Is education the link between orphanhood and HIV/HSV-2 risk among female adolescents in urban Zimbabwe?

Isolde Birdthistle a,b,*, Sian Floyda, Auxillia Nyagadzab, Netsai Mudziwapasib, Simon Gregson b,c, Judith R Glynn a

a London School of Hygiene & Tropical Medicine, London, United Kingdom
b Biomedical Research & Training Institute, Harare, Zimbabwe
c Imperial College, London, United Kingdom

ABSTRACT

As the population of orphans grows in AIDS-affected settings, recent studies describe a heightened risk of HIV and sexual risk behaviours among adolescent orphans compared to their non-orphaned peers. This study explores the role of education in explaining the excess sexual risk previously documented among unmarried female orphans in urban Zimbabwe. School attendance and attainment were assessed by type of orphanhood, and for their association with markers of sexual risk (HIV and/or HSV-2 infection) among 743 participants drawn from a random sample of 15–19-year-old girls identified in a cross-sectional survey in Highfield, Harare, in 2004. Multivariable logistic regression was used to assess the role of educational status in explaining the higher prevalence of adverse sexual outcomes among unmarried orphans compared to non-orphans, adjusting for possible confounders. Double orphans had significantly lower educational attendance and attainment than non-orphans. Maternal orphans had higher odds of school drop-out, although this association disappeared when adjusted for recent mobility. Educational status was strongly associated with HIV/HSV-2 risk, but explained only a small part of double orphans’ sexual risk and did not explain the HIV/HSV-2 risk of maternal and paternal orphans. High overall levels of secondary school participation and school fee assistance provided to vulnerable families may have reduced the schooling disparities between orphans and non-orphans in Highfield. However, further efforts are needed to rectify the schooling inequities that persist, while additional research is needed to identify other socio-economic and emotional factors driving orphans’ sexual risk so that prevention and support programmes can meet the needs of this growing population.

© 2009 Elsevier Ltd. All rights reserved.

Introduction

There is a growing body of research exploring whether orphans are at higher sexual health risk than their non-orphaned peers. In particular, recent analyses have emerged from Zimbabwe and South Africa, where the incidence and prevalence of orphans are rising (Hosegood et al., 2007; Watts, Lopman, Nyamukapa, & Gregson, 2005). Published studies are summarised in Table 1.

Urban and rural data in Zimbabwe show higher levels of HIV and/or herpes simplex virus type-2 (HSV-2) among adolescent girls who have lost their mother or both parents compared to non-orphaned peers (Birdthistle et al., 2008; Gregson et al., 2005; Nyamukapa et al., 2008). The urban study also distinguished orphans according to the timing of parent loss and found that unmarried paternal orphans were at heightened sexual risk if they lost their father at a young age (before adolescence) (Birdthistle et al., 2008). Data from a 2004 national survey of male and female 12–17-year-olds found that paternal and maternal, but not double, orphans were more likely than non-orphans to have initiated sex (Nyamukapa et al., 2008).

Nationally-representative data from South Africa in 2003 show that, compared to non-orphans, male and female orphans were
more likely to have had sex, and female orphans were more likely to be HIV-positive (Operario, Pettifor, Cluver, MacPhail, & Rees, 2007). Data from KwaZulu-Natal also found that both male and female orphans were more likely than non-orphans to have had sex, and to have initiated sex earlier (Thurman, Brown, Richter, & Rees, 2007). Data from KwaZulu-Natal also found that both male and female orphans were more likely than non-orphans to have had sex, and to have initiated sex earlier (Thurman, Brown, Richter, & Rees, 2007). Data from KwaZulu-Natal also found that both male and female orphans were more likely than non-orphans to have had sex, and to have initiated sex earlier (Thurman, Brown, Richter, & Rees, 2007). Data from KwaZulu-Natal also found that both male and female orphans were more likely than non-orphans to have had sex, and to have initiated sex earlier (Thurman, Brown, Richter, & Rees, 2007). Data from KwaZulu-Natal also found that both male and female orphans were more likely than non-orphans to have had sex, and to have initiated sex earlier (Thurman, Brown, Richter, & Rees, 2007). Data from KwaZulu-Natal also found that both male and female orphans were more likely than non-orphans to have had sex, and to have initiated sex earlier (Thurman, Brown, Richter, & Rees, 2007). Data from KwaZulu-Natal also found that both male and female orphans were more likely than non-orphans to have had sex, and to have initiated sex earlier (Thurman, Brown, Richter, & Rees, 2007). Data from KwaZulu-Natal also found that both male and female orphans were more likely than non-orphans to have had sex, and to have initiated sex earlier (Thurman, Brown, Richter, & Rees, 2007). Data from KwaZulu-Natal also found that both male and female orphans were more likely than non-orphans to have had sex, and to have initiated sex earlier (Thurman, Brown, Richter, & Rees, 2007). Data from KwaZulu-Natal also found that both male and female orphans were more likely than non-orphans to have had sex, and to have initiated sex earlier (Thurman, Brown, Richter, & Rees, 2007). When adjusted for a range of factors (from an unadjusted odds ratio of 1.57 [1.37–1.82] to an adjusted odds ratio of 1.25 [1.08–1.44]). This indicates that the female orphans’ sexual risk was partly but not fully explained by age, province, race, geographic area type, dwelling type, household electricity, caregiver status or education status (Operario et al., 2007). The unadjusted odds ratio for male orphans’ HIV risk lost significance when adjusted for the same factors, suggesting that one or more of the variables contributes to male orphans’ risk (see Table 1). Which variables contributed cannot be deduced, however, as only the final adjusted model is presented. The study in KwaZulu-Natal reported that orphans were more likely than non-orphans to live in households with low socio-economic index scores and less likely to be attending school (Thurman et al., 2006). However, orphans’ higher odds of being sexually active persisted when controlled for these factors, as well as gender and area of residence. The national survey across Zimbabwe found that male and female orphans of all types had more psychosocial distress than non-orphans and distress was linked to early sex initiation (Nyamukapa et al., 2008). Similarly, being out of school and having a female head of household were more common among orphans

