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Educational Outcomes for Orphan Girls in Rural Zimbabwe: Effects of a School Support Intervention

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Abstract

Educational achievement has important implications for the health and well-being of young women in sub-Saharan Africa. We assessed the effects of providing school support on educational outcomes of orphan girls in rural Zimbabwe. Data were from a randomized controlled trial offering the intervention group comprehensive schooling support and controls no treatment initially and then fees only. Results indicated comprehensive support reduced school dropout and absence but did not improve test scores. Providing support to orphan girls is promising for addressing World Health Organization Millennium Development Goals, but further research is needed about contextual factors affecting girls' school participation and learning.

Improving the education of girls and women is critical for improving women's health globally, as well as the well-being of their children and families (Glewwe, 1999; LeVine, LeVine, Rowe, & Schnell-Anzola, 2004). Women's education also benefits developing countries' economic efficiency (Schultz, 2002) and progress towards democracy (Wyndow, Li, & Mattes, 2013). Universal participation and gender parity in education is among the World Health Organization's Millennium Development Goals (MDGs) (United Nations, 2013). Less than 30% of children complete secondary school in sub-Saharan Africa (SSA) (Lewin, 2009) and girls' education lags behind boys, especially in secondary school (Plan, 2008), which is particularly needed for empowering women and improving their health outcomes (Grown, Gupta, & Pande, 2005). Addressing women's health in Africa is of utmost urgency (Izugbara & Covan, 2014) and the WHO MDGs link educating girls and empowering women with achieving health gains. Our purpose here is to examine the effect of a school support intervention on orphan girls' educational outcomes. Previous publications include the intervention's impact on health outcomes more directly (e.g.,

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Hallfors et al., 2015) but the current paper addresses the question: can school support improve the educational achievement of adolescent Zimbabwean female orphans?

Girls who stay in school are less likely to engage in sexual activity and marry as teenagers (Hallfors et al., 2015), and are more likely to have a better economic future and better health (Miller, Hallfors, Cho, Luseno, & Waehrer, 2013), including protection from HIV and other sexually transmitted infections (STIs) (Jukes, Simmons, & Bundy, 2008) and intimate partner violence (McCloskey, Williams, & Larsen, 2005). Positive effects of education may occur through many paths, including changing attitudes about gender (Macintyre et al., 2013) and facilitating learning of HIV/AIDS information (Jesmin, Chaudhuri, & Abdullah, 2013). Orphans (defined by UNAIDS, UNICEF, USAID, 2004 as persons under 18 years old with one or both parents deceased) are vulnerable to being out of school (UNICEF, 2006), being old for grade (Bicego, Rutsetin, & John, 2003), and having social and health problems (Gregson et al., 2005).

SCHOOLING SUPPORT AS PUBLIC HEALTH STRATEGY

Researchers and policymakers have identified potential in programs that subsidize schooling costs for achieving public health and human rights objectives for orphans and other vulnerable children (OVC) in SSA (Adato & Bassett, 2009). Paying for school fees and providing cash transfers that make money available for families to afford school fees have been shown to be promising strategies for reducing school dropout, reducing HIV/STI risk, and preventing child marriage among SSA OVC (e.g., Hallfors et al., 2011; Pettifor, MacPhail, Nguyen, & Rosenberg, 2012).

Few researchers, however, have examined the impact of schooling support intervention on the key educational outcomes of academic progression and performance among youth in SSA. Research using rigorous experimental design is needed in order to address important policy questions pertaining to implementing such interventions. In the present study we address this gap by examining school progression and performance of rural orphan girls participating in a randomized controlled trial (RCT) testing the effects of school support on HIV-related outcomes in Zimbabwe.

Among the small number of similar previous RCTs in SSA, Robertson et al. (2013) reported positive effects of a conditional cash transfer (CCT) program in Zimbabwe that required compliance with conditions related to child well-being (e.g., school attendance, vaccinations) in promoting good school attendance among OVC youth ages 6-17 years. Baird et al. (2010) used a geographic sample of girls ages 13-22 in Malawi and found that a combined intervention of CCT and school fees payments reduced dropout after one year among treatment participants (7%) compared to controls (11%) who had been enrolled in secondary school at the start of the study. Participants who had already dropped out of school by study onset were more likely to reenroll in school with CCT compared to the no-treatment control group (61% vs. 17%). Baird, McIntosh, and Ozler (2011) also found positive effects of the intervention on school enrollment and test performance (reading, math, and cognitive ability) after two years. Other researchers have found positive effects of providing school uniforms on dropout in Kenya (Duflo, Dupas, & Kremer, 2012; Evans, Kremer, & Ngatia, 2009). Evans et al. (2009) found that uniform provision improved average test score one year after program inception, but not beyond. Cho et al. (2011) found that orphan school support reduced drop out after one year. None of these researchers examined normal progression (advancing in grade each year) and only two (Baird et al., 2011; Evans et al., 2009) examined performance (e.g., test scores). Fiszbein et al. (2009) reviewed CCT program evaluations and reported consistent null effect findings on test scores, but none of the programs were in Africa.

