamples to retain power to estimate differential effects [50]. For all economic outcomes at the level of the young women, we estimated the effect of baseline poverty on each outcome using generalized linear models with robust standard errors, and adjusted for young women's age, grade level, household size, and whether they have ever had sex. Demographic controls were chosen based on existing literature on the confounders for our exposure–outcome relationships.

Next, we estimated the total effect of the CCT intervention on outcomes using an intent-to-treat (ITT) estimator. We used the linear model displayed in Equation (1) where CCT_i is the indicator for treatment, Y_{it} is the outcome of interest and ε_{it} is the error.

$$Y_{it} = \beta_0 + \beta_1 CCT_i + \varepsilon_{it} \quad (1)$$

In addition to Equation (1), which gives us the total ITT effect, we also estimate Equation (2) to test for moderation of the treatment effect by baseline poverty status where P_i is an indicator for being in the bottom half of the sample at baseline, and $CCT_i P_i$ is an interaction term between indicators for treatment and the baseline bottom half.

¹The CES-D was not included in the baseline survey so we show baseline descriptive data for the 10-item Children's Depression Index (cite) in Table 1.

$$Y_{it} = \beta_0 \alpha + \beta_1 CCT_i P_i + \beta_2 CCT_i + \beta_3 P_i + \varepsilon_{it} \quad (2)$$

Using the p-value on the interaction term from Equation (2), we can also test for significant differential treatment effects by baseline poverty status.

In addition, we further investigated the role of economic well-being as a mediator to explain other program impacts on sexual behaviors and psychosocial well-being. For this we examined the extent to which heterogeneous treatment effects can be explained through the impacts of the CCT on economic indicators for young women from the bottom half. We estimated a simple model for mediation that builds off Equation (2) by including additional terms for economic index in the model.

$$Y_{it} = \beta_0 \alpha + \beta_1 CCT_i P_i + \beta_2 CCT_i + \beta_3 P_i + \beta_4 Econ_{it} + \varepsilon_{it} \quad (3)$$

$Econ_{it}$ is a vector that includes the economic index as both a contemporaneous and baseline covariate; baseline levels are controlled for to account for confounding between the mediator and dependent variable [51]. We then compared the treatment effect estimates from the mediated model to those from the unmediated model to evaluate how much the economic index attenuates the treatment effect. Attenuation of the treatment effect would suggest that other program impacts can be explained, at least in part, because of impacts to young women's economic well-being.

To estimate Equations (1), (2), and (3), we used General Estimating Equation (GEE) models with exchangeable correlation structure and robust standard errors. GEE models were used to account for repeated observations on participants over the three follow-up study visits. Models with dependent variables at the level of the young woman additionally control for her age at baseline. Statistical analysis was performed using Stata 14.2.

Results

Sample and baseline balance

This analysis used data from the three follow-up visits during the main trial. The baseline sample included 2,533 young women of which 2,448 were HIV negative and included in the main analysis [39]. At the final planned visit, retention was 87% in the control group and 95% in the intervention group, however, differential retention was not significant and weighting for loss did not affect main study results [39]. Since we focus on economic outcomes in this analysis, we include all young women with at least one follow-up survey visit, N=2,438. Table 1 provides baseline descriptive statistics for demographic and outcome variables used in this analysis. We tested for balance by regressing baseline covariates on treatment indicators using OLS regression models. P-values in the right-hand column show that there are no significant differences across the two groups. Study participants were also balanced on the main study outcomes of HIV and HSV-2 infection status [39].

All young women participating in the study were South African and of black race/ethnicity and had a median age of 15 years (IQR 14–17). More than 80 percent of households were receiving the South African Child Support Grant for at least one of their children during the study period, which indicates that young women in the study generally lived in poor households. Table 1 provides additional detail about the low socio-economic status of young women in the study. At baseline, only 25% had any savings and 16% had a bank or post office account. Additionally, a little over half of women had regular access to their own spending money (median amount per month: R50). For women that had any money, the main source of that money is from their families, followed by a job, and then outside grants (see Figure 1 for full classification of sources). Despite a job being women's top three sources of their money, only 15 percent of young women report working at baseline. This low rate is likely due in part to eligibility requirements that young women enrolled in the study had to be in school and thus less able to hold a job at the same time. However, it also reflects the context of the study area, where employment opportunities are limited and youth unemployment is especially high [52].

Relative poverty of sample

At the time of baseline data collection in 2011, the poverty line set by the Government of South Africa was R620 per capita/month [53]. The mean total per capita consumption of treatment and control households was R455 and R473/month respectively (Table 1), indicating a high rate of households in poverty. However, this is only a rough measure of poverty since our measure of aggregate consumption is not directly comparable to the government's measure used for determining poverty lines. On the other hand, the South African food poverty line (the amount which the government deems necessary for essential basic needs) provides a better basis of comparison as our survey included a comprehensive food consumption module. The food poverty line was R321 per capita/month in 2011 [53], which is around 70 percent of total per capita consumption and almost R100 higher than the average per capita food consumption among our sample (Table 1). Food consumption among our sample also makes up around half of total consumption signifying that most consumption is for basic needs in these households. Further evidence of low food consumption is reflected in the fact that nearly one-third of young women in both groups reported being worried about having enough food in the past 12 months.

Next, we estimated the baseline association between young women's economic outcomes and relative household poverty (Table 2). Relative household poverty was defined as being from the bottom half of the sample in terms of total per capita household consumption (a comparison of baseline characteristics for poverty subgroups can be found in Appendix Table A1). Table 2 shows that being relatively worse off is an important and significant predictor of young women's economic participation and control of economic resources. In particular, young women living in poorer households are 4 percentage points (pp) more likely to work while they are less likely to have savings (−11pp), a bank account (−7pp), or have discretionary funds (−7pp). There is no significant relationship, however, between relative poverty and whether a young woman borrowed money from anyone outside the family.

The relationships between relative poverty and young women's economic resources at baseline suggests that household poverty may play a role in the extent to which the cash transfer effects these economic resources. However, these baseline relationships do not make clear what direction the relationship would take. The design of this CCT provided both the young woman and her household with conditional monthly cash payments, so depending on both perceptions of how the young woman's money is to be used and the impact of the household transfer on household economic well-being, a young woman may feel obligated to use her own transfers to contribute to the household [43]. In this case, we may find smaller treatment effects for young women from the poorest households if greater financial stress in these households translates into more pressure on the young woman to help out her family. Alternatively, recent qualitative and quantitative findings do not suggest that young women generally felt pressured to contribute to their households [40]. Consequently, we might observe larger treatment effects for young women from the poorest families since they start from a lower level of resources at baseline and thus have more to gain. In the following analysis, we further examine whether baseline poverty moderates the causal effect of the CCT on young women's resources.