Existing evidence for the causes of orphans’ sexual risk

As yet, there has been limited exploration of the reasons for orphans’ higher sexual risk; specifically, the causal pathways by which losing a parent may lead a young person to risk behaviours and HIV/STI infection. Though several of the above-mentioned studies considered socio-economic factors in their analyses, as presented in Table 1, they do not offer conclusive evidence of their role in orphans’ sexual risk. For example, among the nationally-representative sample of 15–24-year-old South Africans, the evidence for an association between females’ orphan status and HIV infection decreased but remained significant when adjusted for

<table>
<thead>
<tr>
<th>Reference</th>
<th>Year data collected</th>
<th>Setting (group)</th>
<th>Age (years) (no. &amp; sex)</th>
<th>Sexual outcome(s) measured</th>
<th>Prevalence of outcome</th>
<th>Crude OR (95% CI)</th>
<th>Adjusted OR (95% CI)</th>
<th>Factors adjusted for</th>
</tr>
</thead>
<tbody>
<tr>
<td>Birdthistle et al., 2008</td>
<td>2004 Harare, Zimbabwe (general, urban population)</td>
<td>14–20 (N = 743 unmarried females)</td>
<td>HIV, HSV2 or ever pregnant</td>
<td>Father only died 8.6 (14/163)</td>
<td>Age adjusted 1.0 (0.6–2.7)</td>
<td>1.25 (1.08–1.44)</td>
<td>Age, gender, area of residence, education status</td>
<td></td>
</tr>
<tr>
<td>Nyamukapa et al., 2008</td>
<td>2004 Zimbabwe, national survey (general, urban &amp; rural)</td>
<td>12–17 (N = 4660 M&amp;F)</td>
<td>Ever had sex</td>
<td>Father only died % not reported</td>
<td>Age &amp; gender adjusted 1.07 (0.80–1.47)</td>
<td>1.07 (0.80–1.47)</td>
<td>Age, gender, location, poverty (poorest quintile), gender of household head (woman), school enrolment status (out of school), psychosocial distress</td>
<td></td>
</tr>
<tr>
<td>Operario et al., 2007</td>
<td>2003 South Africa, nationally-representative survey (general, urban &amp; rural)</td>
<td>15–24 (N = 11,904 M&amp;F)</td>
<td>HIV</td>
<td>Female orphans (any type) 18.3 Male orphans 6.0</td>
<td>Age &amp; gender adjusted 1.29 (1.00–1.67)</td>
<td>1.29 (1.00–1.67)</td>
<td>Age, province, race, geographic area type, dwelling type, household electricity, caregiver status, education status</td>
<td></td>
</tr>
<tr>
<td>Thurman et al., 2006</td>
<td>2001 KwaZulu-Natal, South Africa (general, urban &amp; rural)</td>
<td>14–18 (N = 1694 M&amp;F)</td>
<td>Ever had sex</td>
<td>Female orphans (any type) 45.3 Male orphans 54.9</td>
<td>p &lt; 0.05 OR not reported</td>
<td>p &lt; 0.05 OR not reported</td>
<td>Gender, area of residence, Socio-economic index scores, current school attendance</td>
<td></td>
</tr>
<tr>
<td>Gregson et al., 2005</td>
<td>2001–2003 Manicaland, Zimbabwe (general, rural population)</td>
<td>15–18 (N = 1017 Males: 17–18 (N = 470)</td>
<td>HIV</td>
<td>Father only died 1.8 (4/223)</td>
<td>Not reported 1.1</td>
<td>Not reported 1.1</td>
<td>Age, socio-economic location</td>
<td></td>
</tr>
</tbody>
</table>

Table 1: Summary of published research findings on associations between orphan status and sexual risk.
and associated with early sexual debut. When controlled for in multivariable analyses, these factors accounted for the increased odds of sexual debut among paternal orphans but only partially among maternal orphans. When unmarried girls’ relationship to head of household (parent, grandparent, other) was included, the association between maternal orphanhood and sexual debut became similar to non-orphans, suggesting this may be important.

Finding lower levels of secondary education among maternal orphans, and strong negative associations between secondary schooling and sexual debut as well as HIV, the study in rural Zimbabwe concluded that “lower education levels underpin the heightened risks of HIV and other adverse reproductive health outcomes found in young women and among maternal orphans in particular,” (Gregson et al., 2005). However, education was not included in the multivariable model to assess its specific influence on the association between orphan status and HIV. (The estimated effect of orphanhood was controlled for age and socio-economic location.) The authors also noted orphans’ earlier onset of marriage – “usually with men who are several years older and therefore more likely to be HIV-positive” – which is also associated with leaving school early. In urban Zimbabwe, teenage orphans were not more likely than non-orphans to be married, and disaggregating the data showed that the sexual risk of orphans was more prominent among unmarried girls. Among married girls, HIV/HSV-2 prevalence was high regardless of orphan status (Birdthistle et al., 2008).

