Sexual Behavior Among Young Carers in the Context of a Kenyan Empowerment Program Combining Cash-Transfer, Psychosocial Support, and Entrepreneurship

Michael L. Goodman, Beatrice J. Selwyn, Robert O. Morgan, Linda E. Lloyd, Moses Mwongera, Stanley Gitari & Philip H. Keiser

Sexual Behavior Among Young Carers in the Context of a Kenyan Empowerment Program Combining Cash-Transfer, Psychosocial Support, and Entrepreneurship

Michael L. Goodman

Sodzo International and Division of Management, Policy and Community Health, School of Public Health, University of Texas, Houston and Center for Global Health Education, University of Texas Medical Branch, Galveston

Beatrice J. Selwyn, Robert O. Morgan, and Linda E. Lloyd

Division of Management, Policy and Community Health, School of Public Health, University of Texas, Houston

Moses Mwongera and Stanley Gitari

Community Health Department, Maua Methodist Hospital, Meru County, Kenya

Philip H. Keiser

Center for Global Health Education, University of Texas Medical Branch, Galveston

This study examined associations between sexual initiation, unprotected sex, and having multiple sex partners in the past year with participation in a three-year empowerment program targeting orphan and vulnerable children (OVC). The Kenya-based program combines community-conditioned cash transfer, psychosocial empowerment, health education, and microenterprise development. Program participants (n = 1,060) were interviewed in a cross-sectional design. Analyses used gender-stratified hierarchical logit models to assess program participation and other potential predictors. Significant predictors of increased female sexual activity included less program exposure, higher age, younger age at most recent parental death, fewer years of schooling, higher food consumption, higher psychological resilience, and lower general self-efficacy. Significant predictors of increased male sexual activity included more program exposure, higher age, better food consumption, not having a living father, and literacy. Findings support a nuanced view of current cash transfer programs, where female sexual activity may be reduced through improved financial status but male sexual activity may increase. Targeting of OVC sexual risk behaviors would likely benefit from being tailored according to associations found in this study. Data suggest involving fathers in sexual education, targeting women who lost a parent at a younger age, and providing social support for female OVC may decrease risk of human immunodeficiency virus (HIV) transmission.

An estimated 56 million children (<18 years) in sub-Saharan Africa have lost one or both of their parents, of whom 15.1 million were orphaned by human immunodeficiency virus (HIV)/acquired immunodeficiency syndrome (AIDS) (UNICEF, 2014). Within Kenya, there are an estimated 2.6 million orphaned and vulnerable children (OVC; Lee et al., 2014), of whom

1 million were orphaned by HIV/AIDS (UNICEF, 2014). Current researchers focusing on OVC seek to clarify the types of risk posed by OVC status (Sherr et al., 2014) and how these risks can be mitigated. In the context of high HIV prevalence where OVC have been found to have higher HIV prevalence than non-OVC (Gregson et al., 2005), understanding how to limit sexual risk behaviors among OVC is critical.

There is an active debate in the literature regarding whether OVC engage in riskier sexual behaviors than non-OVC. As summarized by Operario, Underhill, Chuong, and Cluver (2011), studies have found inconsistent associations between orphan status and sexual

risk behaviors. Though inconsistent, studies have found orphans to be at greater risk of earlier sexual initiation, transactional sex, and multiple partners compared to nonorphans (Operario et al., 2011). Further complicating the debate, differential associations appear between sexual risk behaviors and orphan subgroup depending on the study (Operario et al., 2011). Orphan subgroup refers to which parent the child has lost; *paternal, maternal,* or *double orphan* refer to the loss of father, mother, or both, respectively. Some studies that report significant differences between maternal orphanhood and nonorphanhood have not found significant differences between paternal or double orphanhood and nonorphanhood. The same is true of significant differences found within strata of paternal and double orphanhood as well, with differences not always found in other strata of orphan subgroups in the same data set. Greater analytical clarity is required to understand the potentially important ways orphanhood, generally and by subgroup, affects sexual risk behaviors among adolescents. It is possible that the age at which one experiences orphanhood and the gender of the adolescent are important modifiers of the association between orphan status and sexual risk behavior.

In addition to parental loss, which is frequently accompanied by a loss of social and material standing (Evans & Miguel, 2007; Kirkpatrick, Rojjanasrirat, South, Sindt, & Williams, 2012), older caregiving siblings in OVC families often face significant demands on their mental and physical resources (Sherr et al., 2014). Households of OVC where an elder sibling adopts the primary caregiving responsibilities have been referred to as *youth-headed households* (Thurman et al., 2006), and those elder siblings providing the bulk of care for younger siblings have been called *young carers* (Skovdal, Ogutu, Aoro, & Campbell, 2009). Young carers often experience enormous stress and isolation as a result of their caregiving responsibilities (Okawa et al., 2011). Young carers, in balancing the grief of parental loss, social standing, and material standing, while providing care for remaining siblings, may also be at an elevated risk of sexual risk behaviors (Cluver, Orkin, et al., 2013).

The current study used multiple behavioral outcomes to evaluate potential sexual risk exposure among a population of young carers in Kenya. The first behavioral outcome is sexual initiation. Pettifor, Van der Straten, Dunbar, Shiboski, and Padian (2004) found that earlier sexual initiation is a risk factor for adverse outcomes, including HIV infection. Similarly, Gregson and colleagues (2005) concluded that younger age at sexual initiation is a risk factor for HIV among female OVC in Zimbabwe. Sexual abstinence is a common behavioral target found in governmental and nongovernmental approaches to reducing HIV transmission and other adverse sex outcomes (Lillie, Pulerwitz, & Curbow, 2009).

The second behavioral outcome was reporting sexual intercourse within the past six months among those who reported not using a condom at last sex event. Respondents who affirmed having had at least one intercourse event in the past six months without using a condom have a higher risk of HIV transmission and other adverse sex outcomes compared to those who have not had sex in the past six months (Olley, Seedat, Gxamza, Reuter, & Stein, 2005). Within Kenya, most new HIV infections occur among heterosexual couples in stable partnerships (Gouws & Cuchi, 2012). As such, while there may be other benefits to enduring, committed relationships (Gibb, Fergusson, & Horwood, 2011), unprotected sex events within any context may be considered potential risk factors for transmission of HIV and other sexually transmitted infections (STIs). Consistent condom usage can reduce HIV transmission risk by 90% to 95% (Pinkerton & Abramson, 1997) and is an important protective mechanism among sexually active young adults (Hendriksen, Pettifor, Lee, Coates, & Rees, 2007).

The third behavioral outcome addressed in this study was reporting multiple (more than one) sex partners in the past year. Having multiple sex partners in the previous year has been established as a risk factor for HIV transmission risk (Chen et al., 2007). Operario, Pettifor, Cluver, MacPhail, and Rees (2007) found higher prevalence of multiple sexual partners among OVC compared to non-OVC. Factors potentially contributing to increased multiple partnerships among OVC compared to non-OVC are not well understood.

Lee and colleagues (2014) found a significant difference ($p < 0.0001$) in the household size of OVC and non-OVC households, with OVC households having 1.4 members more on average. Household size emerged in focus groups with other populations in Meru County, Kenya, addressing reasons to use family planning (Goodman & Gitari, 2012). Women in this population indicated that household stress from living with many household members could drive men out of the household to engage with other sex partners. Though unexplored in current research, household size may be a risk factor for multiple sex partners among OVC, especially males.

The behavioral outcomes evaluated in this study closely correlate with the three behavioral objectives of most HIV-prevention strategies employed across sub-Saharan Africa: abstinence, being faithful, and consistent condom use ("ABC"; Murphy, Greene, Mihailovic, & Olupot-Olupot, 2006). The Ministry of Health in Kenya promotes these three behavioral targets through its Kenya National HIV and AIDS Strategic Plan (National AIDS Control Council [KNASP] III, 2009), the first outcome of which is to reduce sexual risk behavior among OVC and other vulnerable populations. KNASP III includes a focus on community-based programs to develop local capacity to achieve ABC-compliant behaviors along with voluntary counseling and testing for HIV.

Another policy mechanism that may reduce HIV transmission is the Kenya Cash Transfer Program

(Handa, Halpern, Pettifor, & Thirumurthy, 2014). Cash transfer programs have been used to support poorer households in sub-Saharan African countries for the past decade (Adato & Bassett, 2008). Typically government-sponsored, cash transfer programs have successfully supported school attainment, food access, and clothing and health expenditures (Garcia & Moore, 2012). In some sub-Saharan African countries—namely Kenya, Botswana, Lesotho, Mauritius, Senegal, Seychelles, and Zimbabwe—cash transfer programs are targeted specifically toward households providing care for OVC.