Effects on economic well-being

We first illustrate how young women's financial independence changed in Figure 1, which shows the distribution of young women's 'main source of money' by time and treatment arm. The baseline categories include family, friends, job, boyfriend/partner, sex work, other, or 'didn't have money'. At follow-up, the CCT became an additional source. We see that there is a balance between treatment and control groups across categories at baseline, but during follow-up, there is a clear shift in the distributions between treatment and control groups, primarily because of the introduction of the CCT. At baseline, the most commonly reported source of young women's money was her family and then her job, these two accounting for over 50 percent of responses in both study arms. During follow-up study visits, jobs become less important and a woman's family is a larger source of money for both groups compared to baseline, but the CCT becomes the second largest main source (27%) for young women in the treatment group². Additionally noteworthy is that reports of boyfriends as a 'main source of money' is low (less than 4%) across baseline and follow-up for both study arms³.

Next, Table 3 provides estimates for both the total and differential impacts of the CCT on household consumption and the index of young women's economic well-being. Columns 1 to 4 show that the CCT significantly increased both total and food per capita household consumption between 4 to 5 percent, but there was no significant differential effect by baseline poverty status as indicated by the interaction term in columns (2) and (4). Additionally, the coefficients for the baseline bottom half indicate that the poorest households in control group have much lower total and food consumption across follow-ups,

²3.4 percent of control group also reported the CCT as their main source of money. This data could be due to misreporting, but as there were reports of young women in the treatment group sharing their money with friends and siblings, this may reflect those allocations.

³Less than half of women report being sexual active during the trial, however, of the women that report having a partner, the majority report that they received money at some point from their partner.

signifying that our baseline poverty designation was also a good measure for persistent poverty.

Comparatively, for young women, the CCT led to a significant increase in the index for economic well-being of 0.15 points (Column 5, $p < 0.01$), a modest 8.5% increase from baseline. There was also a significant differential treatment effect for the women from the bottom half at baseline (Column 6). The interaction term in Column (6) indicates the CCT led to a larger impact on the economic index (0.16 points, $p < 0.01$) for the bottom half over the top half. Consequently, the marginal effect of the CCT on the index for the bottom half is 0.23 points ($p < 0.01$), representing a 14.4% increase from their mean at baseline. The marginal effect for the top half is much smaller at 0.07 points ($p < 0.1$).

This relationship is also apparent in CDF plots of the index by treatment status shown in the Appendix (Figure A1). Compared to baseline, when distributions are equal, there is a clear shift at follow-up and this is driven by the effects for those in the bottom half.

We also examined marginal treatment effects on individual items of the resource index to understand which are most improved by the CCT (Figure A2). We find significant increases in *savings* and *always having spending money* among the full sample but no heterogeneity across poverty subgroups. For *food secure* and *never borrowed*, however, we find significant differential treatment effects which are explained by improvements for young women from the poorest households. Additionally, young women from the bottom half are significantly less likely to be doing *paid work* compared to young women from the top half.

Effects on other outcomes

The second part of our analysis then examined whether baseline poverty status further influenced the treatment effect on other study outcomes of interest including sexual behaviors: having any sex partner, transactional sex and older partner (among sexually active), and psychosocial well-being. Psychosocial outcomes include sexual relationship power (SRPS z-scores) for the sexually active only, depressive symptoms (CES-D z-scores), and feelings of hopefulness (Hope z-scores)). For each of our outcomes, we tested for differential treatment effects using Equation (2) but also show the total treatment effects using estimates from Equation (1) (many of which have been presented elsewhere; see [39]).

Table 4 displays results for each outcome from separate regressions for the total effect (Model 1) and moderated effect (Model 2). For all sexual behavior outcomes (Columns 3–6), there are no differential effects by baseline poverty status and the only significant treatment effect (as reported in the results from the main trial [39]) is for any sexual partner in the past 12 months (RR 0.91, $p < 0.05$). In contrast, for each psychosocial outcome in Table 4, we find no total treatment effect but large differential treatment effects. Results from the psychosocial outcomes indicate that the CCT had more beneficial effects on psychosocial well-being for young women from the poorest households at baseline. Coefficients, which are in standard deviations (SD), from the interaction terms show the poorest young women have higher sexual relationship power scores (0.28 SD, $p < 0.01$), greater hope (0.14 SD, $p < 0.05$), and lower depressive symptoms (−0.12 SD, $p < 0.10$) than those from the top half at baseline. The positive impacts of the CCT for young women from

poorest families at baseline are also in stark contrast to negative association between psychosocial wellbeing and being from the poorest families for the control group—coefficients for the ‘Baseline poverty’ indicator are all strongly significant and indicate lower psychosocial well-being.

Furthermore, we estimated marginal effects of treatment by poverty status using the model estimates presented in Table 4 (results not shown in Table 4). The marginal effects for young women from the bottom half calculated also indicate a beneficial effect of the CCT (SRPS 0.14 SD, $p=0.05$; CESD -0.09 SD, $p=0.07$; and Hope 0.05 SD, $p=0.30$). Comparatively, marginal effects for women from top half are all in the opposite direction (SRPS -0.14 SD, $p=0.05$; CESD 0.05 SD, $p=0.31$; and Hope -0.09 SD, $p=0.08$). Figure 2 provides a visualization of these contrasting effects, making it clear that the positive impacts for the bottom half were washed out by the top half, leading to near zero treatment effects for full sample.

Mediation of Impacts

Given the strong results for the poorest young women from Table 4, we further examined whether the differential treatment effects on psychosocial outcomes are attributable to the CCT impacts on their economic resources. We explored mediation of psychosocial wellbeing in Table 5 using the economic index used earlier (*always had funds, had savings, never borrows, and food secure*). In addition, we also used a second economic index that adds *no paid work* to the existing measure. We chose to add this indicator to the index because of the large differential impact on paid work as shown in Figure A2.