Questions thus remain about the mechanisms through which orphaned adolescents experience higher sexual risk than non-orphans, and how this risk can be mitigated, but educational status emerged in several studies as a potentially important factor. Related research builds a case for the contribution of education to orphans’ sexual risk.

Evidence of educational disadvantage among orphans

To date, most published analyses depict educational disadvantage among orphans compared to non-orphans in sub-Saharan Africa. The differences are often greatest among maternal and double orphans, although the timing and nature of differences vary by study. An analysis of Demographic and Health Surveys (DHS) in five African countries from 1995 to 2000 showed that orphans are less likely than non-orphans to be at their proper educational level, with the strongest effect at younger ages (ages 6–10 vs 11–14) and among double orphans (Bicego, Rutstein, & Johnson, 2003). Analyses of 19 DHS from 10 sub-Saharan African countries in 1992–2000 found evidence of lower enrolment among orphans, particularly double orphans, among children aged 6–14 years (Case, Paxson, & Ableiding, 2004). The enrolment gap between orphans and non-orphans increased with age among 9–14-year-olds. A more recent analysis of DHS from 11 African countries in 2000–2005 found lower levels of primary school attendance and completion among orphans compared to non-orphans in most countries (Campbell, Handa, Moroni, Odongo, & Palermo, 2008). Again, the largest disparities were seen among double orphans.

Longitudinal data from KwaZulu-Natal found that orphans experienced lower enrolment, completed fewer years of schooling and had less invested in their school-related expenses (Case & Ardington, 2006). Among this sample of 6–16-year-olds, maternal and double orphans’ schooling was affected most and cannot be explained by lower household wealth; they were educationally disadvantaged even compared to other children living in the same households. In contrast, paternal orphans’ low grade-for-age was explained by their relative poverty. A separate panel study in KwaZulu-Natal found that children (aged 9–21 years) who lived with their father, but not necessarily their mother, were less likely than those who did not live with their father to be behind at school, and this association was not explained by household wealth (Timaeus & Boler, 2007). Those with deceased or absent fathers showed the least progress at school, leading the authors to credit the “support and directive aspects of fathering.” However, while the analysis controlled for mothers’ education, which has an association with children’s educational achievement, it could not control for fathers’ education because data were not available.

Analysis of a five-year panel dataset capturing 20,000 children in Kenya showed the effects of a parent death on school participation over time, with the largest effects for children whose mother died (Evans & Miguel, 2007). The analysis detected a drop in primary school enrolment two years before a parent death, and a greater decrease after the death, persisting at a lower level for up to three subsequent years. In Manicaland, Eastern Zimbabwe, the loss of a mother also hindered primary school completion more than loss of a father, an effect that grew stronger with time since her death (Nyamukapa & Gregson, 2005). Among the older population of 15–18-year-olds, orphaned and vulnerable females, particularly maternal orphans, were less likely to have received any secondary school education (Gregson et al., 2005). The authors attributed the findings, not to poverty among affected children, but to the tendency of many surviving fathers to place their children in the care of others, while widowed mothers prioritised their children’s education.

Role of education in HIV infection and sexual risk behaviours

Research has documented the role of both school attainment and attendance in HIV infection (Gregson, Waddell, & Chandiwana, 2001). A recent systematic review of educational attainment and HIV infection in sub-Saharan Africa documented a shift in HIV risk from the most educated early in the AIDS epidemic to the least educated since the mid-1990s (Hargreaves, Bonell, et al., 2008). The 36 studies reviewed had controlled appropriately for variables such as sex, age, wealth, household expenditure, and place of residence, leading the review authors to credit the change with faster adoption of protective behaviours, including condom use, among the more educated.

A study of the links between school attendance and HIV infection among unmarried 14–25-year-olds in rural South Africa in 2001 found lower levels of HIV among male students, compared to their out of school peers (Hargreaves, Morison, et al., 2008). While the association with HIV was not as evident among females, female students had fewer sex partners and their partners were closer to their own age; they also reported having sex less often, and sex with condoms more often, than non-students.

In sum, recent research depicts a heightened sexual risk among orphans, but the reasons for this risk have not been formally investigated. As most analyses of large survey and longitudinal datasets show that maternal and double orphans experience greater educational disadvantage than their peers, and recent evidence confirms the vulnerability of the least educated to HIV infection as the AIDS epidemic matures, this study asks whether the higher risk of HIV among orphans is explained by educational disruptions following a parent’s death. We investigate this question among unmarried orphans in Highfield in urban Zimbabwe.

