How does a national poverty program influence sexual debut among Kenyan adolescents?

Introduction

Cash transfer programs, currently operating in over 30 countries, have the potential to prevent the spread of HIV, particularly among adolescents (1). One study has already demonstrated a reduction in HIV prevalence as a result of a conditional cash transfer program (2), and more research is currently underway (3-5). However, it is not known *how* these programs may be working to bring about reduced HIV risk. It is important to identify these mediation pathways in order to better understand disease etiology and to more efficiently tailor interventions to maximize their HIV preventive potential.

There are several plausible mediation pathways that have been proposed. Grants may decrease HIV risk by providing the financial means for households to keep children in school longer (i.e. due to the income effect of an unconditional cash transfer, or due to the price and income effects of a conditional cash transfer). Increased schooling, in turn, could lead to decreased HIV risk by putting students in contact with safer partners (other students) or by empowering the recipients with increased sexual education. Grants may also decrease HIV risk with the higher socioeconomic status (SES) enabled by the cash payments. The relationship between SES and HIV is complex, but, generally, evidence has been found linking both highest and lowest SES indices with increased HIV risk (6). Finally, grants may reduce HIV risk by improving the psychosocial status of recipients. Depression is associated with both poverty (7) and HIV risk (8). Receipt of the grant may alleviate some of the poverty-related depressive symptoms and increase feelings of hopefulness, leading to lowered HIV risk.

The Cash Transfer for Orphans and Vulnerable Children (CT-OVC) is administered by the government of Kenya and currently reaches 135,000 households and benefits over 350,000 vulnerable children (9). Households caring for an orphan or vulnerable child are provided with an unconditional cash transfer of KSH1,500 per month (US$22). A recent evaluation of the 4-year impact of CT-OVC on the sexual behavior of adolescents living in study households found that receipt of the grant was significantly associated with delayed sexual debut, and weakly associated with a reduced number of partners and unprotected sex acts (10). Here, we examine whether schooling, SES, or psychosocial status mediates the association household receipt of the grant and sexual debut in the same cohort of adolescents.

Methods

As part of an *a priori* monitoring and evaluation plan, in 2007, a sample of eligible households were randomly assigned to receive the CT-OVC grant (n=1540) or act as controls (n=754) at a rate of 1:2 (control: intervention), stratified by geographic location. Four years later, data were collected on the demographics, sexual behavior, and psychosocial status of adolescents (age 15-25) living in study households. In this analysis, we include adolescents up to age 22 (age 11-16 in 2007) who resided in the household for at least two years before interview, and had not experienced sexual debut as of 2007 (n=1307).

We explored the potential mediators of the association between *CT-OVC receipt*, defined as living in a household that was randomized to receive the CT-OVC grant, and *sexual debut*, defined as first vaginal sex having occurred during the intervention follow-up. The mediators we examined were: 1. *School dropout*, defined as a dichotomous variable that differentiates between those currently in school or those who have completed 12 years of education, and those who dropped out of school before completing 12 years of education; 2. *SES*, defined as a continuous variable measuring the monthly per adult household expenditures; and 3. *Psychosocial status*, defined as a continuous variable measured by the Center for Epidemiologic Studies Depression Scale (CES-D)(11).

To explore the mediating effects of these variables, we first assessed whether the potential mediator was associated with both the independent variable (CT-OVC receipt) and the dependent variable (sexual debut) using logistic regression models. If both of these associations held (at a p-value threshold less than or equal to 0.1), we went on to test for full mediation of the effect of CT-OVC on sexual debut by adding the mediator to the logistic regression model of the main effect. If the beta estimate for the CT-OVC variable was not significantly different from zero after controlling for the mediator, we considered the pathway fully mediated. To confirm the presence of mediation, we conducted Sobel tests, specialized t-tests that determine whether the reduction of the main effect by addition of the mediator is statistically significant (12). Because Sobel tests are typically conservative with over-estimated standard errors (13), we set a p-value threshold of 0.10 to assess the statistical significance of the mediation. We performed all mediation analysis in both crude models and models adjusted for age, sex, Nairobi residence, and relationship to the household head. To see if the mediation pathways may differ between young men and young women, we also performed the analyses stratified by sex.