To examine these relationships, we estimate the simple mediation model shown in Equation (3) that includes the economic index in the model at contemporaneous and baseline levels. Results in Table 5 show that for CES-D and Hope, the addition of the economic index clearly attenuates the total treatment impact for the poorest half with the strongest attenuation in the last model, where the index also includes *no paid work*. The magnitude of the treatment effect is attenuated by 21% (from -0.14 SD to -0.11 SD) for the standardized CES-D score and 36% (from 0.14 SD to 0.09 SD) for the standardized Hope score in the third models (column 6 and 9, respectively). The coefficients on treatment effects are also no longer significant below the 10 percent level. On the other hand, the strong effect of the CCT on the sexual relationship power scale (SRPS) for poorer young women is less affected by the economic index. The total treatment effect is attenuated by 18% in the last model (column 3) but is still significant at the 5% level. Notably, the economic index is strongly associated with psychosocial well-being as coefficients for the economic indices are large and highly significant ($p<0.01$)

Lastly, Figure 2 also shows the change in marginal effects for the bottom and top half after including the economic well-being index (without paid work) as a mediator⁴. The mediated effects for the bottom half are all clearly smaller (attenuated) and insignificant after accounting for young women’s economic resources. The mediated effects for the top half,

⁴Results look the same for the resource index with no paid work.

however, are either the same size or larger compared to the total treatment effect and significant for SRPS and Hope z-scores.

To summarize, the pattern of results indicates that the CCT had the largest impacts on young women's economic resources for those study participants that were from the poorest households at baseline and that these impacts help explain the psychosocial well-being improvements for those same participants. In this way, the CCT appears to be most protective of the young women that would have otherwise been more at risk for depression and lower sexual empowerment. However, the improvement in economic well-being for the poorest young women did not explain as much of their increase in sexual relationship power scale (SRPS) as it did for the CES-D and Hope scales.

Discussion

Economic empowerment has shown promise in reducing HIV risk for young women, however, research is scant on the role economic resources play in empowering participants to gain control over their sexual lives [11, 25, 35–39]. Here, we focused on the effects of the CCT on the economic resources of participants to provide new experimental evidence on the scope of cash transfers as a structural HIV intervention to impact women's economic empowerment. We found a significant increase in economic well-being for young women who received transfers, and that the economic impact of the CCT is stronger for young women that come from the poorest families. In comparing the distribution of economic resources in each subgroup across treatment arms, it is clear that young women from the poorest households benefit most from the cash transfer because they would not have otherwise had those resources compared to young women from the better off households.

When we further examined other program outcomes for heterogeneous effects by relative baseline poverty status, we find evidence that the CCT also improved psychosocial well-being for young women from the poorest families but not the better off families. Program impacts on scales for depression, sexual relationship power, and hope each displayed the same contrasting pattern. Results show a beneficial effect of the CCT for young women from poorest families compared to a negative effect for young women from the better off families. In this way, the heterogeneity in treatment effects for the top and bottom half were washed out in the full sample so that the total treatment effect is both null and approximately zero. Further investigation revealed that these heterogeneous impacts are partly explained by the increase in economic resources that were also driven by young women from the poorest families.

In assessing economic resources mediating role in young women's behavior and health outcomes, this analysis provides a greater understanding of the underlying mechanisms through which such programs affect outcomes. This is important for assessing the theory behind economic empowerment for HIV prevention in this population and for distinguishing the effectiveness of specific interventions. An earlier structural HIV prevention intervention for adolescent girls in Zimbabwe found that not only was microfinance ill-suited for younger women due a combination of age, gender, and structural barriers, but having extra cash and traveling for business made some girls more vulnerable to theft and harassment [54]. Those

findings highlighted the need to critically examine whether and how structural interventions improve economic empowerment or whether they lead to unintended consequences that can heighten young women's risk and vulnerability. This analysis contributes to our understanding of the process by which individual and household economic factors affect young women's ability to control and direct their lives. More rigorous research is needed on this relationship in other contexts and settings in order to design and target appropriate and effective economic interventions for girls and women across the region.

This work builds on previous evidence from a similar cash transfer experiment in Malawi that also included direct transfers to girls. That program resulted in increased schooling and reduced HIV prevalence, in addition to lower rates of pregnancy and marriage in the unconditional arm [55]. Additionally, the Malawi experiment varied the size and recipient of the transfer and a heterogeneity analysis showed some differences for the unconditional arm on schooling, marriage, and pregnancy by cash transfer amounts to parents. The results did not show that giving different amounts to the girl improved any outcomes, leading the authors to suggest that giving transfers directly to the girls would be not be more effective than parents [55]. While we do not have variation in the transfer size (or an unconditional treatment arm to separate the cash component from the schooling condition), we do have variation in the level of baseline poverty and can assess whether average treatment effects differ by baseline poverty status.

The biggest impacts for young women from the poorest households at baseline were on improving food security and reducing their likelihood of borrowing money (Table and Figure A2). Additionally, young women from the bottom half were less likely to be doing paid work during the study period compared to those from the top half. This result is surprising since young women in the bottom half were more likely to be doing paid work at baseline. What this means for economic empowerment is unclear, but since the CCT is conditional on school attendance and paid work can compete with a young woman's time spent on her schooling, this could suggest the transfer reduces the necessity of working for young women from poorer families who might otherwise need to help support her family. Anecdotally, however, some young women reported starting their own businesses with the money. Therefore, it is possible that the increase in paid work for the young women from the top half could reflect an increase in entrepreneurial activities. As these activities would require capital, young women that were better off to begin with economically would have an advantage over young women from the poorest households. Nevertheless, after including *no paid work* as part of the economic well-being index, we found that it increases the precision of the index as a pathway through which the CCT improved psychosocial well-being for young women from the bottom half.