Methods

Study design and procedures

Full details of sampling, recruitment and data collection are given elsewhere (Birdthistle et al., 2008). In short, data were drawn from a cross-sectional study conducted in 2004 in a high-density suburb of Harare, Zimbabwe. All 15–19-year-old girls from all households in
a random sample of census enumeration areas were invited to participate in a private interview about their living situation, parents/caregivers and family, sexual experiences and HIV/AIDS issues. Upon further consent, a nurse collected a biological specimen (either a venous blood or dried-blood spot or oral fluid sample, depending on the participant’s preference), which was tested for HIV (Vironostika, Lab Assist; confirmation of positives with Determine, Abbot) and (for venous samples only) Herpes simplex virus type-2 (HSV-2, Kalon; confirmed with repeat tests). The individual interviews were combined with a household survey, in which an adult answered questions about co-residents and the dwelling, and linked by code to the anonymous laboratory results. Permission for the study was received from the ethics committees of MRC-Zimbabwe and the Biomedical Research and Training Institute of Zimbabwe and the London School of Hygiene and Tropical Medicine.

Conceptual framework

Possible pathways between orphanhood and adverse sexual health outcomes are outlined in Fig. 1. Four pathways were selected based on exploratory research conducted in the study community and factors shown in other studies to be associated with orphanhood (contributions to orphans’ sexual risk have not been established, as noted in the Introduction above, and are thus hypothesised) (Birdthistle, 2007). This analysis explores the educational pathway, considering the influence of other possible pathways.

Education hypothesis

It is hypothesised that two aspects of education could influence sexual risk: lifetime educational attainment and/or current school attendance. Attainment, or the highest education level completed, could determine whether an adolescent has attained a certain level of education needed to: (a) gain literacy, understanding and skills to avoid HIV, e.g., to act on health messages promoting condom use; or (b) gain the minimum qualifications to secure a job and financial independence, thus avoiding transactional or survival sex, or early marriage for financial security. Educational attainment may also coincide with aspiration, reflecting a determination to invest in one’s own potential and future, e.g., by avoiding sexual risks. Attainment can reflect a girl’s educational history, including events at the time of and soon after a parent’s death, but may also reflect events that occurred before orphanhood.

School attendance can influence access to health services and counselling, as well as a sexual network with potentially fewer and younger sexual partners compared to youth who are out of school.

Hargreaves, Morison, et al. (2008) propose that sexual networks of students may be characterised by smaller age differences between partners, enabling “greater power equity to negotiate condom use.” And, within schools, “higher levels of social capital and more positive future expectations may support the adoption of protective behaviours.” This is in contrast to the adult sexual networks which school-leavers may face, “in which negotiation processes are more fraught and older partners with more experience and power dictate the ‘rules’ of sexual engagement” (Hargreaves, Morison, et al., 2008). Alternatively, a girl’s enrolment may be dependent on expectations of sexual relations with a fee sponsor or teacher, putting pupils at sexual risk (Tichatonga & Shumba, 2001). In sum, enrolment can reflect a girl’s current situation, including the choices and investments of her current caregivers (Case et al., 2004).

If the loss of one or both parents detrimentally affects either educational attainment or attendance, and these, in turn, increase HIV risk, then being out of school and/or leaving school early could mediate orphans’ disproportionate risk of HIV compared to their peers.

Statistical analyses

Participants were classified according to whether they had lost their father only (“paternal orphans”), mother only (“maternal orphans”), both parents (“double orphans”) or whether both parents were still alive (“non-orphans”). The main sexual health outcome was infection with either HIV or HSV-2, as a combined indication of lifetime sexual risk. In the original analysis describing orphans’ heightened sexual risk, HIV and HSV-2 were combined with pregnancy as a marker of unprotected sex (Birdthistle et al., 2008). For this analysis of education as a causal pathway, pregnancy is not included as a sexual health outcome, since pregnancy may have precipitated school leaving rather than vice versa.

One variable for educational status was created, to incorporate both attendance (in or out of school) and attainment (completed at least Form 4 of secondary school, as that is recognised as school completion, circa age 16), with the following categories:

1. In school, at level Form 4 or above
2. In school, below Form 4
3. Out of school, having completed Form 4 or higher
4. Out of school, having left before completing Form 4 (considered to have left early).

The prevalence of HIV and/or HSV-2 was compared among unmarried paternal, maternal, double orphans and non-orphans. Educational status was assessed by orphan type and age (since educational expectations differ by age, and orphanhood is associated with age), and for associations with HIV/HSV-2. Multivariable logistic regression was used to assess the effect of educational status on the relationship between orphan status and sexual risk.

Factors which may result from a parent’s death and subsequently affect schooling were considered as possible confounders of the association between education and sexual risk (depicted with light arrows in Fig. 1). The following measures for the economic, environmental and emotional pathways in Fig. 1 were selected as confounders, on the basis of preliminary qualitative research, as well as associations in univariable analyses with two or all of the factors key to this study, specifically, orphan type, educational status and/or HIV/HSV-2 prevalence (Birdthistle, 2007): (1) poverty, measured by the number of meals eaten by members of a participant’s household, with less than three meals per day acting as a proxy for a ‘poorer’ household (this was
considered a more appropriate measure of socio-economic status than income as a minority of people are employed in this context; (2) residential mobility/stability, measured by time lived in Highfield, with having lived in Highfield for less than one year a reflection of recent mobility; and (3) frequency of church attendance, with one or more times per week reflecting the importance of religiosity in a participant’s life. Each potential confounder was included in the multivariable model to gauge their effects on estimates of education’s contribution to orphans’ HIV/HSV risk.