Results

Overall, there were 1307 adolescents included in our analysis. The majority were male (61.3%), and the mean age of the participants was 17.2.

Table 1 presents the results from logistic models of the associations between the independent variable, the mediators, and the dependent variable, adjusted for age, sex, Nairobi residence and relation to household head. School dropout was strongly associated with sexual debut in both crude and adjusted analyses (full sample aOR: 2.56; 95%CI: 1.85, 3.53), though the effect appears to be stronger in women (aOR: 5.36; 95% CI: 2.97, 9.70) than in men (aOR: 1.81; 95% CI: 1.21, 2.69). Receipt of the CT-OVC was protective against school dropout in both crude and adjusted analyses (aOR: 0.74; 95% CI: 0.54, 1.03); however, this association only held among men (aOR: 0.61; 95% CI: 0.41, 0.92), not women (aOR: 0.98; 95%CI: 0.56, 1.73). Since school dropout could not act as a mediator among women, we went on to perform formal mediation analysis for school dropout only among the crude and adjusted models in the male-specific stratum.

Though there was some evidence that our measure of SES was associated with sexual debut (aOR: 1.41; 95% CI: 1.04, 1.90), receipt of the CT-OVC was not associated with SES in either the crude or adjusted analyses, in either men or women. Therefore, no further mediation analysis was performed for this variable. Receipt of the CT-OVC appeared to be associated with a lower indicator of depressive symptoms (aOR: 0.79; 95% CI: 0.63, 0.99), though this effect only held among males (aOR: 0.69; 95% CI: 0.52, 0.92). There was some evidence in the crude analysis that psychosocial status was associated with sexual debut (OR: 1.18; 95% CI: 0.95, 1.46); however, this effect did not hold with adjustment or stratification by sex. Therefore, no further mediation analysis was performed for psychosocial status.

We formally tested the crude and adjusted mediating effects of school dropout among young men (see Figure 1). The addition of the school dropout variable to the main effects model attenuated the main association between CT-OVC and sexual debut and dropped the p-value of this main effect to non-significance in both the crude and adjusted models. Sobel tests confirmed the statistical significance of the mediating effects of school dropout among men (adjusted Sobel test statistic: -1.82; p-value=0.07).

Discussion

Overall, the results of this study suggest that school dropout acts to mediate the association between a poverty alleviation program and HIV risk behavior (sexual debut) in young men. In this subgroup, receipt of the grant reduces the likelihood of dropping out of school early, which, in turn, reduces the risk of sexual debut. However, school dropout does not account for the reduced odds of sexual debut seen among female grant recipients. Neither SES nor psychosocial status appears to mediate the main effect in either men or women. The fact that we do not find an association between receipt of the grant and SES is likely due to the fact that the value of the transfer had been eroded by over 50 percent since baseline; impacts from the 2009 follow-up wave did show strong impacts on SES but apparently these have not been maintained because of inflation.

The results of the stratified analysis indicate some major differences by gender. Risk factors for sexual debut appear to be different for men and women (e.g. school dropout is a much stronger risk factor for sexual debut among women compared to men) and household receipt of the grant appears to affect men and women differently (e.g. grant receipt is associated with decreased school dropout and decreased depressive symptoms for men but not women). We are particularly interested in why we do not see an effect on schooling among women. Intra-household gender bias could explain this result (grant money preferentially spent on costs associated with keeping young men in school; education for young women may not be valued as much as for young men). As schooling is a much stronger predictor of sexual debut in women compared to men, were the grant to have an effect on schooling in young women, the program could potentially harness much more power to reduce HIV risk in this vulnerable group. One way an effect on schooling among young women has been accomplished in other cash

transfer programs is to attach a conditionality of school enrollment for children in grant-receiving households.