Given the exceptionally high rates of school attendance in both study arms (over 95%), we can reasonably attribute the effects of treatment on individual resources as effects of the cash transfer component. There is a strong literature showing that cash transfers that target the most vulnerable and poor families have large impacts on child schooling and household poverty [56]. The young women in this study come from a very poor area in South Africa, although the transfer amounts to young women were not large relative to other grant programs in South Africa (e.g., Child Support grant). The baseline relationships between

relative poverty and young women's economic resources suggested that household poverty may play a role in the extent to which the cash transfer affects these economic resources as young women from the poorest households had significantly fewer economic resources and were more food insecure. In this case, we could have found smaller treatment effects for young women from the poorest households if greater financial stress in these households translated into more pressure on the young woman to help out her family. Recent quantitative and qualitative findings do not suggest that young women generally felt pressured to contribute to their households [40]. Noteworthy is that the CCT also included a monthly parental transfer (twice the size of the young women's). This likely contributed to the widespread account by the young women that they were both able to keep and make decisions on how to spend their individual transfer [40]. Consequently, we found larger treatment effects for young women from the poorest families since they start from a lower level of resources at baseline and thus have more to gain. These results highlight the need to take into account how household poverty can act as a moderator of program effects.

Findings from this analysis have implications for HIV prevention and cash transfer programming. For one, age and gender-specific strategies might be further enhanced by poverty targeting to find the most vulnerable young girls. By including community involvement or traditional proxy means tests as part of targeting procedures, interventions could better reach the most vulnerable families and girls. This includes other hard-to-teach young people such as out-of-school girls that our study did not include. Although enhanced targeting may maximize potential impacts by improving coverage of the most vulnerable adolescents, it can also be costly. The costs and benefits of increasing targeting versus having fewer exclusion criteria should be determined and considered by policy-makers in response to each context and available resources.

Moreover, the design of this CCT—providing both the young woman and her household with monthly cash payments—appeared to play an important role. Young women, especially those from poorer families, may feel obligated to use their own resources to contribute to their households. By explicitly designating part of the transfer to the young woman and providing a separate transfer to the family, the intervention not only set expectations about who had ownership over the transfers, but also supported household economic well-being. This in turn reduced a potential financial obligation for the young women. The evidence from the study demonstrates how increasing economic resources for young women contributes to greater well-being. This complements other studies that have shown the importance of young women's economic resources on sexual decision-making such as adopting sexual protective behaviors [14, 29–31]. Therefore, economic-strengthening initiatives for young women that allow for and encourage personal ownership over financial resources, could empower young women to avoid HIV, providing a missing link to support HIV prevention initiatives.

Concluding remarks

Young women and adolescent girls' vulnerability to HIV makes them an important target group for policymakers. Structural interventions that target young women directly and increase their economic empowerment can provide a critical opportunity to reduce this

vulnerability. Economic empowerment can drive change for young women in poverty by helping them to gain financial independence, opening opportunities for their future, strengthening their self-worth and confidence, and even improving sexual decision-making and health outcomes. Nonetheless, as this intervention was not specifically poverty targeted, we found that results varied across relative household poverty, suggesting that expansion of similar programs to all girls in SSA may not have the desired impacts.

Because the relationships between economic status and HIV risk are complex and vary by context, more research is needed to understand the linkages among age, gender, and poverty in specific contexts, as no single approach is likely to work for all young women. Future studies should carefully consider the role of relative poverty in HIV prevention for young women and anticipate how heterogeneity in baseline parameters may play out in hypothesized or desired outcomes. Policymakers planning to implement cash transfers and other economic interventions for HIV prevention, should reflect on whether more effective targeting of the most vulnerable girls and young women would lead to better use of limited resources. Greater coordination between health, gender, and economic development agendas could allow for improvements in this area and has implications for increased funding for programs that can enhance multiple outcomes for target groups.

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Appendix

Table A1.

Baseline comparison between young women from the poorest (bottom half) of households to the top half at baseline

	Bottom half <i>N</i> =1,265	Top half <i>N</i> =1,267
	% (unless otherwise stated)	
Demographics		
Age	15.7	15.4
Household size	6.9	5.4
Ever had sex	28.8	26.0
Any sexual partner past 12 months	28.5	25.5
Transactional sex ^{<i>I</i>}		
Older sexual partner (5+ years) ^{<i>I</i>}	2.0	2.0
Any unprotected sex (past 3 months) ^{<i>I</i>}	33.2	26.6

	Bottom half N=1,265	Top half N=1,267
	% (unless otherwise stated)	
Sexual relationship power scale (0–24) ^I	15.1 (SD 6.1)	16.1 (SD 5.8)
Hope score (0–39)	30.7 (SD 7.2)	31.7 (SD 6.9)
Child's Depression Index 10 item (0–18)	4.6 (SD 3.1)	4.4 (SD 3.0)
Young women's economic resources		
Always had spending money	8.2	12.5
<i>Top three sources of young woman's funds:</i>		
Job	25.4	21.7
Family	27.2	36.9
Grants to the household	11.7	9.9
Engaged in paid work	17.9	14.2
Savings	19.5	30.4
Bank or post office account	12.4	19.9
Ever borrowed money 'to get by'	23.6	21.2
Food worry (young woman, past 12 months)		
Household SES		
Household monthly per capita consumption (mean Rand)	182.5	740.5
Household monthly per capita food consumption (mean Rand)	120.6	350.4
Asset Index (mean, range 0–61)	12.6	15.9
Number of grants to the household	3.1	2.3

Notes: P-values based on equality of means tests with robust standard errors.

^IOnly for young women who had ever had sex (N=693).

Panel A2. Pooled sample (N=2,533) **Panel 2. Poorest half sample (N=1,267)** **Panel 3. Top half sample (N=1,265)** **Figure A1. Cumulative distribution functions (CDFs) for the economic index**

CDFs show the cumulative distribution of the economic index separately for treatment and control arms across baseline and follow-up visits. Panel 1 shows the distributions for full sample, while Panel 2 and 3 divide the sample by baseline poverty status (Panel 2, Bottom half; Panel 3, Top half).

Table A2.

Impacts of CCT on Young women's economic resources and moderation by baseline poverty

	Paid work		Savings		Discretionary funds		Never borrow	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Coefficient (SE)							
CCT	0.03 *** (0.01)	0.06 *** (0.01)	0.07 *** (0.02)	0.07 *** (0.02)	0.04 *** (0.01)	0.04 ** (0.02)	0.03 ** (0.01)	-0.01 (0.02)
CCT *baseline poverty		-0.07 *** (0.01)		0.00 (0.03)		-0.01 (0.01)		0.08 *** (0.03)
Baseline poverty		0.07 *** (0.01)		-0.06 ** (0.02)		0.02 (0.02)		-0.06 *** (0.02)
Observations	4,997	4,980	5,017	5,000	4,996	4,979	5,001	4,984

Notes:

*
p<0.1;**
p<0.05***
p<0.01.