Factors which may be consequences of, and therefore subsequent to, school drop-out or absence were considered to be on the causal pathway between education and HIV, and not treated as potential confounders (e.g., unemployment). Similarly, factors which were seen as intrinsically linked with a parent’s death were considered to be on the causal pathway (e.g., relationship to head of household, co-residence with parents, number of caregivers in lifetime; causal pathways are depicted with dark arrows in Fig. 1). To avoid over-adjusting (i.e., underestimating the effect of education in explaining orphans’ higher risk of HIV/HSV-2), such variables were not included in multivariable analyses.

Results

Participation in the survey

Of 2742 households visited in the selected areas, 1057 contained eligible participants. Of 1283 girls invited to participate, 863 (67%) came for an interview and 839 (97% of the interviewees) provided a biological specimen (749 venous blood, 76 finger-prick sample and 14 oral fluid). In data collected from the household surveys, there were no statistically significant differences between girls who did and did not participate. According to date of birth, participants were between the ages of 14 and 20 years-old.

Prevalence of orphanhood and sexual health outcomes by orphan status

Excluding pregnancy as an outcome for the purposes of this study did not alter the key findings of the original analysis (Birdthistle et al., 2008). Levels of HIV (18%) and HSV-2 infection (42%) were high among married girls (45% HIV/HSV-2; n = 50/110), with small and non-significant differences by orphan type. Among the unmarried girls (n = 743), there were significant differences in prevalence of HIV/HSV-2 among orphans compared to non-orphans (6.2%; n = 19/306), with the highest prevalence among maternal orphans (19.7% [n = 12/61]; age-adjusted odds ratio, aOR = 3.4 [1.5–7.6]), followed by double orphans (13.6% [n = 12/88]; aOR = 2.3 [1.0–4.9]), and girls who lost their father before the age of 12 (11% [n = 9/80]; aOR = 2.3 [1.0–5.3]), but not after age 12 (6%; [n = 5/83]; aOR = 1.0). Subsequent analyses were restricted to unmarried girls, to investigate the higher HIV/HSV-2 prevalence evident among unmarried orphans.

Educational outcomes by orphan status

About 60% of the unmarried participants were currently in school. Among those, six girls were still in primary school and 27 girls were attending college. Two girls said they had never attended any school and 46 others dropped out during or upon completion of primary school, but most unmarried girls had attended some secondary school (93%).

Overall, double orphans were the least likely to be in school, with 47% attending (age-adjusted p-value = 0.004, compared to 60% non-orphans). Among pupils, double orphans were more likely than non-orphans to be below Form 4 (p = 0.04). Of those out of school, double orphans were more likely to have left before rather than after completing Form 4, in comparison to non-orphans (p < 0.001). Double orphans’ lower odds of attendance and attainment did not alter significantly when additionally adjusted for the potential confounders (specifically, meals per day, recent mobility, and church attendance). There was no difference in current attendance of maternal orphans (54%) compared to non-orphans (60%; age-adjusted p = 0.7). Though maternal orphans were more likely than non-orphans to leave school before completion (27% vs 13% respectively), the association between maternal orphan status and school drop-out was of borderline significance (aOR = 1.7, 0.8–3.7; p = 0.1), and disappeared when adjusted for time lived in Highfield (aOR = 0.8; 0.4–1.9, p = 0.7). Maternal orphans were the most likely to have moved to Highfield recently and recent arrivals had very high odds of leaving school early: aOR = 9.2 [5.4–16.0] compared to girls who had lived in Highfield longer than one year. No associations were found between educational status and having lost a father before the age of 12.

Fig. 2 presents educational status by orphan type, separately for the younger and older girls in the study, since different expectations of educational attainment apply.

Expected to be in school

Of the younger girls (unmarried) in the study – 14–17-year-olds – 76% (320/421) were enrolled in school, 9% (37) had already completed Form 4, and 15% (64) had left school before Form 4. Double orphans were the most likely to be out of school at this age, with almost one-quarter having left before Form 4 (15/64), compared to 13% of non-orphans (age-adjusted p = 0.001). Maternal orphans were also more likely to have left early (19%) among this age group, though this was not significantly different from non-orphans when adjusted for age (p = 0.6).
Expected to have completed Form 4 or higher

Among the 18–20-year-olds, one-quarter (54/209) were still in school; over half (109) had left school after completing Form 4 and 22% (46) left before Form 4. Among the older unmarried girls, orphans were more likely than non-orphans to have left school before Form 4, with the highest proportions of early-leavers among maternal orphans (38% vs 15% of non-orphans; \( p = 0.2 \)), followed by double orphans (34%; \( p = 0.02 \)). Among older paternal orphans, there was no difference in school attendance \( (p = 0.6) \) or drop-out \( (p = 0.5) \) when compared to non-orphans.

Reasons for leaving school

When asked directly in the interview, the most common reason cited for leaving school early, among both orphans and non-orphans, was the inability to pay school fees, books or uniforms (cited by 86% of all unmarried school-leavers). Some double (9) and orphans, was the inability to pay school fees, books or uniforms was the most likely reason for leaving school \( (n = 10) \), but no maternal orphans, cited a parent's death as the reason for leaving school. It was not common for unmarried girls to leave school due to pregnancy \( (n = 1) \), illness \( (n = 1) \), to find work \( (n = 1) \), or expulsion for pregnancy \( (n = 0) \), failing exams \( (n = 0) \) or behavioural problems \( (n = 0) \). Most girls who left school due to pregnancy were married at the time of the interview \( (10/12) \).