BACKGROUND

Zimbabwe's education system consists of 7 years of primary school and 6 years of secondary (4 years of Ordinary or "O" Level and 2 years of Advanced or "A" Level). Children normally begin school at age six. Students take exams at the end of Grade 7 in math, English, indigenous language (e.g., Shona or Ndebele), and "General Paper" (social studies, environmental science, religious education). Private secondary schools and high quality government secondary schools typically use Grade 7 scores as admission criteria (Kanyongo, 2005).

Secondary education begins with Form 1 (Grade 8). Most students attend day secondary schools. Boarding and private schools are higher quality but expensive; all secondary schools charge fees/levies and require uniforms. O-Level core subjects are math, English, science, Shona or Ndebele, geography, and history. At the end of Form 4 students take the General Certificate of Education Ordinary Level Examinations, a primary determinant for admission to A-Level schooling. The Zimbabwe Schools Examination Council administers Grade 7 and O-Level exams (Kanyongo, 2005).

After gaining independence in 1980, access to education for native people improved, and Zimbabwe boasted the highest literacy rate in SSA (United States Department of State & Zimbabwe Embassy, 2008). But after 1995, tuition increased and public schools began to deteriorate due, in part, to the HIV/AIDS epidemic (Pennap, Chaanda, & Ezirike, 2011). Among all women ages 20-24, 77% reported having some secondary school. Only 8.2% completed 6 years of secondary school or more (compared to 14.5% of same-age men) (Zimbabwe National Statistics Agency [ZIMSTAT] & ICF International, 2012). Rural youth complete less schooling than urban (averaging 6 years versus 9) (ZIMSTAT & ICF International, 2012). Causes of school dropout among girls in rural Zimbabwe include poverty, pregnancy, early marriage, and traditional beliefs devaluing girls' education (Mawere, 2012). Orphans are less likely than non-orphans to attend school (Rusakaniko, Chikwasha, Bradley, & Misra, 2010), and 41% of children ages 15-17 are orphans (ZIMSTAT & ICF International, 2012).

A barrier for Zimbabwe students is the cost of schooling (Mawere, 2012). Fees are charged in both primary and high schools. Although official government policy proclaims education as a universal right (Kanyongo, 2005), students are routinely sent home from school until they can bring fees (Hallfors et al., 2011). Sponsorship is rare—only 4-5% of orphans aged 6-17 years received external education support in Manicaland Province during 2009-2011 (Pufall et al., 2014).

Zimbabwe faced crippling hyperinflation, widespread hunger and political turmoil during the time of our study (Gwatirisa & Manderson, 2012) particularly in 2008 and 2009. Chronic teacher strikes further disrupted education. Many private schools were able to continue services, however, by charging higher fees to pay teacher incentives.

In the present research, we examine the effect of school support on grade progression and academic performance among randomly assigned experimental and control participants over five years. Our research questions are: (a) What is the effect of offering comprehensive schooling support on orphan girls' educational outcomes?; (b) What is the effect of offering delayed partial support (fees only) on dropping out of school?; (c) What other factors impact educational progression and performance?; and (d) What effect does offering school support have on school absence?

METHODS

Sample and Study Design

All orphan girls who were in grade 6 in 2007 in 25 participating primary schools in Manicaland Province were invited to the study, with schools randomly assigned to intervention or control condition. Participants in intervention schools received comprehensive school support of fees, uniform, school supplies, and a school-based "helper" who monitored and helped resolve barriers to school attendance. Since some schools had daily feeding programs (which may affect school attendance), the study subsidized feeding programs (one meal daily) for all students at all study schools for two years. All participants provided written informed assent along with their parent/guardian's consent for participation. A total of 328 girls joined the study; none declined. Participants were equivalent by condition at baseline on key variables (Hallfors et al., 2011).

After two years, promising results of the intervention were found on HIV risk prevention measures (marriage and protective attitudes) as well as school enrollment, attendance, educational aspiration, and belief in one's chances for completing high school (Hallfors et al., 2011). After a third follow-up in 2010, we found the intervention was cost effective in delaying marriage, keeping participants in school, and improving health-related quality of life (Miller et al., 2013). Delayed partial school support (fees only) was then offered to control group participants beginning in January (Term 1) of 2011, while we continued offering comprehensive support to the intervention group. Institutional review boards of PIRE and the Medical Research Council of Zimbabwe approved study procedures.