GEE linear estimates with robust standard errors, adjusted for age. Baseline poverty is defined as being in the bottom half of households for total per capita household consumption at baseline.

Figure A2. Marginal effects for the impact of the CCT on young women's economic participation and resources.

Notes: Marginal effects for the total treatment effect and by baseline poverty status (top or bottom half). Estimates provided with 95% confidence interval bars (insignificant results cross the vertical line at 0).

References

1. Levine R, & Lloyd Cynthia B. & Greene Margaret & Grown Ca. (2009). Girls Count: A Global Investment & Action Agenda. <https://www.icrw.org/wp-content/uploads/2016/10/Girls-Count-A-global-Investment-and-Action-Agenda.pdf>
2. Jones N, Harper C, Watson C, Espey J, Wadugodapitiya D, Page E, ... Clench B (2010). Stemming Girls' Chronic Poverty: Catalysing Development Change by Building Just Social Institutions (SSRN Scholarly Paper No. ID 1719613). Rochester, NY: Social Science Research Network Retrieved from <https://papers.ssrn.com/abstract=1719613>
3. UNICEF. (2011). The State of the World's Children 2011: Adolescence - an Age of Opportunity. UNICEF.
4. Wojcicki JM (2005). Socioeconomic status as a risk factor for HIV infection in women in east, central and southern Africa: a systematic review. *Journal of Biosocial Science*, 37(1), 1–36. 10.1017/S0021932004006534 [PubMed: 15688569]
5. Kim J, Pronyk P, Barnett T, & Watts C (2008). Exploring the role of economic empowerment in HIV prevention. *AIDS*, 22, S57 10.1097/01.aids.0000341777.78876.40

6. Gillespie S, Kadiyala S, & Greener R (2007). Is poverty or wealth driving HIV transmission? *AIDS*, 21, S5 10.1097/01.aids.0000300531.74730.72
7. Harrison A, Colvin CJ, Kuo C, Swartz A, & Lurie M (2015). Sustained High HIV Incidence in Young Women in Southern Africa: Social, Behavioral, and Structural Factors and Emerging Intervention Approaches. *Current HIV/AIDS Reports*, 12(2), 207–215. 10.1007/s11904-015-0261-0 [PubMed: 25855338]
8. Shisana O, Rehle T, Simbayi LC, Zuma K, Jooste S, Zungu N, Labadarios D, Onoya D et al. (2014) South African National HIV Prevalence, Incidence and Behaviour Survey, 2012. Cape Town, HSRC Press
9. UNAIDS. 2016-prevention-gap-report_en.pdf. (n.d.). Retrieved from http://www.unaids.org/sites/default/files/media_asset/2016-prevention-gap-report_en.pdf
10. Luke N (2003). Age and economic asymmetries in the sexual relationships of adolescent girls in sub-Saharan Africa. *Studies in family planning*, 34(2), 67–86. [PubMed: 12889340]
11. Karim QA, Sibeko S, & Baxter C (2010). Preventing HIV Infection in Women: A global Health Imperative. *Clinical Infectious Diseases*, 50(Supplement_3), S122–S129. 10.1086/651483 [PubMed: 20397940]
12. MacPhail C, & Campbell C (2001). “I think condoms are good but, aai, I hate those things”: condom use among adolescents and young people in a Southern African township. *Social Science & Medicine* (1982), 52(11), 1613–1627. [PubMed: 11327136]
13. Kaufman CE, & Stavrou SE (2004). ‘Bus fare please’: the economics of sex and gifts among young people in urban South Africa. *Culture, Health & Sexuality*, 6(5), 377–391. 10.1080/13691050410001680492
14. Jennings L, Mathai M, Linnemayr S, Trujillo A, Mak’anyengo M, Montgomery BEE, & Kerrigan DL (2017). Economic Context and HIV Vulnerability in Adolescents and Young Adults Living in Urban Slums in Kenya: A Qualitative Analysis Based on Scarcity Theory. *AIDS and Behavior*, 21(9), 2784–2798. 10.1007/s10461-017-1676-y [PubMed: 28078495]
15. Leclerc-Madlala S (2008). Age-disparate and intergenerational sex in southern Africa: the dynamics of hypervulnerability. *AIDS*, 22, S17 10.1097/01.aids.0000341774.86500.53
16. Harrison A, Cleland J, & Frohlich J (2008). Young People’s Sexual Partnerships in KwaZulu-Natal, South Africa: Patterns, Contextual Influences, and HIV Risk. *Studies in Family Planning*, 39(4), 295–308. 10.1111/j.1728-4465.2008.00176.x [PubMed: 19248716]
17. Luke N (2005). Confronting the “Sugar Daddy” Stereotype: Age and Economic Asymmetries and Risky Sexual Behavior in Urban Kenya. *International Family Planning Perspectives*, 31(1), 6–14. [PubMed: 15888404]
18. Biello KB, Sipsma HL, Ickovics JR, & Kershaw T (2010). Economic dependence and unprotected sex: the role of sexual assertiveness among young urban mothers. *Journal of Urban Health: Bulletin of the New York Academy of Medicine*, 87(3), 416–425. 10.1007/s11524-010-9449-1 [PubMed: 20352355]
19. Dunkle, Jewkes Rachel K, Brown Heather C., Gray Glenda E., McIntyre James A., Harlow Siobán D.. Transactional sex among women in Soweto, South Africa: prevalence, risk factors and association with HIV infection. *Social Science & Medicine*. Volume 59, Issue 8 2004, Pages 1581–1592, 10.1016/j.socscimed.2004.02.003. [PubMed: 15279917]
20. Jewkes R, Dunkle K, Nduna M, & Shai NJ (2012). Transactional sex and HIV incidence in a cohort of young women in the stepping stones trial. *Journal of AIDS and Clinical Research*, 3(5). Retrieved from <https://www.cabdirect.org/cabdirect/abstract/20133136887>
21. Krishnan S, Dunbar MS, Minnis AM, Medlin CA, Gerdtz CE, & Padian NS (2008). Poverty, Gender Inequities, and Women’s Risk of Human Immunodeficiency Virus/AIDS. *Annals of the New York Academy of Sciences*, 1136, 101–110. 10.1196/annals.1425.013 [PubMed: 17954681]
22. Ashburn K, & Warner A (2010). Can economic empowerment reduce vulnerability of girls and young women to HIV? Retrieved from <https://www.icrw.org/publications/can-economic-empowerment-reduce-vulnerability-of-girls-and-young-women-to-hiv/>
23. Heise L, Lutz B, Ranganathan M and Watts C (2013), Cash transfers for HIV prevention: considering their potential. *Journal of the International AIDS Society*, 16: n/a, 18615. doi:10.7448/IAS.16.1.18615