The potential of cash transfer programs to decrease sexual risk behaviors among OVC has recently led to efforts to understand the potential positive spillover effects of this social policy. Cash transfer programs were not originally designed to influence sexual risk behaviors, but it is conceivable that they may do so unintentionally. Given that poverty (Lee et al., 2014; Rosenberg, Pettifor, Thirumurthy, Halpern, & Handa, 2014), poorer food access (Case, Paxson, & Ableidinger, 2004; Weiser et al., 2007), and lower education attainment (Case, 2004) are associated with OVC status and sexual risk behaviors, there is reason to suspect improvements generated by cash transfer programs to these exposures would improve sexual risk behaviors among OVC. Research on poverty-reduction strategies irrespective of OVC status have found corresponding improvements in sexual risk behaviors (Pettifor, MacPhail, Nguyen, & Rosenberg, 2012; Rosenberg et al., 2014), providing hope that similar findings would be echoed among OVC-targeting interventions. Indeed, associations have recently been found between participating in OVC-targeting cash transfer programs and decreased sexual initiation in Kenya (Handa et al., 2014) and transactional sex (Cluver, Boyes, et al., 2013) among women.

Study Aim

The current study evaluated sexual risk behaviors (sexual initiation, unprotected sex among those sexually active in previous six months, and multiple sex partners in the previous year) among participants in an OVC-targeting community-based program incorporating elements of psychosocial support, microfinance, entrepreneurial and other life skills training, cash transfer, and sex education in Kenya. These three behavioral outcomes align directly with the health promotion aims of abstinence, partner faithfulness, and consistent condom use.

Method

Participants

All study participants ($n = 1,060$) were active members of the empowerment program under study, ZOE Orphan Empowerment, and were stratified across

the three program years. Participants join the program in February of each year, and data were collected in March 2014. Some participants ($n = 359$; Cohort 1) joined the program just prior to data collection, other participants ($n = 446$; Cohort 2) joined one year prior to data collections, and finally, some participants ($n = 255$; Cohort 3) joined the program two years before data collection. For purposes of data presentation, higher cohort numbers indicate greater program exposure.

Program households of OVC siblings are targeted by local leaders (e.g., tribal elders, pastors, local government employees, local social workers) based on factors related to orphan status, food security, and household economic strength at baseline. The most vulnerable households from program regions are selected, and only the most at-risk households are included in the final cohort household count, as dictated by available program dollars. Exclusion of initially included households is decided by trained program social workers and usually amounts to 5% to 10% of included households identified by local leaders. The distribution of program households by orphan subgroup (maternal, paternal, and double) is not statistically different from that found by Lee et al. (2014) in the larger Kenyan population. All program households are classified as OVC households.

Households are represented by older siblings who have household caring responsibilities, often as the primary carer, for younger siblings and occasionally older relatives, including terminally ill parents (Skovdal et al., 2009). Older siblings, or young carers, represent families in weekly working group meetings and monthly regional meetings across the 64 unique working groups and 13 unique program regions in Meru County, Kenya.

Study Program

The program design operates primarily through working groups comprised of young carers and a community mentor. The program intervention lasts for three years, with a new cohort entering and exiting each February. Young carers elect leaders from program members, decide on shared entrepreneurial endeavors, allocate entrepreneurial training and cash transfer, receive training on health topics including sex education, and exchange personal stories of general life challenges and successes. Working groups have a joint bank account from which microgrants are given—and sometimes paid back, depending on the a priori commitments made by the working group. Some working groups decide to generate a permanent revolving fund that will make loans and emergency cash available after the three-year duration of the program. Cash transfer decisions are facilitated by the working group through majority vote and are conditioned on the needs and survival strategies of participants. Cash may go to short-term payments for food and clothing or be used for

longer-term strategies, such as education-related expenses and business expansions. Entrepreneurial training includes general business management, specific skill transfer (e.g., barbering, tailoring, auto mechanic), and often a transfer of a start-up kit to begin a business. Start-up kits include necessary hardware to begin the business chosen by the young carer, as allocated by the working group. Examples of start-up kits include sewing equipment for tailors, haircutting accessories for barbers, or tool sets for auto mechanics.

The sex education program component is powered by a train-the-trainer model originating with the Kenyan National AIDS Control Council. Staff members are trained annually by the council in the ABC prevention strategy at a weeklong program. Staff members then disseminate this training to working groups through community mentors, working group leaders, and direct training with the working groups at weekly meetings. In addition to ABC training, the Mission for Essential Drugs and Supplies organization (World Health Organization, 2004) provides education on voluntary counseling and testing (VCT) through the same information pathways. The program model emerged in Rwanda after the 1994 genocide; it is faith-based and supported financially predominantly by churches in the United States.

Measures

Outcome measures assessed in this study were sexual initiation, unprotected last sex among those sexually active in the previous six months (versus no sex in same time period), and multiple sex partners in the previous year. Number of sex partners in the past year was recorded using the following categories: *None, One, Two to four, Five to seven, Eight to 10*, and *More than 10*. Timing of most recent sex was recorded in the following categories: *Never, Over a year ago, Between six months and a year, Between one month and six months, Between one week and one month ago*, and *Within the past week*. Unprotected last sex was measured by a negative response to a single-item question concerning condom usage at last sex among those who reported sex within the previous year. Potential predictor variables included time in the program, age, material inputs from the program, orphan household factors, food consumption and security, psychological assets, and education. Time in the program was represented by the variable Cohort Number, which served as a proxy for exposure to the various program inputs and was considered the primary exposure of interest.

Material Inputs From Program

Transfer of cash and start-up kits are the primary material goods provided directly by the program. Not all participants receive the same amount of money, and not all receive a start-up kit. The allocation process is owned by the working groups in tandem with interests and needs of individual families. Changes in personal monthly income are strongly associated with program participation and not completely explained by the transfer of cash and start-up kit (Goodman, Serag, Smith, Gitari, & Keiser, 2015). Reported personal monthly income was also included as a potential predictor variable.

Orphan Household Factors

Orphan subgroups considered included maternal, paternal, double, and nonorphan. Nonorphans in the sample had parents who were terminally ill, lived in extremely poor conditions, or experienced household abuse in some form and were therefore classified as vulnerable. Respondents were asked how many years had passed since their most recently deceased parent died. To create the age at most recent parental death variable, years since most recent parental death was subtracted from the respondent's current age. Household size was assessed by asking respondents how many people currently live in the respondent's household.

Food Consumption and Security

Food-secure respondents were those who responded *Rarely* or *Never* to the question "How frequently have you and your household gone without sufficient food in the past 12 months?" Food-insecure respondents answered *Often* or *Sometimes* to this question. It is a subjective measure of food sufficiency in the past year. Food consumption was also assessed and categorized using the World Food Programme's Food Consumption Score (Wiesmann, Bassett, Benson, & Hoddinott, 2009). Wiesmann and colleagues (2009) recommend increasing the thresholds for the three categories (poor, borderline, and acceptable) by the number of days on which oils and sugars are consumed if these groups are consistently high across all groups. We followed their recommendation. Food Consumption Score is a quantified assessment of the caloric diversity and density consumed by the household over the past seven days.

Psychological Assets

General self-efficacy (GSE; Schwarzer & Jerusalem, 1995) and psychological resilience (RS-25; Wagnild & Young, 1993) were measured using full-length versions of validated scales. Both produced acceptable reliability in the current population ($\Omega = 0.69$ and 0.78, respectively; Revelle & Zinbarg, 2009). Self-efficacy is a measure of one's belief in one's ability to make and accomplish meaningful goals. Resilience is a measure of one's ability to positively manage adverse experiences without experiencing future negative consequences. Self-efficacy and resilience have been associated with pro-health behavior in other populations (Drimie & Casale, 2009; Sanders, Hill, Crosby, & Janssen, 2014) and were considered potential mediators of the study program and study outcomes.

Education

Education variables included years of completed education and basic literacy. Years of completed schooling was considered a continuous predictor. Basic literacy was measured by asking respondents to read two simple sentences in the local language. Three categories emerged from responses to this question: able to read all, some, or none of two sentences. Basic literacy is a proxy measure for the ability to access basic written information and does not necessarily imply this skill is applied.