Variables

A survey was administered in 2007 (Wave 1), 2008, 2009, 2010, and 2012 (Wave 5). Wave 5 participation was 88%; sensitivity testing indicated that participants who responded to the last survey were equivalent by condition on most baseline measures (Hallfors et al., 2015). Other sources of data were notes and records maintained by field staff. Schools provided enrollment information and test score data.

DEPENDENT VARIABLES—*Academic progression* was measured by examining survey responses at each wave to the question "What class/standard/form are you in?" and to the

Wave 5 item about highest grade in school completed. Participants were coded into the following categories for each year examined: (1) Permanent dropout (i.e., dropped out of school and never returned); (2) Delayed progression (stayed back one or more years or temporarily dropped out and therefore behind normal grade); (3) Normal progression (stayed in school and completed O-levels in 2012, including O-level exams); and (4) Unknown (e.g., due to moving far away or unable to contact). Dichotomous *school dropout* variables were created for each year indicating whether or not the participant had permanently dropped out of school.

Academic performance was measured using school-administered, nationally standardized exams. For the *Grade 7 exam score,* each of the four subjects tested had been graded from 1 to 9 (with 1 being highest achievement). We used the continuous measure of Grade 7 exam results which is a sum of the four scores that ranges from 4 (highest possible result) to 36 (lowest possible). We also created a categorical measure indicating “high” performance (scores of 4 - 14), “low” performance (scores of 15 – 36), or missing.

The *O-level exam* for each academic subject is graded A through F, and unclassified (U), with A as the highest grade and U as the lowest (Kanyongo, 2005). Students need a C or above in five subjects including English in order to officially pass the exam and qualify for A-level high school. Regardless of test score, sitting for the exam marks completion of Ordinary level (Kanyongo, 2005). We created a dichotomous variable indicating an *Official pass* on the exam. To measure variation in performance, we also created two variables for the number of subjects passed: a 3-category variable indicating having passed 0-1, 2-3, or 4+ subjects and a dichotomous variable indicating having passed 0-1 versus 2 or more subjects. Most participants who took the exam took it in 2012 (n=174), which corresponds to normal academic progression from study onset. Their scores were combined with those from 21 participants who took the exam in 2013 (delayed progression). No significant difference was found in scores by exam year (Rao-Scott chi-square = 0.10, p = .76).

Frequent absence (yes/no) measured respondent report of 2+ days absence/month in the last year (for Waves 1-4) or the last term (Wave 5). Respondents who were in school and reporting frequent absence were asked their *reason for absence.* If more than one reason was indicated, we coded a single response, prioritized as follows: cannot pay school fee, lack uniform/school clothes, lack school supplies, caring for children, illness, school far away, and other.

EXPLANATORY AND OTHER VARIABLES—Other measures included *study condition,* based on type of primary school attended. *Age at baseline* was based on birthdate as of October, 2007. Older age has been found to be positively associated with dropout (Lloyd, Mensch, & Clark, 2000) and negatively related to performance (Mungai, 2012). *Number of meals eaten per day,* measured at baseline, is considered as a more sensitive measure for rural adolescent orphans than the more common index count of household assets (Bingenheimer, 2007; Howe, Hargreaves, Ploubidis, De Stavola, & Huttly, 2011). *Religious affiliation* based on Wave 5 survey data was coded as Apostolic (indigenous Christian sects) versus Other Christian. *Secondary school type* refers to having attended a religious versus community or government secondary school. For participants attending more than one school, we used school attended for the most terms.

Other variables included: *orphan type at baseline* [maternal (mother deceased) or double (both parents deceased) versus paternal or unknown], *primary school type* (religious versus secular/government), and *boarded during secondary school* (at least one term or more versus attended day school).

Zimbabwe Demographic and Health Survey (ZDHS)

We used the most recent ZDHS data to compare participants to a national reference group on Form 4 completion. The ZDHS is a large nationally representative survey using stratified multi-stage cluster sampling (ZIMSTAT & ICF International, 2012). To be comparable to the RCT sample, analyses included only Shona-speaking women in rural areas ages 20-24 in the 2010-11 ZDHS (N=580).

Analysis

Socio-demographic variables were examined by study condition. We conducted bivariate analyses examining the association of condition by academic progression in Waves 2-5. We also report proportion of the control group accepting study fees payments.

In order to examine intervention effects across years, we calculated dropout rates at each time point by condition in two ways: (a) *cumulative dropout rate* indicating participants who had permanently dropped out by the end of each year, and (b) *conditional dropout rate* indicating new dropouts at each time point (i.e., calculated only among participants who had not dropped out by the most recent previous time point). Odds ratios assessing difference in dropout rates by condition for each year were calculated using logistic regression models controlling for covariates: age, meals per day, and religion. Covariate variable results in the logistic regressions of 2010 and 2012 cumulative dropout are reported in order to examine other potential causal factors of academic progression.