24. Pettifor A, MacPhail C, Nguyen N, & Rosenberg M (2012). Can Money Prevent the Spread of HIV? A Review of Cash Payments for HIV Prevention. *AIDS and Behavior*, 16(7), 1729–1738. 10.1007/s10461-012-0240-z [PubMed: 22760738]
25. Reed E, West BS, Salazar M, & Monroy RV (2018). Economic Empowerment to Improve Sexual and Reproductive Health Among Women and Girls In Global Perspectives on Women's Sexual and Reproductive Health Across the Lifecourse (pp. 297–315). Springer, Cham 10.1007/978-3-319-60417-6_17
26. Tenkorang EY, Maticka-Tyndale E, & Rajulton F (2011). A multi-level analysis of risk perception, poverty and sexual risk-taking among young people in Cape Town, South Africa. *Health & place*, 17(2), 525–535. [PubMed: 21195013]
27. Thornton R (2009 or 2010)? Sexual networks and social capital: multiple and concurrent sexual partnerships as a rational response to unstable social networks. *African Journal of AIDS Research*, 8(4), 413–421. 10.2989/AJAR.2009.8.4.5.1042
28. Loevinsohn M, & Gillespie SR (2003). HIV/AIDS, food security and rural livelihoods: understanding and responding. IFPRI Washington, DC <https://core.ac.uk/download/pdf/6289494.pdf>
29. Nyanzi B, Nyanzi S, Wolff B, & Whitworth J (2005). Money, men and markets: economic and sexual empowerment of market women in southwestern Uganda. *Culture, Health & Sexuality*, 7(1), 13–26. 10.1080/13691050410001731099
30. Mumah JN, & Jackson-Smith D (2014). Why Are the Benefits of Increased Resources Not Impacting the Risk of HIV Infection for High SES Women in Cameroon? *PLOS ONE*, 9(6), e100507 10.1371/journal.pone.0100507 [PubMed: 24968350]
31. Jennings L, Pettifor A, Hamilton E, Ritchwood TD, Gómez-Olivé FX, MacPhail C, ... Team, T. H. 068 S. (2017). Economic Resources and HIV Preventive Behaviors Among School-Enrolled Young Women in Rural South Africa (HPTN 068). *AIDS and Behavior*, 21(3), 665–677. 10.1007/s10461-016-1435-5 [PubMed: 27260180]
32. Pronyk PM, Hargreaves JR, Kim JC, Morison LA, Phetla G, Watts C, ... Porter JDH (2006). Effect of a structural intervention for the prevention of intimate-partner violence and HIV in rural South Africa: a cluster randomised trial. *Lancet (London, England)*, 368(9551), 1973–1983. 10.1016/S0140-6736(06)69744-4
33. Ssewamala FM, Han C-K, Neilands TB, Ismayilova L, & Sperber E (2010). Effect of economic assets on sexual risk-taking intentions among orphaned adolescents in Uganda. *American Journal of Public Health*, 100(3), 483–488. 10.2105/AJPH.2008.158840 [PubMed: 20075323]
34. Ssewamala FM, Ismayilova L, McKay M, Sperber E, Bannon W, & Alicea S (2010). Gender and the Effects of an Economic Empowerment Program on Attitudes Toward Sexual Risk-Taking Among AIDS-Orphaned Adolescent Youth in Uganda. *Journal of Adolescent Health*, 46(4), 372–378. 10.1016/j.jadohealth.2009.08.010 [PubMed: 20307827]
35. Taaffe J, Cheikh N, & Wilson D (2016). The use of cash transfers for HIV prevention — are we there yet? *African Journal of AIDS Research*, 15(1), 17–25. 10.2989/16085906.2015.1135296 [PubMed: 27002355]
36. Dunbar MS, Dufour M-SK, Lambdin B, Mudekunya-Mahaka I, Nhamo D, & Padian NS (2014). The SHAZ! Project: Results from a Pilot Randomized Trial of a Structural Intervention to Prevent HIV among Adolescent Women in Zimbabwe. *PLOS ONE*, 9(11), e113621 10.1371/journal.pone.0113621 [PubMed: 25415455]
37. Baird S, Chirwa E, McIntosh C, & Özler B (2010). The short-term impacts of a schooling conditional cash transfer program on the sexual behavior of young women. *Health Economics*, 19(S1), 55–68. [PubMed: 19946887]
38. Baird SJ, Garfein RS, McIntosh CT, & Özler B (2012). Effect of a cash transfer programme for schooling on prevalence of HIV and herpes simplex type 2 in Malawi: a cluster randomised trial. *The Lancet*, 379(9823), 1320–1329.
39. Pettifor A, MacPhail C, Hughes JP, Selin A, Wang J, Gómez-Olivé FX, ... & Suchindran C (2016). The effect of a conditional cash transfer on HIV incidence in young women in rural South Africa (HPTN 068): a phase 3, randomised controlled trial. *The Lancet Global Health*, 4(12), e978–e988. [PubMed: 27815148]