Some interview questions about schooling were asked only to orphans, specifically, how their parent’s death affected their schooling, and answers are summarised in Table 2. Of those who lost a parent when aged 12 or older, and likely to remember the experience, the most common consequence was that grades suffered (30%). About 20% of orphans said they were absent more often or left school temporarily, while 16% said they left school permanently. About one-third of girls said there had been no effect of the parent’s death on their schooling.

School fee assistance

When asked whether their family had ever received any kind of assistance, 20% of unmarried girls mentioned – unprompted – that their family had received assistance with school fees, books or uniforms (question did not specify whether assistance was specifically for the girls’ own fees). Assistance with school fees was the third most common answer after food (50%) and money (35%), and details are presented in Table 3. Double (32%) and paternal (29%) orphans were more than twice as likely as non-orphans (14%) to say their family received school fee assistance \( \text{aOR} = 2.8 [1.7–4.7] \) for double and \( 2.3 [1.4–4.0] \) for paternal compared to non-orphans, while families of maternal orphans (19%) were not significantly more likely than non-orphans to have received fee assistance \( \text{aOR} = 1.5 [0.8–3.0] \).

When asked what kind of support they felt their family needed most, 23% listed school fee assistance, the third most common answer after food (40%) and material things (e.g., clothing and blankets; 32%). Maternal and double orphans were almost twice as likely to say their family needed school fee support \( 29% \) vs \( 19% \) of non-orphans; \( \text{aOR} = 1.9 [1.1–3.4] \) for maternal and \( 1.7 [1.9–2.8] \) for double orphans compared to non-orphans), while there was no significant difference in needs reported by non-orphans and girls who lost their father at a young age \( \text{aOR} = 1.3 [0.7–2.2] \).

Sexual health outcomes by educational status

Among all unmarried girls, there were higher levels of HIV/HSV-2 among those out of school vs those attending (Table 4). Overall, girls who were not in school had more than three times the odds of infection compared to those in school, and the association was not influenced by potential confounders.

Patterns of risk by educational attainment differed slightly among the older and younger participants. Among the older girls (18–20-year-olds), there was only a single case of HIV/HSV-2 among 41 current students compared to 15% \( (n = 15/102) \) prevalence among those who left after completion, and 26% \( (n = 12/46) \) among those who left school before completing Form 4. The younger girls in the study (14–17-year-olds) were at heightened risk of HIV/HSV-2 if they left school having completed Form 4 (19% prevalence), but not if they left school early (6% vs 5% among those in school).

The role of potential confounders

The indicators selected as possible confounders played the following roles in univariable analyses with orphan type, educational status and HIV/HSV-2:

- Poverty: Girls who lost their father at a young age, or both parents, were more likely to live in households who ate fewer than three meals a day, rather than three or more \( \text{aOR} = 2.3 [1.4–3.8] \) and \( 1.9 [1.2–3.1] \) respectively. No such association was found for maternal orphans \( \text{aOR} = 0.8 [0.4–1.5] \).

- Living in a ‘poorer’ household was associated with being out of school, with the strongest effect among those who left school early \( \text{aOR} = 2.3; 1.4–4.0 \). However, there was no statistically significant association between household meals and HIV/HSV-2 status \( \text{aOR} = 1.4 [0.7–2.5] \).

- Geographic mobility: Girls who lost their mother or both parents were significantly more likely to have lived in Highfield for less than one year rather than longer \( \text{aOR} = 4.2 [2.4–7.4] \) and \( 2.6 [1.6–4.1] \) respectively. Having lived in Highfield for less than one year was also associated with being out of school, with very high odds among those who left school early \( \text{aOR} = 9.9; 5.7–17.3 \), but was weakly associated with HIV/HSV status.

- Religiosity: Regular church attendance was very high among all participants (90%). Double orphans were the least likely to attend church at least weekly, while there was no difference among maternal, paternal or non-orphans. Regular attendance at church was least likely among those who left school early \( \text{aOR} = 0.4; 0.2–0.9 \), and significantly and inversely associated with HIV/HSV infection \( \text{aOR} = 0.3; 0.1–0.6 \).

Collinearity between the potential confounding variables was not strong (data not shown).

The effect of education on the association between orphanhood and HIV/HSV-2

Table 5 presents the crude and age-adjusted association between orphan status and HIV/HSV-2 infection. As previously reported, the association is strongest among maternal orphans, followed by double orphans, and girls who lost their father before age 12. When these associations are adjusted for education (in four categories), only the association among double orphans reduces, by

---

Table 2

<table>
<thead>
<tr>
<th>Effects mentioned (unprompted)</th>
<th>Mother died when girl 12 years or older ( n = 106 )</th>
<th>Father died when girl 12 years or older ( n = 154 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Absent more often</td>
<td>14% (15)</td>
<td>15% (23)</td>
</tr>
<tr>
<td>Less time for homework</td>
<td>8% (8)</td>
<td>3% (5)</td>
</tr>
<tr>
<td>Grades suffered</td>
<td>32% (34)</td>
<td>29% (44)</td>
</tr>
<tr>
<td>Left school temporarily</td>
<td>8% (9)</td>
<td>5% (8)</td>
</tr>
<tr>
<td>Left school permanently</td>
<td>16% (17)</td>
<td>16% (24)</td>
</tr>
</tbody>
</table>

* Includes double orphans.
a small amount (8%). Additionally adjusting for potential confounders further reduced the association among double orphans, for a total reduction of 19%, leaving most of the association unexplained. Including potential confounders did not reduce the age-adjusted odds for maternal or paternal orphans. (The increase of approximately 25% in maternal orphans' odds of HIV/HSV-2 when adjusted for confounding factors is due to the observed association between mobility and maternal orphans' schooling; when adjusted for mobility, there was almost no difference between maternal and non-orphans' educational outcomes.)