We examined cross-tabulations of frequent absence from school by condition across time points. We examined reason for school absence in the follow-up surveys (Waves 2-5) by condition, among those reporting frequent absence.

In examining academic performance, we calculated the proportion of participants by condition who had taken the O-level exam (completed Form 4). We conducted separate bivariate analyses examining condition by the categorical grade 7 score, the continuous grade 7 exam score, the 3-category O-level exam variable indicating number of subjects passed, and the dichotomous O-level exam variable indicating official pass. We also examined the proportion of participants who had officially passed the O-level exams in 2012 among those who had advanced to A-level schooling in 2013. Logistic regressions were conducted on the two dichotomous O-level variables (official pass and passing 2 or more subjects). In addition to using the same explanatory variables as in the logistic regressions of dropout, these models included the variable for secondary school type. A grade 7 exam score was missing for 18% of the sample (n=58); this variable was not included in regression models.

Lastly, using the ZDHS data, we calculated the proportion of 20-24 year-old rural Shona-speaking young women that had completed four years of secondary school. Survey procedures in SAS (SAS Institute Inc., 2013) or Stata (StataCorp, 2011) were used to account for complex sampling design.

RESULTS

Characteristics of the sample are presented and indicate no significant difference by condition on baseline variables (Table 1). However, intervention participants were more likely to have attended a religious secondary school and boarding school.

Association between Condition and Academic Progression

There was a significant difference in academic progression by condition starting in 2009, with greater percentages of intervention participants than controls progressing normally through school ($p < .010$ for 2009; $p < .001$ for 2010 and 2012; see Table 2).

Table 3 depicts the percent of participants in each condition that had permanently dropped out of school by each time point (*cumulative dropout rate*). By the final time point, 21.9% of the comprehensive intervention group had dropped out of school compared to 40.7% of the control group. Of the 145 control group participants, 71% (n=103) accepted study fee payment (offered in 2011) for at least one school term. Most of these had managed to stay in school; just two control participants who had previously dropped out came back to school after we offered fees.

Examining *conditional dropout rates* (Table 3), the largest difference by condition was in 2009 when 3.3% of the intervention versus 12.6% of controls dropped out of school. This was when students progressing normally entered secondary school. In 2010, the conditional dropout rate dipped slightly among controls and increased among the intervention. In 2012, the conditional dropout rate increased further to 17.3% in the control/delayed partial intervention group, and to 12.8% in the intervention. Participants were then, on average, almost 17 years old and marriage rates were rising particularly among the control/delayed partial intervention group (Hallfors et al., 2015).

Examination of the effect of study condition on cumulative school dropout across the full span of study years shows a significant protective effect of the intervention at all follow-up time points (Table 3). Participant’s age was also a significant predictor of cumulative school dropout in 2010 (OR=2.798 for each additional year of age, 95% confidence interval [CI]=2.024-3.866) and 2012 (OR=2.810, 95% CI=1.950-4.049; results not shown in table). Other covariates were not significant predictors. As shown in Table 3, study condition was a significant predictor of the Conditional Dropout Rate in the logistic regression for 2008 and 2009. Although there were somewhat higher proportions of new dropout cases in the control compared to comprehensive intervention group in 2010 and 2012, odds ratios progressively narrowed and study condition was not a statistically significant predictor in those years.

Condition and Absence from School

At baseline, there was no significant difference in absence from school by condition (modified Rao-Scott chi-square = 0.99, p = .32). Students in the comprehensive intervention group were much less likely than those in the control group to report frequent school absence, although the difference narrowed dramatically at Wave 5 (Table 4). Among control group students with high absence, inability to pay school fees was the most frequently reported reason for absence (ranging from 39% in 2008 to 80% in 2010) until Wave 5. Illness also was a prominent reason for absence.

Condition and Academic Performance

About equal proportions of participants by condition took the Grade 7 exam (Table 5). The mean continuous grade 7 exam score did not differ by study condition (p=.32). However, difference by condition was significant when examining the categorical exam variable (p=.05). Overall, participants did not perform well on the Grade 7 exam, with only 10% of the intervention and 4% of the control group falling into the higher performing category.

About 70% of intervention compared to 46% of control participants took the O-level exams (Rao-Scott chi-square=29.00, p<.001). There was no significant difference by condition on the 3-category O-level exam variable for number of subjects passed (p=.92) or on the official pass variable (p=.47). About three-fourths of the students in each condition passed fewer than two exam subjects. Despite completing Form 4, very few students officially passed the exam (7% of intervention and 5% of control). Among the 174 students who took the O-level exam in 2012, only 14 advanced to A level schooling in January 2013. Of those 14 students, only 10 of them (71%) actually had officially passed the O-level exam (results not shown in table).