40. MacPhail C, Khoza N, Selin A, Julien A, Twine R, Wagner RG, ... Pettifor A (2017). Cash transfers for HIV prevention: what do young women spend it on? Mixed methods findings from HPTN 068. *BMC Public Health*, 18, 10.1186/s12889-017-4513-3 [PubMed: 28697762]
41. Kahn K, Collinson MA, Gómez-Olivé FX, Mokoena O, Twine R, Mee P, ... Tollman SM (2012). Profile: Agincourt Health and Socio-demographic Surveillance System. *International Journal of Epidemiology*, 41(4), 988–1001. 10.1093/ije/dys115 [PubMed: 22933647]
42. Gómez-Olivé FX, Angotti N, Houle B, Klipstein-Grobusch K, Kabudula C, Menken J, ... Clark SJ (2013). Prevalence of HIV among those 15 and older in rural South Africa. *AIDS Care*, 25(9), 1122–1128. 10.1080/09540121.2012.750710 [PubMed: 23311396]
43. Baird S, Hoop J. de, & Özler B (2013). Income Shocks and Adolescent Mental Health. *Journal of Human Resources*, 48(2), 370–403. 10.3368/jhr.48.2.370
44. Ssewamala FM, Neilands TB, Waldfogel J, & Ismayilova L (2012). The Impact of a Comprehensive Microfinance Intervention on Depression Levels of AIDS-Orphaned Children in Uganda. *Journal of Adolescent Health*, 50(4), 346–352. 10.1016/j.jadohealth.2011.08.008 [PubMed: 22443837]
45. Ssewamala FM, Han CK, & Neilands TB (2009). Asset ownership and health and mental health functioning among AIDS-orphaned adolescents: Findings from a randomized clinical trial in rural Uganda. *Social science & medicine*, 69(2), 191–198. [PubMed: 19520472]
46. Pulerwitz J, Gortmaker SL, & DeJong W (2000). Measuring Sexual Relationship Power in HIV/STD Research. *Sex Roles*, 42(7–8), 637–660. 10.1023/A:1007051506972
47. Dunkle KL, Jewkes RK, Brown HC, Gray GE, McIntyre JA, & Harlow SD (2004). Gender-based violence, relationship power, and risk of HIV infection in women attending antenatal clinics in South Africa. *The lancet*, 363(9419), 1415–1421.
48. Radloff LS (1977). The CES-D Scale: A Self-Report Depression Scale for Research in the General Population. *Applied Psychological Measurement*, 1(3), 385–401. 10.1177/014662167700100306
49. Abler L, Hill L, Maman S, DeVellis R, Twine R, Kahn K, ... Pettifor A (2017). Hope Matters: Developing and Validating a Measure of Future Expectations Among Young Women in a High HIV Prevalence Setting in Rural South Africa (HPTN 068). *AIDS and Behavior*, 21(7), 2156–2166. 10.1007/s10461-016-1523-6 [PubMed: 27544516]
50. Bedoya G, Bittarello L, Davis J, & Mittag N (2017). Distributional Impact Analysis. World Bank Policy Research Working Paper 8139
51. Keele L, Tingley D, & Yamamoto T (2015). Identifying mechanisms behind policy interventions via causal mediation analysis. *Journal of Policy Analysis and Management*, 34(4), 937–963.
52. Collinson MA, White MJ, Ginsburg C, Gómez-Olivé FX, Kahn K, & Tollman S (2016). Youth migration, livelihood prospects and demographic dividend: A comparison of the Census 2011 and Agincourt Health and Demographic Surveillance System in the rural northeast of South Africa. *Etude de La Population Africaine = African Population Studies*, 30(2 Suppl), 2629–2639. 10.11564/30-2-852 [PubMed: 28663669]
53. Stats SA (2014). Poverty trends in South Africa: An examination of absolute poverty between 2006 and 2011. Pretoria: Statistics South Africa.
54. Dunbar MS, Maternowska C, Kang M-SJ, Laver SM, Mudekunye I, & Padian NS (2010). Findings from SHAZ!: A Feasibility Study of a Microcredit and Life-Skills HIV Prevention Intervention to Reduce Risk among Adolescent Female Orphans in Zimbabwe. *Journal of Prevention & Intervention in the Community*, 38(2), 147–161. 10.1080/10852351003640849 [PubMed: 20391061]
55. Baird S, McIntosh C, & Özler B (2011). Cash or condition? Evidence from a cash transfer experiment. *The Quarterly Journal of Economics*, 126(4), 1709–1753.
56. Bastagli F, Hagen-Zanker J, Harman L, Barca V, Sturge G, Schmidt T, & Pellerano L (2016). Cash transfers: what does the evidence say A rigorous review of programme impact and the role of design and implementation features. London: ODI.

Figure 1. Young women's main source of money (self-reported)

Distribution of the source young women reported where they get most of their money by treatment status at baseline and follow-up (combined effect).

Figure 2. Marginal treatment effects of the CCT on psychosocial wellbeing by baseline poverty status (total and mediated effects)

Estimated marginal treatment effects for each psychosocial outcome grouped by baseline poverty status (top half or bottom half). Each bar represents a separate model. Blue bars are the marginal effect from Table 4 models while the red bars are the marginal effects from Table 5 after accounting for the economic well-being index (excluding paid work).

Table 1.

Baseline balance and summary statistics for outcomes and key demographics

	Treatment <i>N</i> =1,272	Control <i>N</i> =1,261	Difference	p-value (T-C)
Mean (SD)/Median(IQR), or %				
Demographics				
Age	15.5 (1.7)	15.5 (1.6)	0.0	0.89
Household size	6.2 (2.7)	6.1 (2.6)	0.1	0.42
Ever had sex	27.1	27.7	−0.6	0.72
Any sexual partner past 12 months	26.2	27.7	−1.5	0.42
Transactional sex [/]	15.5	17.1	−1.6	0.60
Older sexual partner (5+ years) [/]	19.9	20.6	−0.7	0.82
Any unprotected sex (past 3 months) [/]	32.9	27.5	5.4	0.12
Psychosocial wellbeing				
Sexual relationship power scale (0–24) [/]	15.5 (6.1)	15.6 (5.8)	−0.1	0.79
Hope score (range:0–39)	31.2 (7.2)	31.2 (7.2)	0.0	0.93
Child's Depression Index 10 item (0–18)	4.5 (3.1)	4.4 (3.0)	0.1	0.46
Young women's economic resources				
Always had spending money	9.7	11.0	−1.3	0.28
Typical amount of spending money per month (if any)	50 (IQR:20,100)	50 (IQR:20,115)	--	0.42
<i>Top three sources of young woman's funds:</i>				
Job	24.8	22.3	2.6	0.13
Family	31.8	32.3	−0.5	0.79
Grants to the household	10.6	11.1	−0.5	0.68
Engaged in paid work	15.0	17.1	−2.1	0.15
Savings	24.8	25.2	−0.4	0.80
Bank or post office account	15.8	16.5	−0.7	0.63
Ever borrowed money 'to get by'	23.4	21.5	1.9	0.25
Food worry (young woman, past 12 months)	32.9	35.7	−2.8	0.14
Household SES				
Household monthly per capita consumption (mean Rand)	455.0 (SD 675.3)	472.7 (SD 672.2)	−17.7	0.51
Household monthly per capita food consumption (mean Rand)	233.6 (SD 467.8)	239.8 (SD 413.5)	−6.1	0.73
Asset Index (mean, range 0–61)	14.3	14.2	0.1	0.61
Number of grants to the household	2.7 (SD 2.0)	2.7 (SD 1.9)	0.0	0.27
Poorest (bottom half of total per capita consumption)	50.7	49.2	1.5	0.45

Notes: P-values based on equality of means tests with robust standard errors.