Table 1. *Respondent Characteristics*

Characteristics	Cohort 1		Cohort 2		Cohort 3	
	Males	**Females**	**Males**	**Females**	**Males**	**Females**
Sample size	136	223	125	321	93	162
Age						
Years, median	18	18	18	18	20	19.5
IQRΔ	16, 20	16, 19	17, 20	17, 20	18, 21	18, 21
Wilcoxon rank-sum Z (p)Φ	REF	REF	−.94 (.35)	−3.70 (<.001)	−5.35 (<.001)	−6.38 (<.001)
Material transfers						
Dollars received (median)[†]	0	0	50.6	54.22	84.34	84.34
IQR			36.14, 84.34	36.14, 69.28	60.24, 120.48	60.24, 120.48
Wilcoxon rank-sum Z (p)Φ			REF	REF	−3.85 (<0.001)	−6.92 (<0.001)
Received start-up kit (%)	0	0	29.6	37.07	46.24	59.88
95% CI			22.17, 38.29	31.93, 42.52	36.21, 56.57	52.07, 67.21
Monthly income (household head, USD)[†]	7.83	6.02	12.05	12.05	18.07	12.05
IQR	3.61, 18.07	2.41, 12.05	9.64, 24.10	6.02, 24.10	12.05, 36.14	7.23, 24.10
Wilcoxon rank-sum Z (p)	REF	REF	−4.53 (<.001)	−6.89 (<.001)	−5.23 (<.001)	−8.76 (<.001)
Orphan household factors						
Median years since most recent parental death	8	5	6.5	6	8	7
IQR	4, 10	3, 10	4, 10	4, 10	5, 13	4, 10
Wilcoxon rank-sum Z (p)	REF	REF	−1.04 (.30)	−2.50 (.01)	−1.73 (.08)	−2.55 (.01)
Categorized food consumption and food security						
Poor (%)	30.6	45.62	27.2	44.2	22.58	17.5
95% CI	22.69, 38.50	38.94, 52.30	19.29, 35.11	38.72, 49.68	13.92, 31.24	11.55, 23.45
Pearson X^2 (p)	REF	REF	0.321	0.406	0.118	<.001
Borderline (%)	25.37	18.43	25.6	22.57	15.05	23.13
95% CI	17.91, 32.84	13.23, 23.63	17.84, 33.36	17.96, 27.18	7.65, 22.46	16.52, 29.73
Pearson X^2 (p)	REF	REF	0.54	0.147	0.042	0.162
Acceptable (%)	44.03	35.94	47.2	33.23	62.37	59.38
95% CI	35.52, 52.54	29.51, 42.38	38.33, 56.07	28.03, 38.43	52.33, 72.40	51.68, 67.07
Pearson X^2 (p)	REF	REF	0.349	0.288	0.005	<.001
Food secure (%)	18.38	14.8	34.4	22.12	25.81	24.07
95% CI	11.79, 24.98	10.1, 19.49	25.96, 42.84	17.55, 26.68	16.75, 34.87	17.42, 30.73
Pearson X^2 (p)	REF	REF	8.67 (0.003)	4.56 (0.033)	1.81 (0.179)	5.31 (0.021)
School completion (years)						
Median	6	7	7	7	7	7
IQR	4, 8	5, 8	5, 8	5, 8	5, 8	6, 8
Wilcoxon rank-sum z (p)	REF	REF	−3.004 (.003)	−0.472 (.637)	−1.812 (.070)	−1.022 (.307)
Sexually initiated (%)	55.88	63.22	64.52	59.74	67.03	63.06
95% CI	47.43, 64.33	56.85, 69.6	55.98, 73.06	54.28, 65.21	57.19, 76.88	55.42, 70.69
Pearson X^2 (p)	REF	REF	2.015 (0.156)	0.666 (0.415)	2.833 (0.092)	0.001 (0.973)
Sex in past 6 months and unprotected last sex (%)	13.9	12.81	12.46	14.42	11.46	11.29
95% CI	9.33, 18.47	9.34, 16.29	8.78, 16.13	11.11, 17.72	6.43, 16.5	7.32, 15.26
Pearson X^2 (p)	REF	REF	0.24 (0.625)	3.53 (0.06)	0.49 (0.485)	0 (0.99)
Sex in past 6 months and protected last sex (%)	13.9	15.6	14.06	16.25	20.38	23.39
95% CI	9.33, 18.47	11.83, 19.37	10.19, 17.93	12.77, 19.72	14.01, 26.75	18.08, 28.69
Pearson X^2 (p)	REF	REF	0 (0.959)	0.47 (0.495)	2.8 (0.09)	3.25 (0.071)
No sex in last 6 months (%)	72.2	71.59	73.48	69.34	68.15	65.32
95% CI	66.27, 78.12	66.9, 76.28	68.57, 78.4	65, 73.68	60.78, 75.52	59.36, 71.29
Pearson X^2 (p)	REF	REF	0.11 (0.741)	3.91 (0.048)	0.73 (0.395)	2.52 (0.112)
Multiple sex partners in past year (%)	13.97	8.97	17.6	9.96	21.51	11.73
95% CI	8.07, 19.87	5.19, 12.75	10.83, 24.37	6.67, 13.26	13, 30.01	6.72, 16.74
Pearson X^2 (p)	REF	REF	0.648 (0.421)	0.152 (0.696)	2.219 (0.136)	0.785 (0.376)

Note. Δ IQR = interquartile range; ΦWilcoxon rank-sum tests were used to assess equal rank sums because data did not meet normality assumptions; [†]All monetary units were originally recorded in Kenyan shillings (KES) and converted to U.S. dollars (USD) at an exchange rate of 81KES = 1USD; categorized Food Consumption Score comes from World Food Programme measure (2008).

Procedure

Data were collected in a cross-sectional design using a structured questionnaire at monthly regional meetings in March 2014. Interviews were conducted in a public place, away from other program participants.

Data were collected by program leaders who were trained to conduct and record interviews. Data collectors conducted interviews only at program locations that were not contiguous with their own home region to limit social response bias and were instructed to immediately report to study coordinators if they had any prior social contact with potential study subjects. There were no such occasions. Program participants were informed their participation was not necessary but might provide helpful information for research and evaluation purposes. Two program participants

abstained from the study; 1,060 provided informed consent and participated in the study.

Data Analysis

Orphan subgroups were collapsed to vital status of father (living/deceased) to account for sparse cells in a few models. Bayesian information criterion was used to determine which model was preferred (Schwarz, 1978) when orphan subgroup appeared statistically significant, and in each case supported using vital status of father only. "Father living" includes maternal orphans and nonorphans. "Father deceased" includes paternal orphans and double orphans.

Due to expected differences by gender (e.g., Kohler & Thornton, 2011), all analyses were stratified by gender.

Table 2. *Hierarchical Logit Models of Sexual Initiation on Program Participation, Age, and Other Respondent Characteristics*

	Females				Males			
	Model 1 ($n = 599$)		Model 2 ($n = 564$)		Model 1 ($n = 307$)		Model 2 ($n = 297$)	
Characteristics	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Program exposure								
Cohort 1	REF		REF*		REF		REF[†]	
Cohort 2	0.62	0.32–1.19	0.59	0.31–1.14	1.94[†]	0.94–3.98	2.02*	1.07–3.81
Cohort 3	0.48*	0.23–0.99	0.35**	0.17–0.75	1.16	0.60–2.21	1.11	0.58–2.14
Age (yrs)	1.52***	1.37–1.68	1.81***	1.49–2.18	1.22**	1.08–1.37	1.23***	1.09–1.38
Material inputs from program								
Cash received ($)			1	0.99–1.01			1	0.99–1
Start-up kit received			1.07	0.61–1.87			1.05	0.52–2.1
Personal monthly income ($)			1	0.98–1.01			0.99	0.98–1.01
Orphan household factors								
Years since most recent parental death	0.97[†]	0.93–1.10	0.97[†]	0.93–1.01	1.02	0.97–1.08		
Age at most recent parental death (yrs)			0.98*	0.96–1				
Father deceased							REF	
Father living							0.46**	0.26–0.82
Categorized Food Consumption Score								
Poor			REF***				REF***	
Borderline			3.55***	1.95–6.45			1.21	0.58–2.53
Acceptable			2.81***	1.72–4.59			3.98***	2.03–7.79
Psychological assets								
General self-efficacy			0.92*	0.87–0.99				
Resilience			1.02*	1–1.04				
Education								
School years completed			0.93[†]	0.86–1.01				
	β	SE (β)	β	SE (β)	β	SE (β)	β	SE (β)
Intercept	−6.41	0.95	1.21	0.433	0.15	0.35	−0.46	0.46
Random intercepts								
Program region	0.11	0.16	0.05	0.14	0.32	0.26	0.22	0.24
Program working group	0.5	0.26	0.43	0.25	0	0	0.11	0.29
Model diagnostics								
Likelihood ratio test (p)	81.32 (<0.001)		121.38 (<0.001)		17.3 (0.002)		52.73 (<0.001)	
Global Wald test (p)	61.92 (<0.001)		83.78 (<0.001)		15.11 (0.005)		31.01 (<0.001)	