Predictors of Academic Performance

Study condition was not a statistically significant predictor of either officially passing the exam or passing 2 or more subjects (Table 6). Baseline SES, however, was associated with greater odds of exam performance, as was attending a religious secondary school. Apostolics were less likely than other Christian participants to have passed 2 or more exams.

National Comparisons

ZDHS analyses indicate that 52.8% of rural, Shona-speaking females aged 20-24 years in Zimbabwe reported having completed four years of secondary school, compared to 46.2% of the control and 70% of the intervention groups.

DISCUSSION

This comprehensive school support intervention improved Zimbabwean orphan girls' academic progression both when compared to a no treatment control and to a delayed partial intervention. The findings extend those of a published report of reduced school dropout after two years of comprehensive school support (Hallfors et al., 2011) and are congruent with other findings of schooling subsidies helping SSA adolescents stay in school at one- and two-year follow-up (Baird et al., 2011; Cho et al., 2011). The comprehensive intervention is associated with reduced frequency of both delayed school progression and permanent dropout 2, 3, and 5 years after study onset. The Cumulative Dropout Rate after five years of the study was 41% among controls and 22% in the comprehensive intervention group. Logistic regression results of the Cumulative Dropout Rates indicate that positive effects of comprehensive school support remain after controlling for individual and school variables. Odds for cumulative dropout for comprehensive intervention participants were 72% lower than among the control group at the 3-year follow-up and 56% lower at the 5-year follow-up after which time a delayed school fee intervention had been implemented. Seventy percent of the intervention group took the O-level exam in either 2012 or 2013 and therefore completed high school, which was significantly higher than the control group (46%) and, notably, also higher than a group of orphans and non-orphaned rural young Shona women aged 20-24 in Zimbabwe (53% Form 4 completion, ZDHS analysis).

Our results from analyses of Conditional Dropout Rates across years suggest that the strongest effect of the intervention occurred in 2008 and 2009, as indicated by the large magnitude odds ratios for condition. In particular, 2009 was critical academically as normal progressing students transitioned to secondary school and higher fees widened the gap by condition. In 2009, about 13% of controls dropped out of school compared to 3% of intervention participants. In 2010, although there was still double the proportion of new dropouts in the control (12%) compared to intervention group (6%), the difference was not statistically significant in the logistic regression. The gap in the rate of new dropouts between control and intervention conditions further narrowed in 2012 (17% versus 13%, respectively), and the odds ratio for condition was correspondingly closer to 1.0 in 2012, suggesting that offering school fee payments to the control group starting in 2011 had improved their likelihood of staying in school. This premise is further supported by the results for school absence. Inability to pay school fees was found to be an important barrier to school attendance among control participants in school. The intervention reduced frequent absence at each time point after baseline, and the difference by condition decreased after giving fees to the control group in 2011. Greater absenteeism is known to be associated with school dropout (Flisher, Townsend, Chikobvu, Lombard, & King, 2010). Reducing school absence therefore may have been one mechanism by which the intervention had a positive effect on reducing dropout.

Offering school fees to orphan girls even in their third year of high school can be beneficial, although intervening earlier is recommended. We suspect that the rate of new dropouts did not increase among controls from 2009 to 2010 and instead remained flat at about 12% in both years because the most vulnerable girls had already dropped out right after finishing primary school, and may have lacked monetary means and impetus to stay in school. However, high absence continued to be prevalent among control group students continuing in school in 2010; 80% reported lack of fees as a reason for absence.

The findings do not indicate significant difference by condition on academic performance, as measured by the national exam administered after four years of high school. A smaller proportion of control participants completed secondary school, but those that did performed at an equivalent level as participants who had been supported since the beginning of the project. Other studies have reported improvement in test scores of those receiving school subsidies compared to controls one year (Evans et al., 2009) and two years (Baird et al., 2011) after program implementation. Differences in methodology may explain why previous researchers found significant program effects and we did not. Prior measurement was during primary school in one study (Evans et al., 2009) and others used independently developed tests administered to all participants (including dropouts) at home (Baird et al., 2011). Our use of a standardized national high school exam represented a very high bar for measuring achievement, as can be seen by the small proportion of girls nationwide that passed the O-level exams. It is possible that cognitive tests developed for research purposes (Baird et al., 2011) may have been more sensitive and better able to detect modest differences between groups. Our approach of relying on school-administered standardized test data has the advantage of evaluating scores that have real-world consequences for participants as well as allowing for comparison with students nationally.