Sexual debut was considered as an intermediary outcome on the pathway between education and HIV/HSV-2. As shown in previous analyses, maternal orphans were most likely to have had sex, followed by double orphans (Birdthistle et al., 2008), with borderline significance. As presented in Table 4, there were strong associations between schooling and sexual debut among unmarried girls: those who were out of school had more than twice the odds of having had sex, and the odds increased to four times for those who left school before Form 4. Adjusting for educational status yielded the same results with sexual debut as with HIV/HSV-2: there was a small reduction in the odds ratio for sexual debut of double orphans and no effect on that of maternal and paternal orphans.

### Discussion

This analysis showed a strong association between educational status and the sexual risk of unmarried adolescent girls in Harare. Out of school youth had more than three times the odds of HIV/HSV-2 than current students. Despite the links between education and HIV/HSV-2, schooling did not explain the heightened sexual risk among maternal or paternal orphans and explained only in small part the HIV/HSV-2 risk among double orphans, who had the lowest odds of both attendance and attainment. Similarly, when sexual debut was considered as a behavioural mechanism along the causal pathway between education and HIV/HSV-2 infection, schooling explained little or none of the earlier debut among maternal and double orphans.

The association between orphanhood and education may not be strong enough to explain orphans' sexual risk. Though orphans described a range of disruptions to their schooling after a parent death, a minority listed interruption or drop-out. The vast majority of school-leavers cited financial reasons for their drop-out, and this was equally true of orphans and non-orphans.

Although disparities in education were observed by orphan type, they may have been minimised by school fee assistance provided to families. Double and paternal orphans may have benefited from assistance with the increasing cost of school fees, particularly as their families received the highest proportions of assistance compared to non-orphans and maternal orphans. The same pattern of fee assistance was detected by research in rural Manicaland in 1998–2000 as well as a national survey in 2004, suggesting that similar criteria for assistance may be followed across Zimbabwe (Nyamukapa & Gregson, 2005; UNICEF & MoPSLW-Zim, 2005).

Gaps in need clearly persist, however, and assistance could be more effectively distributed. Though maternal orphans were more likely than non-orphans to drop-out of school early, and most likely of all groups to say their families needed school fee support, they did not receive more fee support than non-orphans. The analysis showed that maternal orphans' school drop-out may be explained by recent mobility, which may also contribute to their exclusion from assistance in many settings across Zimbabwe. The fact that their father is still alive, whether or not he is present or financially supportive, may also preclude maternal orphans from assistance. Paternal orphans received more than twice the fee support of non-orphans, which may help account for their educational advantage relative to maternal orphans, and possibly why they were less likely than other orphans to say their family needed school fee support. While double orphans were most likely to have received support, they showed the most educational disadvantage, and together with maternal orphans, were most likely to say their family still needed fee assistance.

It is also possible that education may not play a strong role in orphans' HIV/HSV-2 infection in this particular setting, since almost all young people complete primary school and most attend some secondary school. The most recent Demographic and Health Survey for Zimbabwe, 2005/2006, found that, in urban areas, primary school enrolment was about 96% and secondary school enrolment was 54% (although there are indications that primary school completion rates – at 68% in 2004 – have declined over the past decade) (Zimbabwe 2005–2006 DHS). Research in other

### Table 3

School fee assistance received and needed by unmarried girls' families.

<table>
<thead>
<tr>
<th>All participants (n = 632)</th>
<th>Both parents alive (n = 363)</th>
<th>Mother only dies (N = 68)</th>
<th>Both parents died (N = 108)</th>
<th>Father only died before age 12 (N = 93)</th>
</tr>
</thead>
<tbody>
<tr>
<td>% (n/N)</td>
<td>aOR</td>
<td>aOR (95% CI)</td>
<td>p-value</td>
<td>% (n/N)</td>
</tr>
<tr>
<td>Family has received assistance with school fees</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>19.8% (150)</td>
<td>14.1% (51)</td>
<td>1</td>
<td>19.1% (13)</td>
<td>1.5 (0.8–3.0)</td>
</tr>
<tr>
<td>Participants feel their family needs fee assistance</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>22.5% (142)</td>
<td>19.0% (69)</td>
<td>1</td>
<td>29.4% (20)</td>
<td>1.9 (1.3–4.4)</td>
</tr>
</tbody>
</table>

### Table 4

Association between education and sexual risk among unmarried girls.