[/] Only for young women who had ever had sex (N=693).

Table 2.

Baseline relationships between relative poverty status and young women's economic resources

Independent variable: Baseline poverty (poorest 50% in terms of household consumption)		
Dependent variable (yes/no):	Risk Difference (SE)	N
Engaged in paid work	0.04** (0.02)	2,501
Had any savings	-0.11*** (0.02)	2,517
Had a bank account	-0.07*** (0.02)	2,522
Always had spending money	-0.04*** (0.01)	2,508
Never borrowed outside household	-0.02 (0.02)	2,508
Food secure	-0.13*** (0.02)	2,507

Notes:

*
p<0.1;**
p<0.05***
p<0.01.

GLM linear estimates with robust standard errors. Models adjusted for age, grade level, household size, and ever had sex.

Table 3. Intent-to-treat impacts of CCT on household consumption and index of economic resources, moderation by baseline poverty status

Dependent variable:	Coefficient (SE)					
	(1)	(2)	(3)	(4)	(5)	(6)
	Log per capita <i>total</i> expenditure ¹					
	Log per capita <i>food</i> expenditure ¹					
	Index of economic well-being					
CCT	0.04 [*] (0.02)	0.05 [*] (0.03)	0.04 ^{**} (0.02)	0.05 ^{**} (0.03)	0.15 ^{***} (0.03)	0.07 [*] (0.04)
CCT [*] Baseline poverty		-0.01 (0.04)		-0.02 (0.04)		0.16 ^{***} (0.06)
Baseline poverty		-0.44 ^{***} (0.03)		-0.32 ^{***} (0.03)		-0.23 ^{***} (0.04)
Mean of control group ($\pm$ SD)	5.9 ($\pm$ 0.6)	5.9 ($\pm$ 0.6)	5.3 ($\pm$ 0.6)	5.3 ($\pm$ 0.6)	2.0 ($\pm$ 0.9)	2.0 ($\pm$ 0.9)
Observations	4,974	4,974	4,973	4,973	5,048	5,031

Notes:

^{*} p<0.1;

^{**} p<0.05

^{***} p<0.01.

GEE linear estimates with robust standard errors. Baseline poverty is defined as being in the bottom half of households for total per capita household consumption at baseline. Models using the index of economic resources as the dependent variable are adjusted for age.

¹Excluding outliers (top 1%)

Table 4.

Treatment impacts on standardized measures of subjective well-being and sexual behaviors, moderated by poverty status

		SRPS [†] z-scores	CES-D z-scores	Hope z-scores	Any partner	Older [†] partner	Transactional [†] sex
		Coefficient (SE)		RR (95% CI)			
Model 1	CCT (total effect)	0.00 (0.05)	-0.02 (0.03)	-0.02 (0.04)	0.91** (0.84 – 0.99)	0.91 (0.74 – 1.12)	1.03 (0.87 – 1.21)
Model 2	CCT*Baseline poverty	0.28*** (0.10)	-0.14** (0.07)	0.14** (0.07)	1.03 (0.87 – 1.22)	0.81 (0.54 – 1.23)	0.93 (0.66 – 1.31)
	CCT	-0.14* (0.07)	0.05 (0.05)	-0.09* (0.05)	0.90* (0.79 – 1.02)	1.08 (0.80 – 1.44)	1.08 (0.84 – 1.41)
	Baseline poverty	-0.22*** (0.07)	0.13*** (0.05)	-0.16*** (0.05)	0.99 (0.87 – 1.12)	1.05 (0.79 – 1.41)	1.23* (0.97 – 1.57)
Observations		1,884	4,867	5,031	5,031	2,189	1,956

Notes: p<0.1;

**

p<0.05

p<0.01.

Coefficients estimated using GEE linear models with robust standard errors. Baseline poverty is defined as being in the bottom half of households for total per capita household consumption at baseline. Risk ratios estimates using GEE log-binomial models with robust standard errors. All models adjusted for age.

[†]Only for young women who had ever had sex.

Table 5.

The role of economic resources as a mediator to explain the differential treatment effects on psychosocial wellbeing

	SRPS z-scores [/]			CES-D z-scores			Hope z-scores		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Coefficient (SE)									
CCT*Baseline poverty	0.28*** (0.10)	0.25** (0.10)	0.23** (0.10)	-0.14** (0.07)	-0.12* (0.07)	-0.11 (0.07)	0.14** (0.07)	0.11 (0.07)	0.09 (0.07)
Resource index	--	0.17*** (0.03)	--	--	-0.12*** (0.02)	--	--	0.18*** (0.02)	--
Resource index (with no paid work)	--	--	0.19*** (0.02)	--	--	-0.14*** (0.02)	--	--	0.21*** (0.02)
CCT	-0.14* (0.07)	-0.14* (0.07)	-0.13* (0.07)	0.05 (0.05)	0.06 (0.05)	0.05 (0.05)	-0.09* (0.05)	-0.10** (0.05)	-0.09* (0.05)
Baseline poverty	-0.22*** (0.07)	-0.18** (0.07)	-0.16** (0.07)	0.13*** (0.05)	0.10** (0.05)	0.08 (0.05)	-0.16*** (0.05)	-0.12** (0.05)	-0.09* (0.05)
Observations	1,884	1,884	1,884	4,867	4,867	4,867	5,031	5,031	5,031

Notes: d<0.1;

**
p<0.05

p<0.01.

Coefficient estimates are in standard deviations. Baseline poverty is defined as being in the bottom half of households for total per capita household consumption at baseline. GEE linear models with robust standard errors. The first model for each dependent variable are the total effects from Table 4, the second and third models control for mediation through economic well-being (and also control for baseline levels of the mediator). All models adjusted for age.

[/] Only for young women who had ever had sex.