Note. Model 1 isolates program exposure by controlling for age and years since most recent parental death, which vary, but are not acted upon, by program year. Model 2 represents the most parsimonious model evaluating associations between sexual initiation and a variety of possible covariates. Cohort number represents the program year of the respondent. Food Consumption Score was taken from the World Food Programme measure and includes dietary diversity and quantity from past seven days. Resilience and general self-efficacy were measured using standardized scales with acceptable reliability in the current population. In addition to those included, considered covariates were reported monthly income and literacy. Any covariate with Wald test p value <0.10 was maintained in the model. P values are indicated for each significant covariate ([†] $p < 0.10$; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$). For each indicator variable, a Wald test was run for the whole variable, and where significant indicated by "REF" of each referent level.

6

A descriptive table was made with all predictor variables stratified by gender and cohort membership. Tests of equal proportions (χ^2) and rank sums were used to test the null hypothesis that there were no significant differences in model covariates across cohorts stratified by gender (Table 1).

Initial efforts to analyze responses to the most recent sex question through ordered logit models showed the models could not support the proportional odds assumption. To ease interpretation, these responses were collapsed to *Never, Ever* (also called sexual initiation), and *Within the past six months*. Those considered to be "sexually initiated" reported at least one sexual intercourse event over the course of their lifetime, including but not limited to the past week. Three categories were formed from responses affirming or negating having had at least one sexual intercourse event within the

previous six months. Some respondents indicated no sexual activity within the past six months. Some respondents indicated having had at least one sex event in the past six months and reported using a condom at last sex. Some respondents indicated having had at least one sex event in the past six months and reported not using a condom at last sex. In regression analyses, the category of respondents who reported using a condom within the past six months were ignored, comparing only those who reported sexual activity in the past six months and the most recent event being unprotected to those who reported no sex in the past six months. Condom usage behavior during events prior to the most recent sex event could not be ascertained through the study design without legitimate concerns of recall bias.

Responses to the question assessing number of sex partners in the previous year were sparse beyond the

Table 3. *Hierarchical Logit Models of Unprotected Sex at Last Event Among Those Sexually Active in Past Six Months (Versus No Intercourse Event) on Program Participation, Age, and Other Respondent Characteristics*

	Females				Males			
	Model 1 ($n = 338$)		Model 2 ($n = 315$)		Model 1 ($n = 166$)		Model 2 ($n = 181$)	
Characteristics	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Program exposure								
Cohort 1	REF***		REF		REF*		REF	
Cohort 2	0.36**	0.18–0.76	0.8	0.3–2.11	3.05*	1.27–7.35	3.34[†]	0.93–12.06
Cohort 3	0.31*	0.11–0.86	0.59	0.24–1.41	1.28	0.4–3.89	1.74	0.5–6.06
Age (yrs)	1.34***	1.23–1.47	1.4***	1.28–1.54	1.17	0.82–1.66	1.21	0.92–1.59
Material inputs from program								
Cash received ($)			1	0.99–1			1	0.99–1
Start-up kit received			0.63	0.33–1.22			0.66	0.16–2.62
Personal monthly income ($)			1.01	0.99–1.03			0.99	0.98–1.01
Orphan household factors								
Years since most recent parental death	0.93*	0.87–0.99	0.93*	0.89–1	0.98	0.92–1.05		
Father deceased							REF	
Father living							0.31**	0.13–0.75
Categorized Food Consumption Score								
Poor			REF*					
Borderline			3.16**	1.34–7.45				
Acceptable			2.74*	1.24–6.04				
Psychological assets								
General self-efficacy			0.89***	0.84–0.94				
Education								
School years completed			0.87*	0.77–1				
	β	SE (β)	β	SE (β)	β	SE (β)	β	SE (β)
Intercept	−1.54	0.32	−1.14	0.95	−2.03	0.4	−1.6	0.39
Random intercepts								
Program region	0.12	0.79	0.47	0.56	0.08	0.24	0	0
Program working group	1.41	0.66	1.14	0.55	0.83	0.82	0.98	0.87
Model diagnostics								
Global Wald test (p)	70.07 (<0.001)		99 (<0.001)		7.83 (0.05)		27.37 (<0.001)	

Note. Model 1 isolates program exposure by controlling for age and years since most recent parental death, which vary, but are not acted upon, by program year. Model 2 represents the most parsimonious model evaluating associations between unprotected sex (versus no sex) in the past six months and a variety of possible covariates. Cohort number represents the program year of the respondent. Food Consumption Score was taken from the World Food Programme measure and includes dietary diversity and quantity from past seven days. General self-efficacy was measured using a standardized scale with acceptable reliability in the current population. In addition to those included, considered covariates were psychological resilience, reported monthly income, and literacy. Any covariate with Wald test p value <0.10 was maintained in the model. P values are indicated for each significant covariate ([†] $p < 0.10$; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$). For each indicator variable, a Wald test was run for the whole variable, and where significant indicated by "REF" of each referent level.

Two to four category (<2% total). The number of sexual intercourse partners was collapsed to *Multiple*, including all categories indicating more than one partner in the previous year. To account for nesting of respondents within working groups within program regions, hierarchical logit models were used to evaluate potentially significant associations between predictor variables and behavioral outcomes. Random intercepts were created for the working group and program region levels. Standard errors in all models were determined using the Huber-White robust estimation approach (Maas & Hox, 2004). Two models were created for each behavioral outcome considered. The first model included the program participation variable (Cohort Number), age, and years since most recent parental death. Age and years since most recent parental death were included because they varied significantly by program year but would not have been affected by program inputs. The second model began with all potential covariates and worked backward using stepwise regression modeling.

Table 4. *Hierarchical Logit Models of Multiple Intercourse Partners in Previous Year on Program Participation, Age, and Other Respondent Characteristics*

	Females				Males			
	Model 1 (*n* = 609)		Model 2 (*n* = 672)		Model 1 (*n* = 308)		Model 2 (*n* = 348)	
Characteristics	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Program exposure								
Cohort 1	REF		REF		REF		REF	
Cohort 2	0.93	0.43–2.05	1.04	0.51–2.13	1.65	0.69–3.94	1.54	0.67–3.54
Cohort 3	1.05	0.42–2.6	0.95	0.41–2.19	1.2	0.51–2.79	1.22	0.55–2.69
Age (yrs)	1.03	0.92–1.17	1.01	0.90–1.13	1.1	0.96–1.27	1.09	0.95–1.25
Material inputs from program								
Cash received ($)			1	1			1	0.99–1
Start-up kit received			0.91	0.47–1.78			0.38*	0.15–0.93
Personal monthly income ($)			1	0.98–1.02			1	0.98–1.02
Orphan household factors								
Years since most recent parental death	0.96	0.90–1.02			0.97	0.91–1.04		
Father deceased							REF	
Father living							0.33**	0.13–0.83
Household size (number of members)							1.16*	1.03–1.3
Food consumption and security								
Poor food consumption			REF**					
Borderline food consumption			1.32	0.58–3.01				
Acceptable food consumption			2.55**	1.33–4.89				
Food secure			1.85*	1.01–3.4				
Psychological assets								
General self-efficacy			0.92*	0.85–0.99				
Resilience			1.03*	1–1.05				
Education								
Can read none of two sentences							REF	
Can read all/some of two sentences							0.38*	0.17–0.87
	β	SE (β)	β	SE (β)	β	SE (β)	β	SE (β)
Intercept	−2.61	1.14	−2.87	1.14	−3.67	1.35	−3.71	0.67
Random intercepts								
Program region	0.09	0.21	0.3	0.21	0.92	0.64	0.69	0.49
Program working group	0.3	0.36	0		0		0	
Model diagnostics								
Likelihood ratio test (*p*)	2.38 (0.67)		21.21 (0.01)		4.1 (0.39)		18.41 (0.005)	
Global Wald test (*p*)	2.27 (0.69)		19.74 (0.02)		4.08 (0.4)		22.69 (0.007)	