<table>
<thead>
<tr>
<th>In school</th>
<th>Out of school</th>
<th>Ever had sex</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level Form 4+</td>
<td>Below Form 4</td>
<td>Completed Form 4+</td>
</tr>
<tr>
<td>% (n/N)</td>
<td>aOR</td>
<td>% (n/N)</td>
</tr>
<tr>
<td><strong>HIV or HSV-2 infection</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All unmarried (n = 626)</td>
<td>4.6 (7/154)</td>
<td>5.6 (12/214)</td>
</tr>
<tr>
<td>14–17-year-olds (n = 430)</td>
<td>5.3 (6/113)</td>
<td>5.8 (12/208)</td>
</tr>
<tr>
<td>18–20-year-olds (n = 195)</td>
<td>2.4 (1/41)</td>
<td>0/6</td>
</tr>
<tr>
<td><strong>Ever had sex</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All unmarried (n = 742)</td>
<td>10.4 (19/183)</td>
<td>4.6 (12/260)</td>
</tr>
</tbody>
</table>

aOR – odds ratio adjusted for age, in five levels (14/15-, 16-, 17-, 18-, 19/20-year-olds).
Table 5

Effect of education on association between orphan status and HIV/HSV-2, adjusting for potential confounders.

<table>
<thead>
<tr>
<th>Models (51 cases/533 observations)</th>
<th>Maternal OR (95% CI)</th>
<th>Double OR (95% CI)</th>
<th>Paternal &lt; 12 OR (95% CI)</th>
<th>Educational status</th>
<th>Lived in highfield &lt; 1 year</th>
<th>Church attendance (1+week)</th>
<th>Household meals (&lt;3/day)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>In school, &lt;Form 4</td>
<td>Out of school, &lt;Form 4</td>
<td>Out of school, &lt;Form 4</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Crude association</td>
<td>3.39 (1.52–7.56)</td>
<td>2.39 (1.11–5.13)</td>
<td>1.94 (0.84–4.48)</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td></td>
</tr>
<tr>
<td>Model 1: orphan status adjusted</td>
<td>3.42 (1.52–7.71)</td>
<td>2.28 (1.05–4.94)</td>
<td>2.30 (0.98–5.43)</td>
<td>–</td>
<td>–</td>
<td>–</td>
<td></td>
</tr>
<tr>
<td>for age</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Model 2: Model 1 additionally</td>
<td>3.58 (1.56–8.21)</td>
<td>2.18 (0.99–4.80)</td>
<td>2.50 (1.05–5.96)</td>
<td>0.90 (0.25–3.21)</td>
<td>2.79 (1.05–7.45)</td>
<td>2.58 (0.95–6.70)</td>
<td>–</td>
</tr>
<tr>
<td>adjusted for education</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Model 3: Model 2 additionally</td>
<td>4.26 (1.71–10.62)</td>
<td>2.03 (0.83–4.95)</td>
<td>2.38 (0.92–6.19)</td>
<td>0.83 (0.21–3.31)</td>
<td>2.72 (0.91–8.13)</td>
<td>2.68 (0.85–8.46)</td>
<td>0.72 (0.33–1.56)</td>
</tr>
<tr>
<td>adjusted for potential</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>confounders (44 cases/461</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>observations)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

contexts – where primary and secondary schooling are less widespread than urban Zimbabwe – has shown a starker picture of orphans’ educational disadvantage (Bicego et al., 2003; Case et al., 2004). Monash and Boerma’s (2004) analysis of 31 national surveys in sub-Saharan Africa found the greatest disparities between 10- to 14-year-old orphans’ and non-orphans’ school attendance in countries with the lowest school attendance levels.

Indeed, the educational disadvantage of orphans is not consistent or clear across settings. Study findings vary in terms of the ages and ways in which the education of orphans may be affected. The epidemiological and socio-economic reality across countries will account for different effects on orphans’ education, as will different analytical techniques and outcome measures. Furthermore, the schooling of orphans in their teenage years is not well documented, since few analyses have included participants older than 14 years, the youngest age of the Highfield study participants.

The possibility that higher levels of HIV among orphans are due to vertically-infected infants surviving into their late teens is worth investigating (Ferrand et al., 2007). However, a high level of coinfection between HIV and HSV-2, and reported sexual risk behaviours among orphans, and severe limits on access to nutrition, health services and AIDS treatments for children, make it probable that sexual transmission is the cause of most HIV infections in this population.

As a cross-sectional study, the analysis is limited in distinguishing the order of events tested as predictors and confounders of sexual risk. For example, we cannot verify whether school drop-out precedes HIV/HSV-2 infection or vice versa, however, excluding pregnancy from the sexual health outcomes removes those who left school as a result of pregnancy. Longitudinal research may help to understand the timing of events, like school drop-out and marriage, in relation to parent loss, and better trace the causal pathways of orphans’ risk. This could be particularly enlightening in settings where the disparity between orphan and non-orphans’ educational status is more striking than the current study setting.

Conclusion

In this study, orphans experienced lower school attendance and attainment than their peers, and educational status was strongly associated with HIV/HSV-2 prevalence among unmarried adolescent girls in Harare. However, educational status did not explain the heightened HIV/HSV-2 risk among maternal or paternal orphans and had only a small influence on the sexual risk of double orphans. Orphans’ odds of sexual risk remained high even when controlled for schooling and potential confounders.

Possible explanations for these unexpected findings have been explored. As evidence of orphans’ disproportionate sexual risk emerges in a range of settings, further research on other causal pathways is needed to understand and rectify this risk.

References