Providing comprehensive school support to orphan girls in rural Zimbabwe for five years helped them to stay in school, to complete O-level schooling, and to experience less absence from school. These and related study findings suggest that offering school subsidies are a promising and cost effective strategy for empowering vulnerable adolescent girls, fostering gender equity attitudes and improving their health, well-being, and life outcomes (Hallfors et al., 2011; Miller et al., 2013). We recommend that the support be given early enough to help girls make the transition to high school. We did not, however, find comprehensive support to improve performance measured by standardized test scores. Three-fourths of participants in each study condition passed either none or only one O-level exam subject, and only 5% of control and 7% of comprehensive intervention participants officially passed the O-level exam, which is markedly lower than the 16.4% pass rate among all female students in Zimbabwe in 2012 (Share, 2013). The low pass rates of our study participants likely reflect disruption in the country (high inflation and teacher strikes) during 2008-2009 which may have more severely affected rural areas and orphans.

Many factors influence school dropout and achievement (Ampiah & Adu-Yeboah, 2009), and a variety of contextual factors need be considered if reducing the cost of schooling is employed as a public health strategy. Age was found to be a significant predictor in the logistic regressions of school dropout with older youth more vulnerable to dropout, which is consistent with other research (Lloyd et al., 2000). Cultural norms to marry by a certain age may override a girl taking advantage of the opportunity to stay in school. From our study experience, we found that rural girls, particularly those who do not have school fees, are increasingly likely to drop out and marry as they get older (Hallfors et al., 2015). From other analyses, we found that Apostolic religious affiliation was strongly associated with greater likelihood of early marriage and school dropout among rural orphan girls (Hallfors et al., 2013). We presently find that Apostolic affiliation is also associated with poorer educational performance. The low test scores found in our study suggest that adequate infrastructure and program supports are needed, such as resources and trained teachers to meet the MDGs (United Nations, 2013; Lee & Zuze, 2011). SES and attending a religious secondary school were both predictive of better academic performance outcomes. We found that mission religious schools, which are private and typically more expensive, offered higher quality and more consistent teaching even during periods of instability.

Limitations of this study should be considered. We did not ask survey participants to state their reasons for having dropped out of school. However, we found that most dropouts reported pregnancy and/or marriage, which rural schools considered automatic grounds for ending education. The O-level test occurred after the delayed partial intervention had been implemented, making the intervention's impact on performance less clear. Furthermore, the comparison of study pass rate on O-levels with national data is problematic because we are comparing rural orphan girls with that of the full female population completing O-levels. Existing reports (Share, 2013) did not include subsample information (e.g., orphans versus non-orphans) for more valid comparisons. Our comparisons of RCT participants with national data have the limitation that the ZDHS data are retrospective reports of schooling completed from women who are somewhat older and did not experience the same schooling disruptions in the country as did our age group. Also, we were not able to obtain the level of schooling completed specifically among orphans in the ZDHS because it was not possible for persons older than 17 years.

CONCLUSION

As reflected in the MDGs, achieving optimal health and human rights outcomes for women and girls requires efforts to improve their lives through education (Davidson et al., 2011). Providing schooling support to orphan girls in Zimbabwe improved schooling retention, progression, and attendance but not performance as measured by standardized test scores. The findings support evidence (e.g., Baird et al., 2010; Hallfors et al., 2011; Miller et al., 2013) that reducing the cost of schooling may improve the health and well-being of vulnerable young women. Further research is needed about barriers to school attendance and learning among girls in SSA. Consideration of local contextual factors will help development agencies and policymakers improve interventions designed to educate and empower young women.

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TABLE 1

Characteristics of the sample by study condition.

Variable	Intervention n=183	Control[a] n=145	Difference by group
	Mean (sd[b]) or N (%)	Mean (sd) or N (%)	T-test/ Chi-square (*p* value)
Age at baseline (2007; in years)			
Mean	11.9 (0.92)	12.1 (0.98)	1.46 (0.15)
Range	10-15	10-16	
Orphan Type at baseline			
Maternal or double orphan	85 (46.5%)	59 (40.7%)	0.89 (0.35)
Paternal	98 (53.6%)	86 (59.3%)	
Religious Affiliation[c]			
Apostolic/Traditional/No religion	55 (30%)	49 (34%)	0.44 (0.51)
Other Christians	128 (70%)	96 (66%)	
Socio-Economic Status (SES) at baseline			
Number of meals eaten per day	2.39 (0.88)	2.46 (0.81)	0.73 (0.47)
Primary School type			
Religious	66 (36.1%)	69 (47.6%)	0.24 (0.63)
Secular or government	117 (63.9%)	76 (52.4%)	
Secondary School Type			
Religious	79 (43.2%)	48 (33.1%)	12.1 (0.0024)
Secular or government	92 (50.3%)	70 (48.3%)	
Not in school or Unknown	12 (6.6%)	27 (18.6%)	
Boarded During Secondary School			
Boarding	56 (31.3%)	5 (3.7%)	267.5 (<.001)
Day school	123 (68.7%)	131 (96.3%)	

[a]The study design employed a no treatment control group during 2007-2010 and a delayed partial intervention in 2011-2012.