Note. Model 1 isolates program exposure by controlling for age and years since most recent parental death, which vary, but are not acted upon, by program year. Model 2 represents the most parsimonious model evaluating associations between reporting multiple sex partners in the previous year and a variety of possible covariates. Cohort number represents the program year of the respondent. Food Consumption Score was taken from the World Food Programme measure and includes dietary diversity and quantity from past seven days. Resilience and general self-efficacy were measured using standardized scales with acceptable reliability in the current population. In addition to those included, monthly income was also considered as a potentially significant predictor. Orphan type was originally recorded as maternal, paternal, double, or none. Due to small cell counts and the appearance of patterns associating loss of father with male sex behavior, the original categories were collapsed to father living (maternal and nonorphan) and father deceased (paternal and double orphan). All monetary units were recorded in Kenyan shillings (KES) and converted to U.S. Dollars (USD) at a rate 81 KES = 1 USD. Any covariate with Wald test *p* value <0.10 was maintained in the model. *P* values are indicated for each significant covariate (†*p* < 0.10; *p* < 0.05; **p* < 0.01; ***p* < 0.001). For each indicator variable, a Wald test was run for the whole variable, and where significant indicated by "REF" of each referent level.

All final second models included material inputs from the program (cash received, start-up kit received, and reported personal monthly income). Other covariates were maintained if the *p* value produced by their Wald test was less than 0.10. Global Wald test and likelihood ratio tests were provided for each model. Variance inflation factors were checked on all models to ensure orthogonal assumptions held.

Models that maintained orphan-specific covariates (age at most recent parental death and years since most recent parental death) necessarily excluded respondents who did not share the experience of orphanhood. To assess whether it was acceptable to exclude such respondents, we conducted parallel analyses without the orphan-specific covariates and compared remaining coefficients. We found similar coefficients between all compared models.

The first outcome compares respondents who reported ever having had sex ("sexual initiation") with those who reported never having had sex. The second outcome compares respondents who reported sexual activity in the previous year and unprotected last sex with respondents who reported no sexual activity in the previous six months. The third outcome compares respondents who reported multiple sex partners in the previous year, regardless of condom usage at last sex, with respondents who reported one or no partner in the past year.

All final models with corresponding model diagnostics appear in Tables 2–4. Table 1 depicts all variables that were included in any final model and, when stratified by gender, differed across cohorts with a *p* value <0.10. Any model covariate that remained constant across cohort years (*p* > 0.10) is presented in the text but not in Table 1.

Ethical Considerations

All study subjects provided informed consent. The Committee to Protect Human Subjects at the University of Texas Health Science Center provided ethical approval for the secondary analysis of program collected survey data.

All data were entered in EpiInfo v.7 and analyzed using STATA v.13.

Results

Table 1 shows the respondent characteristics that differed by cohort. Many characteristics were equal across cohorts and were not included in Table 1. Age at most recent parental death was consistently 10.92 years (95% CI: 10.59–11.25). In all, 27% of respondents reported their fathers were still living (95% CI: 24.44%–29.82%). Median scale score of psychological resilience among males was 141 (interquartile range [IQR]: 130–152) and among females was 138 (IQR: 124–151). Median scale score of self-efficacy among males was 34 (IQR: 30–37) and among females was 33 (IQR: 29–36). Of the respondents, 39% could read all of two simple sentences; 41% could read some, and 20% could not read any of two simple sentences. Median household size was five members (IQR: 4–6).

Respondents with more time in the program had significantly higher ages, reported monthly incomes, cash amounts received from the program, probability of receiving a start-up kit, years since most recent parental death, categorized Food Consumption Scores, years of schooling (for males), and food security. In univariate analysis, only outcome measure was significantly different (*p* < 0.05) across program years; males in Cohort 2 were less likely to report no sex in the past six months than males in Cohort 1. A few measures had Pearson's X^2 determined *p* values that were less than 0.10 across program years: increased sexual initiation among females in Cohort 3 compared to females in Cohort 1; higher prevalence of unprotected sex in past six months among males in Cohort 2 compared to males in Cohort 1; and more recent protected sex in past six months among both genders in Cohort 3 compared to respective genders in Cohort 1.

Sexual Initiation

Table 2 displays the results of the hierarchical logit models assessing factors associated with reporting ever having had sex, that is, those who were sexually initiated compared to those who were not sexually initiated. Controlling for age and years since most recent parental death, statistically significant differences were found across program years in both gender strata. Females in Cohort 3 had odds of sexual initiation that were half of those for females in Cohort 1. Males in Cohort 2 had odds of sexual initiation that were twice those of males in Cohort 1. The odds of sexual initiation increased 50% for each added year of age among females and by 22% for each added year of age among males. Specific program-related material inputs and reported monthly income were not associated with sexual initiation among either gender.

Orphan factors were found to be significantly associated with reduced odds of sexual initiation. Among females, being a year older at time of most recent parental death was associated with a 2% reduction in odds of sexual initiation. While age at most recent parental death was not significantly associated with odds of sexual initiation among males, males whose fathers were still living had odds of sexual initiation that were 50% lower than males without living fathers.

Improved Food Consumption Scores were significantly associated with increased odds of sexual initiation among both genders. Among females, having acceptable rather than poor food consumption was associated with

a nearly threefold increase in odds of sexual initiation. Among males, the increase in odds of sexual initiation was nearly fourfold among those with acceptable rather than poor food consumption.

Mental health assets were associated with sexual initiation among females but not males. Among females, a one-point increase in self-efficacy was associated with an 8% reduction in odds of sexual initiation, but a one-point increase in resilience was associated with a 2% increase in odds of sexual initiation.

Unprotected Last Sex in Past Six Months Versus No Sex in Past Six Months

Table 3 depicts the hierarchical logit models of reporting unprotected last sex among respondents who were sexually active in the past six months compared to those who reported no sexual activity in the past six months.

After controlling for age and years since most recent parental death, program participation was associated with reduced odds of unprotected last sex among sexually active females but increased odds among sexually active males. Females who had been in the program two full years (Cohort 3) had odds of unprotected last sex that were one third of the odds of unprotected last sex among females just entering the program. Males who had been in the program one full year had three times the odds of unprotected last sex compared to males just entering the program. Program inputs and increased monthly income were unassociated with unprotected last sex among those reporting sexual activity in past six months.

Increased age and years since most recent parental death were associated with significant changes in odds of unprotected sex among females, but not males. Older females reported higher odds of unprotected last sex, but more years having passed since most recent parental death was associated with decreased odds of unprotected last sex. Males whose father was still living had odds of unprotected last sex that were less than one third the odds of unprotected last sex among males whose father was no longer living, a significant difference.

Better food consumption was associated with increased odds of having unprotected last sex among females but not males. Females with borderline or acceptable food consumption had odds of reporting last sex in the past six months that were around three times the odds of females with poor food consumption scores.

Increases in general self-efficacy and completed school years were significantly associated with reduced odds of unprotected last sex among females, but not males. An increase in self-efficacy by one point was associated with a reduction in odds of unprotected last sex by 11%, and an added year of school was associated with a reduction in odds of unprotected last sex by 13% among females.

Multiple Sex Partners in Past Year

Program participation, age, and years since most recent parental death were not found to be associated with multiple sex partners in the past year. Having received a start-up kit in the past year was associated with reduced odds of multiple partners among males, but the inclusion of this covariate did not significantly alter the null association between program participation and the outcome measure.

Two OVC characteristics were associated with the odds of multiple sex partners among males: vital status of father and household size. Males whose fathers were still living had odds of multiple sex partners in the past year that were one third of those among males whose fathers were no longer living. An increase in household size by one member was associated with a 16% increase in odds of multiple sex partners among males.

Improved food consumption and security were significantly associated with increased odds of multiple sex partners among females. A single point increase in general self-efficacy among females was associated with an 8% decrease in odds of multiple sex partners in the past year. Also among females, a single point increase in resilience was associated with a 3% increase in odds of multiple sex partners in the past year.

Males who could read all or some of two sentences had odds of multiple sex partners in the past year that were one third of those among males who could not read any of the text in those two sentences.