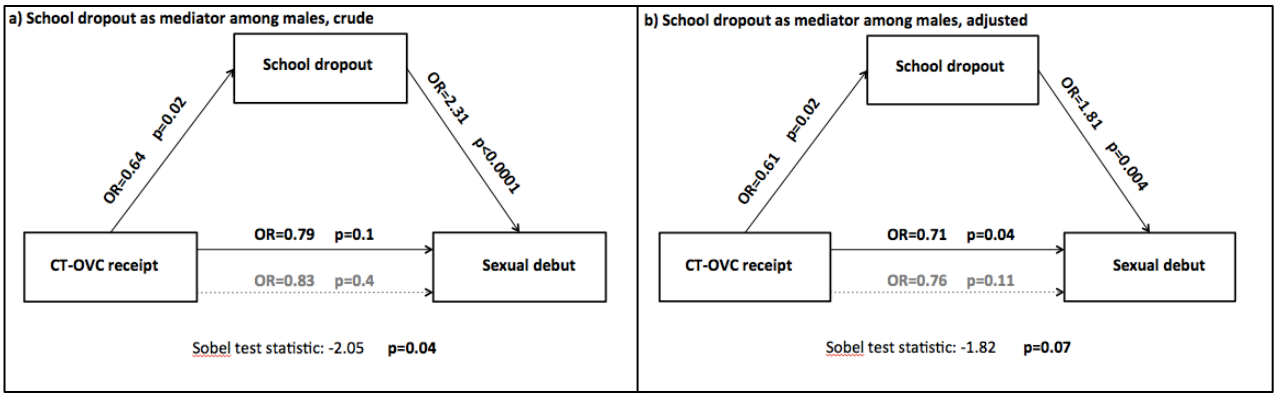
However, grant receipt was associated with a strong reduction in sexual debut risk among young women, independent of schooling, SES, and psychosocial status. Clearly, there must be another explanation, not explored here, for how the grant is influencing sexual risk in young women. Future studies should be designed to investigate other potential mediators of the association between cash transfers and HIV risk, including alternative measures of SES and psychosocial status that may better capture the effect of household grant receipt on adolescents.

Table 1. Adjusted[1] relationships between CT-OVC receipt, mediators (school dropout, SES, psychosocial status), and sexual debut among 1306 adolescents

	CT-OVC → Mediator		Mediator → Sexual debut		Main effect	
Mediator	**OR (95% CI)**	**p**	**OR (95% CI)**	**p**	**OR (95% CI)**	**p**
School dropout						
Total sample	**0.74 (0.54, 1.03)**	**0.08**	**2.56 (1.85, 3.53)**	**<0.0001**	**0.71 (0.55, 0.92)**	**0.01**
Women	0.98 (0.56, 1.73)	0.95	5.36 (2.97, 9.70)	<0.0001	0.70 (0.46, 1.07)	0.1
Men	**0.61 (0.41, 0.92)**	**0.02**	**1.81 (1.21, 2.69)**	**0.004**	**0.71 (0.51, 0.99)**	**0.04**
*SES**						
Total sample	0.90 (0.67, 1.22)	0.5	1.41 (1.04, 1.90)	0.03	0.71 (0.55, 0.92)	0.01
Women	1.04 (0.67, 1.63)	0.9	1.35 (0.85, 2.16)	0.2	0.70 (0.46, 1.07)	0.1
Men	0.81 (0.54, 1.21)	0.3	1.44 (0.96, 2.17)	0.08	0.71 (0.51, 0.99)	0.04
*PS status***						
Total sample	0.79 (0.63, 0.99)	0.04	1.00 (0.79, 1.25)	1.0	0.71 (0.55, 0.92)	0.01
Women	0.97 (0.66, 1.41)	0.9	1.05 (0.72, 1.54)	0.8	0.70 (0.46, 1.07)	0.1
Men	0.69 (0.52, 0.92)	0.01	0.94 (0.71, 1.26)	0.7	0.71 (0.51, 0.99)	0.04

[1]All models adjusted for age, Nairobi residence, relationship to household head, and gender (unstratified models).
*SES modeled linearly for relationship with CT-OVC, quadratically for relationship with sexual debut. OR is for a 3000 vs 1000 per capita expenditure score.
**Psychosocial status measured with CESD score, modeled linearly for relationship with CT-OVC, quadratically for relationship with sexual debut. OR is for a 25 vs 15 CESD score.

Figure 1. Mediation analysis for the mediating effects of school dropout in the unadjusted (a) and adjusted[1] (b) male stratum



[1]All models adjusted for age, Nairobi residence, and relationship to household head.

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