[b]Standard deviation

[c]Measured primarily at Wave 5, when more precise information was collected, but if missing, extracted from next most recent survey data available.

TABLE 2

Frequencies of academic progression category and grade in school by year and study condition.

		2007 (Baseline)		2008 (Wave 2)		2009 (Wave 3)		2010 (Wave 4)		2012 (Wave 5)	
Study condition	Academic Progression	Grade	N (%)	Grade	N (%)	Grade	N (%)	Grade	N (%)	Grade	N (%)
Intervention	Normal progression[a]	Grade 6	183 (100%)	Grade 7	165 (90.2%)	Form 1	154 (84.2%)	Form 2	144 (78.7%)	Form 4	117 (63.9%)
	Delayed progression			Grade 6	12 (6.6%)	Grade 6 & 7	15 (8.2%)	Grade 6 - Form 1	18 (9.8%)	Grade 6 - Form 3	21 (11.5%)
	Permanent dropout				3 (1.6%)		9 (4.9%)		19 (10.4%)		40 (21.9%)
	Unknown				3 (1.6%)		5 (2.7%)		2 (1.1%)		5 (2.7%)
Control[b]	Normal progression	Grade 6	145 (100%)	Grade 7	122 (84.1%)	Form 1	93 (64.1%)	Form 2	77 (53.1%)	Form 4	56 (38.6%)
	Delayed progression			Grade 6	9 (6.2%)	Grade 6 & 7	19 (13.1%)	Grade 6 - Form 1	26 (17.9%)	Grade 6 –Form 3	25 (17.2%)
	Permanent dropout				10 (6.9%)		27 (18.6%)		41 (28.3%)		59 (40.7%)
	Unknown				4 (2.8%)		6 (4.1%)		1 (0.7%)		5 (3.5%)
Group Difference	Rao-Scott chi-square			6.47 (p=0.29)		20.50 (p<.01)		26.11 (p<0.001)		21.39 (p<0.001)	

[a] Normal progression was Grade 6 in 2007, Grade 8 in 2008, Form 1 in 2009, Form 2 in 2010, Form 3 in 2011, and Form 4 in 2012.

[b] The study design employed a no treatment control group during 2007-2010 and a delayed partial intervention in 2011-2012.

TABLE 3

Logistic regression of cumulative and conditional drop-out.

	Cumulative[a] Dropout Rate					Conditional[b] Dropout Rate				
Year:	**Intervention**		**Control[c]**		**OR[d]**	**Intervention**		**Control[c]**		**OR[d]**
	N	**N dropouts (%)**	**N**	**N dropouts (%)**		**N**	**N new dropouts (%)**	**N**	**N new dropouts (%)**	
2008	183	3 (1.6)	145	10 (6.9)	0.166 (p=0.0315)	183	3 (1.6)	145	10 (6.9)	0.166 (p=0.0315)
2009	183	9 (4.9)	145	27 (18.6)	0.167 (p=0.0001)	180	6 (3.3)	135	17 (12.6)	0.191 (p=0.0023)
2010	183	19 (10.4)	145	41 (28.3)	0.277 (p=0.0010)	174	10 (5.7)	118	14 (11.9)	0.479 (p=0.120)
2012	183	40 (21.9)	145	59 (40.7)	0.404 (p=0.0097)	164	21 (12.8)	104	18 (17.3)	0.669 (p=0.404)

[a] Drop out rates calculated for all participants in the study in 2007.

[b] Drop out rates calculated only for participants who were not permanent dropouts at the most recent previous assessment year.

[c] The study design employed a no treatment control group during 2007-2010 and a delayed partial intervention in 2011-2012.

[d] Odds ratio (OR) for difference in drop-out rates between the two study condition groups (delayed partial intervention/no treatment control is reference group) based on logistic regression models. Variables controlled for in all models were study condition, age, number of meals per day at baseline, and religious affiliation.

TABLE 4

Percent reporting frequent school absence and reason for absence by condition and year.