Discussion

Overall program participation showed a protective association against sexual initiation and unprotected sex in the past six months among females. Material transfers and increases in monthly earnings were not associated with changes in female sexual risk behavior. The mechanisms of these protective associations among women requires more study. A number of different possibilities exist, all of which require more data to address. Some insight may be given by the association between self-efficacy and sexual activity among females.

Self-efficacy showed a protective association against sexual initiation, unprotected sex in the past six months, and multiple sex partners among females. The program design may benefit females by offering unmeasured psychosocial support. Studies in other populations have shown that sexual intimacy is often a reflection of a desire for emotional intimacy among females (Lehmiller, VanderDrift, & Kelly, 2011). It is possible that a need for emotional support, elevated among young carers in OVC households (Thurman et al., 2006), might be met by participating in an empowerment program such as the one studied here. The ability to meet the need for support and intimacy may be higher among

10

more resilient females, explaining the elevated sexual risk among females with higher resilience found in this data set. Further study assessing coping mechanisms, stress, and alternative mechanisms for social support among sexually active female OVC is required before this interpretation can move much past reasonable conjecture.

The role of sexual education in the behavioral choices of sexually active females in the context of this and similar programs must also be assessed. While it is reasonable that social support provides for some of the emotional needs of females in the population, increased education on abstinence and faithfulness—part of the ABC curriculum—may also be influential. In both sets of female-only models in Tables 2 and 3, there appears to be a potential dose response. The effect size is greater for females in Cohort 3 than in Cohort 2, giving the appearance of a trend. It is not possible to say whether this trend is related to program factors or unobserved heterogeneity, but if it is due to program factors another possibility is the health training built in. The model provides a context for a number of different elements to be combined, including a partnership with the Kenyan government's target of decreasing sexual risk among OVC through education. That material inputs were unassociated with any behavior among females and that program participation remained significant after adjusting for material inputs indicate the importance of other program factors possibly including sex education.

Earlier age at parental death has elsewhere been identified as a risk factor for elevated risk of HIV among female OVC (Birdthistle et al., 2008). Also among women, the present study found associations between younger age at most recent parental death and higher odds of sexual initiation, and more years since most recent parental death and lower odds of unprotected sex in the past six months.

It is not possible with the current data to explain the association between categorized Food Consumption Score and sexual risk behavior among females. There are a number of reasons the associations may exist, but it must be said that the association is statistically strong and with impressive magnitude. The odds of reporting multiple sex partners in the previous year among females with acceptable food consumption are almost twice the odds of reporting multiple sex partners among females with poor food consumption. It is possible that sex provides female respondents with greater negotiation power for food. Females with more food access may be perceived as more desirable and can court more sex partners. Does increased food consumption improve opportunities for sex, or do opportunities for sex increase food consumption? Longitudinal and qualitative data are required to answer this question in the current population, though existing studies suggest that transactional sex is commonly accepted in East Africa

(Luke, Goldberg, Mberu, & Zulu, 2011; Wamoyi, Fenwick, Urassa, Zaba, & Stones, 2011). Transactional sex would explain why female respondents with better categorized Food Consumption Scores would be more sexually active than females with worse categorized Food Consumption Scores. Females who engaged in transactional sex would be predisposed to engage in sexual activity to increase material access. This practice is well documented, but the extent to which young female carers engage in transactional sex to provide food for younger sibling dependents is less well documented and warrants attention.

Increased years of school was associated with decreased odds of unprotected sex and sexual initiation among women. This finding supports other studies (e.g., Handa et al., 2014) and suggests that interventions to extend schooling of females may reduce HIV transmission risk among the study population.

After adjusting for age and other covariates, program participation among males was associated with increased odds of unprotected sex in the past six months and sexual initiation, though not having multiple sex partners in the past year. This association was found among males in their second but not third year, muddling interpretation. It is possible that unobserved heterogeneity at baseline confounded the present study. Given that the community-based targeting strategy did not involve sexual behaviors, and that the associations between unprotected sex in the past six months, sexual initiation, and program participation held after adjusting for other covariates that did serve as targeting criteria (e.g., personal monthly income, food consumption), it is worth considering how the program may have increased risk of male sexual risk behavior, at least in the first year.

Material inputs and advantages derived from the program were not associated with sexual initiation or unprotected sex in the past six months among males. If program participation had a causal relationship to more recent sex events among males, the pathway was likely not through increased material access. A possible pathway may be increased social exposure, providing greater opportunity to meet potential mates. Yet if increased social exposure allowed more opportunities to meet a sex partner, this should be reflected in the models assessing odds of having multiple sex partners in the previous year. Another possible explanation is that program participation somehow creates more opportunities for sexual events without increasing the number of partners. It is possible that males in the program have elevated social status within the community, increasing their potential to find a single partner. Given the importance of elevating the social status of OVC, male and female alike (Andrews, Skinner, & Zuma, 2006), further research assessing the potential unintended consequences of empowerment programs to increase sexual risk behaviors among males is warranted.

11

Males who received a start-up kit had decreased odds of having multiple partners in the past year, adjusted by personal monthly income and other covariates. The limited change in beta coefficients corresponding to the general program participation variable (Cohort Number) in the model (Table 4) suggests that the association between the program input, start-up kits, and the outcome, multiple sex partners, is exogenous to the path between program participation and outcome. It is possible that working groups elected to allocate start-up kits to group members who had characteristics predisposing them to engage in sex with fewer partners, rather than the program itself, somehow caused males to have lower odds of multiple sex partners. The finding suggests the need for a deeper investigation into the characteristics of program participants who benefit most from the program.

Males with living fathers had significantly lower odds of sexual initiation, having had unprotected sex in the previous six months, and having multiple sex partners in the past year. This is an important finding as it provides greater nuance to the discussion of sexual risk among male OVC, and has not been sufficiently investigated. Montgomery, Hosegood, Busza, and Timæus (2006) wrote one of the first, if not the first, papers to explore positive contributions made by fathers to family systems in the context of high HIV endemicity. The present data plainly suggest fathers may have a role in directing sexual behavior of sons. The means by which fathers positively contribute to the healthy sex behaviors of sons in the present population requires further investigation. Targeting the involvement of fathers in sexual education programs is supported by this finding, though it is necessary to understand the mechanisms by which paternal involvement influences sex behaviors of sons to tailor programs accordingly.

Larger household size predicted higher odds of multiple sex partners in the past year among males. Little in the present data set permits investigation of this finding, but the finding does point to a need for greater exploration of the potential association between household characteristics and sexual behavior. Unpublished qualitative data from older females in the same community indicated that increased household size results in greater in-house stress, creating a push factor for males to leave home and engage in extramarital sex. While this is a reasonable interpretation of the data, further research is required to inform this finding directly.

Improved food consumption among males was positively associated with sexual initiation. There are data supporting the view that males tend to be more sexually active with improved material standing, with a greater risk of multiple sex partners (Luke, 2008). While improved food consumption was associated with odds of ever having had sex among males, it was not associated with multiple partners, which is interesting. Luke

(2008) found that condom usage in heterosexual partnerships was not predicted by wealth status of the male. There is need for greater understanding of how food security and access, along with access to other material assets, influences sex behaviors of male OVC. There may be some concern that improving male economic standing through cash transfer programs may inadvertently provide resources to enhance male sexual negotiating power. The concern for unintended consequences, including enhanced male sexual standing, should be included as a study aim in research on associations between sexual risk behavior among OVC and participation in cash transfer and other empowerment programs. That the present analysis did not find increased odds of multiple sex partners to be associated with program participation, inputs, or better food consumption provides some optimism to this concern.

The ability to read some or all of two simple sentences in the local language was negatively associated with having multiple sex partners among males. School years completed was not associated with assessed behaviors among males, however. It is possible that the ability to read represents the ability to access information on the risks of multiple sex partners. While further research clarifying the association between literacy and sexual behaviors among males is needed, these data suggest that as increased years of schooling decreases the odds of sexual risk behavior among females, increased literacy among males may reduce the odds of multiple sex partners among males.

Limitations

The present study had many limitations. The study design was cross-sectional, allowing only patterns of association and not causation to appear. Many questions related to directionality of associations have arisen through this analysis and require longitudinal or qualitative research to be answered. It is always possible that residual confounders generated or masked associations in the data. The most likely and obvious confounder is unobserved heterogeneity at baseline related to sexual behaviors and included predictor variables. The program targets the most vulnerable families in communities served, which, if anything, would systematically bias results toward null values. There were no differences across program years with respect to orphan subgroup, though age varied as expected with older respondents in older cohorts. Food consumption and security may have varied at baseline, with families who entered earlier having worse food consumption and security. Among women, adjusting for these factors still showed protective program benefits. There was attrition from participants as they progressed through the program years. Program mentors were surveyed as to why members in their working groups stopped participating in the program. Responses indicated that the families

still in need of assistance came regularly, but some families had started successful businesses or had older siblings who now attended school regularly. More schooling was associated with less risky sex among females, indicating that data censored by females who are in school instead of at the program meeting would be pushed conservatively toward the null. Monthly income was unassociated with recorded sex behaviors and, taken as a proxy for successful businesses, indicates there would be little movement toward the null hypotheses if successful business owners were all present in the data.

Data may have been biased due to social response bias and recall bias. To limit social response bias, we used interviewers from similar backgrounds who were not from the geographic region being surveyed. We informed participants that questions could be skipped if they were tempted to provide an untruthful response or if a question in any way made the respondents uncomfortable. Respondents with more program exposure may have been more cognizant of behaviors and more considerate of the consequences of their behaviors than respondents who just entered the program and were less educated on behavioral consequences. Respondents with more program exposure would be more likely to recall events that may have been forgotten by respondents with less program exposure. While recall bias may have been differential, it would lead to null values. It is unlikely that social response bias would be differential, which would also lead to null values. Estimates, if altered by social response or recall bias, would be more conservative than they otherwise would be absent these biases.

Finally, other measures of sexual risk exposure could have been chosen. These include type of sex (oral, anal, or vaginal), age discordance, and HIV serodiscordance. The relevant consequences of any sexual risk behavior is not the behavior itself but social, economic, and biological outcomes from behavior: STI transmission, unwanted pregnancy, decreased economic participation, and lower school attendance among females. These outcomes should be evaluated in the context of the current and competing programs to empower OVC.

Future Study

The present study indicates a number of interesting directions for future research. Programmatic efforts combining benefits of cash transfer programs, psychosocial support, and sex education may benefit from synergy between these elements. The potential of these synergies to improve risky behavior and adverse sex outcomes requires further study, preferably through a longitudinal cluster-randomized trial comparing different components of the study program.

An important finding of this study is the association between age at most recent parental death and sex initiation among females, and paternal loss and sex behaviors among males. Both of these findings nuance efforts to understand assessments of sexual risk behaviors among OVC and strongly support further investigation. The factors that mediate these associations need to be clarified so programs targeting sex behaviors among OVC can be tailored accordingly. Qualitative data would be helpful in understanding the importance of fathers to the sexual development of males. Quantitative measures may be sufficient for nuancing the association between age at most recent parental death and sex behaviors of females. Measures that may mediate the association between age at most recent parental death and sex behaviors include psychosocial factors (e.g., stress, depression, and anxiety; Operario et al., 2011) and wealth factors. The present study assessed monthly income but did not include any measures of wealth that could mediate the association between age at parental death and sex initiation among females.

Conclusion

Debate on the types of risk faced by OVC in the high-HIV prevalent areas of sub-Saharan Africa has recently begun exploring increased sexual risk, and programmatic efforts to reduce risk of HIV transmission among this vulnerable population. The present study evaluated whether participating in a multisectoral empowerment program combining elements of cash transfer, psychosocial support, entrepreneurial training and health education in Meru County, Kenya, was associated with sexual initiation, unprotected sex in the past six months, and multiple sex partners in the past year when stratified by gender. Program participation had a protective association among females but a neutral or adverse association among males. Material transfers and improvements derived from the program were largely unassociated with assessed behaviors. Orphan factors were differentially associated with behaviors by gender. Males who had lost a father had higher odds of sexual activity, though orphan subgroup was not associated with female sex behaviors. Females who were older at most recent parental death had lower odds of sexual initiation. More years since most recent parental death was inversely associated with unprotected sex among females. The study provides relevant information to help clarify the associations between orphan status and sexual risk behaviors, and meaningfully highlights directions for future research and program design.

References

Adato, M., & Bassett, L. (2008). *What is the potential of cash transfers to strengthen families affected by HIV and AIDS? A review of the evidence on impacts and key policy debates.* Washington, DC: International Food Policy Research Institute.

Andrews, G., Skinner, D., & Zuma, K. (2006). Epidemiology of health and vulnerability among children orphaned and made vulnerable by HIV/AIDS in sub-Saharan Africa. *AIDS Care*, *18*, 269–276. doi:10.1080/09540120500471861

Birdthistle, I. J., Floyd, S., Machingura, A., Mudziwapasi, N., Gregson, S., & Glynn, J. R. (2008). From affected to infected? Orphanhood and HIV risk among female adolescents in urban Zimbabwe. *AIDS*, *22*, 759–766. doi:10.1097/qad.0b013e3282f4cac7

Case, A., Paxson, C., & Ableidinger, J. (2004). Orphans in Africa: Parental death, poverty, and school enrollment. *Demography*, *41*, 483–508. doi:10.1353/dem.2004.0019

Chen, L., Jha, P., Stirling, B., Sgaier, S. K., Daid, T., Kaul, R., . . . International Studies of HIV/AIDS (ISHA) Investigators. (2007). Sexual risk factors for HIV infection in early and advanced HIV epidemics in sub-Saharan Africa: Systematic overview of 68 epidemiological studies. *PLoS One*, *2*, e1001. doi:10.1371/journal.pone.0001001

Cluver, L., Boyes, M., Orkin, M., Pantelic, M., Molwena, T., & Sherr, L. (2013). Child-focused state cash transfers and adolescent risk of HIV infection in South Africa: A propensity-score-matched case-control study. *The Lancet Global Health*, *1*, e362–e370. doi:10.1016/s2214-109x(13)70115-3

Cluver, L., Orkin, M., Boyes, M. E., Sherr, L., Makasi, D., & Nikelo, J. (2013). Pathways from parental AIDS to child psychological, educational, and sexual risk: Developing an empirically based interactive theoretical model. *Social Science and Medicine*, *87*, 185–193. doi:10.1016/j.socscimed.2013.03.028

Drimie, S., & Casale, M. (2009). Multiple stressors in southern Africa: The link between HIV/AIDS, food insecurity, poverty, and children's vulnerability now and in the future. *AIDS Care*, *21*, 28–33. doi:10.1080/09540120902942931

Evans, D. K., & Miguel, E. (2007). Orphans and schooling in Africa: A longitudinal analysis. *Demography*, *44*, 35–57. doi:10.1353/dem.2007.0002

Garcia, M., & Moore, C. M. T. (2012). *The cash dividend: The rise of cash transfer programs in sub-Saharan Africa*. Washington, DC: The World Bank. Retrieved from https://openknowledge.worldbank.org/handle/10986/2246.

Gibb, S. J., Fergusson, D. M., & Horwood, L. J. (2011). Relationship duration and mental health outcomes: Findings from a 30-year longitudinal study. *British Journal of Psychiatry*, *198*, 24–30. doi:10.1192/bjp.bp.110.083550

Goodman, M., & Gitari, S. (2012). *Participatory action research with community perceptions on family planning methods*. Unpublished raw data.

Goodman, M. L., Serag, H., Smith, K., Gitari, S., & Keiser, P. H. (2015). *Income and savings behavior among orphan households in Kenya: The role of cash, training and social inputs*. Manuscript submitted for publication.