	2008 (Wave 2)		2009 (Wave 3)		2010 (Wave 4)		2012 (Wave 5)	
Variable	**Intervention**	**Control**[a]	**Intervention**	**Control**[a]	**Intervention**	**Control**[a]	**Intervention**	**Control**[a]
Number frequently absent[b] / number reporting currently attending school (%)	12/166 (7.2%)	23/129 (17.8%)	10/165 (6.1%)	33/105 (31.4%)	8/158 (5.1%)	25/94 (26.6%)	8/142 (5.6%)	11/86 (12.8%)
Rao-Scott chi-square for group difference in frequent absence[c]	5.19*		1.52**		22.47**		4.73*	
Reason for absence[d] (n used for analysis)	(n=12)	(n=23)	(n=10)	(n=33)	(n=8)	(n=25)	(n=8)	(n=10[e])
Cannot pay school fee	0.0	39.1	0.0	60.6	0.0	80.0	0.0	40.0
Do not have school clothes	0.0	4.4	0.0	3.0	0.0	0.0	0.0	0.0
Do not have school supplies	8.3	13.0	0.0	15.2	0.0	4.0	37.5	20.0
Caring for children	33.3	4.4	40.0	0.0	25.0	4.0	0.0	0.0
Illness	58.3	30.4	40.0	18.2	37.5	4.0	62.5	40.0
School too far away	0.0	0.0	0.0	0.0	0.0	4.0	0.0	0.0
Other reason	0.0	8.7	20.0	3.0	37.5	4.0	0.0	0.0
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

[a] No treatment control during 2007-2010 and delayed partial intervention during 2011-2012.

[b] At waves 2 through 4, responses of "2 or 3 days a month" or more often in past year (versus once a month or less) were coded as "frequent absence." At Wave 5, frequent absence refers to "2 or 3 days a month" or more often in past term.

[c] Modified Rao-Scott chi-square computing design correction using null hypothesis cell proportions together with the cell design effects.

[d] Limited to participants reporting frequent absence in the survey wave.

[e] N is 10 instead of the 11 respondents with frequent absence listed above due to missing data.

* $p<.05$,

** $p<.001$

TABLE 5

Academic performance by study condition.

Study Condition	Grade 7 Exam Score			O level Exam –Number of Subjects Passed			O level Exam - Official Pass (passed 5 or more subjects including English)		
	N=270 participants who took exam (84% of Intervention vs. 80% of Control[c], p=0.33)			N=195 participants who took exam[d] (70% of Intervention vs. 46.2% of Control[c], p=<.001) N=194 who have exam score data					
		n	**%**		**n**	**%**		**n**	**%**
Intervention	High[a]	19	10.4%	High (4 or more)	15	11.8%	Pass	9	7.1%
	Low	135	73.8%	Middle (2 – 3)	15	11.8%	Fail	118	92.9%
	Missing	29	15.9%	Low (0 – 1)	97	76.4%			
	[b]Mean test score = 24.41								
Control[c]	High	5	3.5%	4 or more	7	10.5%	Pass	3	4.5%
	Low	111	76.6%	2 – 3	9	13.4%	Fail	64	95.5%
	Missing	29	20.0%	0 – 1	51	76.1%			
	Mean test score = 25.19								
Group difference:	[a]Rao-Scott Chi square = 6.2 (p=0.05) [b]T-test 0.96 (p = 0.32)			Rao-Scott Chi square = 0.17 (p=0.92)			Rao-Scott Chi square = 0.51 (p=0.47)		

[a]Grade 7 exam scores (range=4-36) are coded high=4-14; low=15-36. Rao-Scott chi-square was used to test for difference by study condition of the 3-category Grade 7 exam score.

[b]T-test was used to test for difference by study condition of the continuous Grade 7 exam score.

[c]The study design employed a no treatment control group during 2007-2010 and a delayed partial intervention in 2011-2012.

[d]In all, 195 participants (59.1% of the total sample of 328) are known to have taken the O-level exam in either 2012 (n=174) or 2013 (n=21) and therefore completed Form 4 (exam score missing for one participant). In addition, the study is paying school fees for 7 participants who are in Form 4 in 2014.

TABLE 6

Logistic regression on academic performance outcomes.

	Officially Passed O-Level Exam (versus failed) (N=194)		Passed 2 or more O-level Subject Exams (versus 0 or 1 exam) (N=194)	
	Odds ratio	**95% CI**	**Odds ratio**	**95% CI**
Condition (Intervention vs. Control[a])	2.715	0.511-14.422	1.053	0.367-3.021
Age at baseline	0.549	0.238-1.264	1.249	0.812-1.920
Number of meals at baseline	3.428**	1.526-7.701	1.733***	1.388-2.164
Religious affiliation (Apostolic vs. other)	0.496	0.110-2.230	0.366*	0.143-0.940
Secondary school type (Religious vs. government or secular)	6.613**	1.838-23.791	3.420*	1.276-9.169

CI = confidence interval.

[a]The study design employed a no treatment control group during 2007-2010 and a delayed partial intervention in 2011-2012.

*p<0.05,

**p<0.01,

***p<.001