Gouws, E., & Cuchi, P.; on behalf of the International Collaboration on Estimating HIV Incidence by Modes of Transmission. (2012). Focusing the HIV response through estimating the major modes of HIV transmission: A multi-country analysis. *Sexually Transmitted Infections*, *88*, i76–i85. doi:10.1136/sextrans-2012-050719

Gregson, S., Nyamukapa, C. A., Garnett, G. P., Wambe, M., Lewis, J. J., Mason, P. R., . . . Anderson, R. M. (2005). HIV infection and reproductive health in teenage women orphaned and made vulnerable by AIDS in Zimbabwe. *AIDS Care*, *17*, 785–794. doi:10.1080/09540120500258029

Handa, S., Halpern, C. T., Pettifor, A., & Thirumurthy, H. (2014). The government of Kenya's Cash Transfer Program reduces the risk of sexual debut among young people age 15–25. *PLoS One*, *9*, e85473. doi:10.1371/journal.pone.0085473

Hendriksen, E. S., Pettifor, A., Lee, S. J., Coates, T. J., & Rees, H. V. (2007). Predictors of condom use among young adults in South Africa: The Reproductive Health and HIV Research Unit National Youth Survey. *American Journal of Public Health*, *97*, 1241–1248. doi:10.2105/ajph.2006.086009

Kirkpatrick, S. M., Rojjanasrirat, W., South, B. J., Sindt, J. A., & Williams, L. A. (2012). Assessment of emotional status of orphans and vulnerable children in Zambia. *Journal of Nursing Scholarship*, *44*, 194–201. doi:10.1111/j.1547-5069.2012.01447.x

Kohler, H. P., & Thornton, R. L. (2011). Conditional cash transfers and HIV/AIDS prevention: Unconditionally promising? *The World Bank Economic Review*, *26*, 165–190. doi:10.1093/wber/lhr041

Lee, V. C., Muriithi, P., Gilbert-Nandra, U., Kim, A. A., Schmitz, M. E., Odek, J., . . . Galbraith, J. S. (2014). Orphans and vulnerable children in Kenya: Results from a nationally representative population-based survey. *Journal of Acquired Immune Deficiency Syndromes*, *66*, S89–S97. doi:10.1097/qai.0000000000000117

Lehmiller, J. J., VanderDrift, L. E., & Kelly, J. R. (2011). Sex differences in approaching friends with benefits relationships. *Journal of Sex Research*, *48*, 275–284. doi:10.1080/00224491003721694

Lillie, T., Pulerwitz, J., & Curbow, B. (2009). Kenyan in-school youths' level of understanding of abstinence, being faithful, and consistent condom use terms: Implications for HIV-prevention programs. *Journal of Health Communication*, *14*, 276–292. doi:10.1080/10810730902805895

Luke, N. (2008). Economic status, informal exchange, and sexual risk in Kisumu, Kenya. *Economic Development and Cultural Change*, *56*, 375–396. doi:10.1086/522896

Luke, N., Goldberg, R. E., Mberu, B. U., & Zulu, E. M. (2011). Social exchange and sexual behavior in young women's premarital relationships in Kenya. *Journal of Marriage and Family*, *73*, 1048–1064. doi:10.1111/j.1741-3737.2011.00863.x

Maas, C. J., & Hox, J. J. (2004). Robustness issues in multilevel regression analysis. *Statistica Neerlandica*, *58*, 127–137. doi:10.1046/j.0039-0402.2003.00252.x

Montgomery, C. M., Hosegood, V., Busza, J., & Timæus, I. M. (2006). Men's involvement in the South African family: Engendering change in the AIDS era. *Social Science and Medicine*, *62*, 2411–2419. doi:10.1016/j.socscimed.2005.10.026

Murphy, E. M., Greene, M. E., Mihailovic, A., & Olupot-Olupot, P. (2006). Was the "ABC" approach (abstinence, being faithful, using condoms) responsible for Uganda's decline in HIV? *PLoS Medicine*, *3*, e379. doi:10.1371/journal.pmed.0030379

National AIDS Control Council (2009). *Kenya National AIDS Strategic Plan 2009/10-2012/13*. Nairobi, Kenya: Office of the President. Retrieved from http://www.nacc.or.ke/images/stories/knasp_iii_document.pdf

Okawa, S., Yasuoka, J., Ishikawa, N., Poudel, K. C., Ragi, A., & Jimba, M. (2011). Perceived social support and the psychological well-being of AIDS orphans in urban Kenya. *AIDS Care*, *23*, 1177–1185. doi:10.1080/09540121.2011.554530

Olley, B. O., Seedat, S., Gxamza, F., Reuter, H., & Stein, D. J. (2005). Determinants of unprotected sex among HIV-positive patients in South Africa. *AIDS Care*, *17*, 1–9. doi:10.1080/095401204123315089

Operario, D., Pettifor, A., Cluver, L., MacPhail, C., & Rees, H. (2007). Prevalence of parental death among young people in South Africa and risk for HIV infection. *Journal of Acquired Immune Deficiency Syndromes*, *44*, 93–98. doi:10.1097/01.qai.0000243126.75153.3c

Operario, D., Underhill, K., Chuong, C., & Cluver, L. (2011). HIV infection and sexual risk behaviour among youth who have experienced orphanhood: Systematic review and meta-analysis. *Journal of the International AIDS Society*, *14*, 25. doi:10.1186/1758-2652-14-25

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*, 1729–1738. doi:10.1007/s10461-012-0240-z

Pettifor, A., Van der Straten, A., Dunbar, M. S., Shiboski, S. C., & Padian, N. S. (2004). Early age of first sex: A risk factor for HIV infection among women in Zimbabwe. *AIDS*, *18*, 1435–1442. doi:10.1097/01.aids.0000131338.61042.b8

Pinkerton, S. D., & Abramson, P. R. (1997). Effectiveness of condoms in preventing HIV transmission. *Social Science and Medicine*, *44*, 1303–1312. doi:10.1016/s0277-9536(96)00258-4

Revelle, W., & Zinbarg, R. E. (2009). Coefficients alpha, beta, omega, and the glb: Comments on Sijtsma. *Psychometrika*, *74*, 145–154. doi:10.1007/s11336-008-9102-z

Rosenberg, M., Pettifor, A., Thirumurthy, H., Halpern, C. T., & Handa, S. (2014). The impact of a national poverty reduction program on the characteristics of sex partners among Kenyan adolescents. *AIDS and Behavior*, *18*, 311–316. doi:10.1007/s10461-013-0487-z

Sanders, S. A., Hill, B. J., Crosby, R. A., & Janssen, E. (2014). Correlates of condom-associated erection problems in young, heterosexual men: Condom fit, self-efficacy, perceptions, and motivations. *AIDS and Behavior*, *18*, 128–134. doi:10.1007/s10461-013-0422-3

Schwarz, B. E. (1978). Estimating the dimension of a model. *Annals of Statistics*, *6*, 461–464. doi:10.1214/aos/1176344136

Schwarzer, R., & Jerusalem, M. (1995). Generalized Self-Efficacy Scale. In J. Weinman, S. Wright, & M. Johnston (Eds.), *Measures in health psychology: A user's portfolio: Causal and control beliefs* (pp. 35–37). Windsor, UK: NFER-NELSON.

Sherr, L., Cluver, L. D., Betancourt, T. S., Kellerman, S. E., Richter, L. M., & Desmond, C. (2014). Evidence of impact: Health, psychological, and social effects of adult HIV on children. *AIDS*, *28*, S251–S259. doi:10.1097/qad.0000000000000327

Skovdal, M., Ogutu, V. O., Aoro, C., & Campbell, C. (2009). Young carers as social actors: Coping strategies of children caring for ailing or ageing guardians in western Kenya. *Social Science and Medicine*, *69*, 587–595. doi:10.1016/j.socscimed.2009.06.016

Thurman, T. R., Snider, L., Boris, N., Kalisa, E., Mugarira, E. N., Ntaganira, J., & Brown, L. (2006). Psychosocial support and marginalization of youth-headed households in Rwanda. *AIDS Care*, *18*, 220–229. doi:10.1080/09540120500456656

UNICEF. (2014). *The state of the world's children 2014 in numbers: Every child counts: Revealing disparities, advancing children's rights*. New York, NY: United Nations Children's Fund.

Wagnild, G. M., & Young, H. M. (1993). Development and psychometric evaluation of the Resilience Scale. *Journal of Nursing Measurement*, *1*, 165–178.

Wamoyi, J., Fenwick, A., Urassa, M., Zaba, B., & Stones, W. (2011). "Women's bodies are shops": Beliefs about transactional sex and implications for understanding gender power and HIV prevention in Tanzania. *Archives of Sexual Behavior*, *40*, 5–15. doi:10.1007/s10508-010-9646-8

Weiser, S. D., Leiter, K., Bangsberg, D. R., Butler, L. M., Percy-de Korte, F., Hlanze, Z., … Heisler, M. (2007). Food insufficiency is associated with high-risk sexual behavior among women in Botswana and Swaziland. *PLoS Medicine*, *4*, e260. doi:10.1371/journal.pmed.0040260

Wiesmann, D., Bassett, L., Benson, T., & Hoddinott, J. (2009). Validation of World Food Programme's Food Consumption Score and alternative indicators of household food security (IFPRI discussion paper 00870). Retrieved from http://www.ifpri.org/sites/default/files/publications/ifpridp00870.pdf

World Health Organization. (2004). *Mission for essential drugs and supplies*. Kenya: Case study: Perspective and practice in antiretroviral treatment. Retrieved from http://www.who.int/hiv/amds/en/MEDS.pdf

15