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Premarital Sex and Schooling Transitions in Four sub-Saharan African Countries

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ABSTRACT

With the spread of formal schooling in sub-Saharan Africa and delays in the age at marriage, a growing proportion of adolescents remain enrolled in school when they "come of age." As a consequence, more and more adolescents have to negotiate sexual maturation and sexual initiation in a context very different from that experienced by earlier generations. Using data from the 2004 National Survey of Adolescents conducted in Burkina Faso, Ghana, Malawi, and Uganda, this paper investigates the timing of two key transitions in adolescence—school exit and premarital sex—among those who remain enrolled in school at the beginning of adolescence (age 12). Discrete-time hazard models show that in general girls are more likely than boys to leave school before completing secondary school and before completing primary school, and, among those completing primary school, are less likely to progress to secondary school, although those girls who complete primary school do so at the same age as or at a younger age than their male peers. Girls appear more vulnerable to dropout once they become sexually mature and once they engage in premarital sex. While girls were found to be less likely than boys, at any given age and controlling for other covariates, to have had premarital sex (except in Ghana), school enrollment and the timing of school entry were not consistent factors explaining gender differences. Thus, the negative consequences for schooling associated with sexual maturation and premarital sex appear to be greater for adolescents in these four countries, especially for girls, than the consequences of leaving school early for the likelihood of premarital sex.

With the spread of formal schooling in sub-Saharan Africa, a growing proportion of adolescents remain enrolled in school when they "come of age." As a consequence, more and more adolescents are having to negotiate sexual maturation and sexual initiation in a context very different from that experienced by prior generations. With rapidly rising rates of return in the labor market to post-primary schooling, educational aspirations are rising across Africa, and marriage and childbearing are being delayed. Nonetheless, school careers can be easily derailed when adolescent students engage in unprotected sex and fall victim to unintended pregnancy (leading either to premature parenthood or to a potentially risky abortion). Girls' educational careers and their returns to educational investments are particularly in jeopardy, since pregnancy while in school typically leads to school exit for girls who choose to proceed with the pregnancy, whereas boys' educational careers are less likely to be compromised by fatherhood. Policies and programs designed to encourage school progression and completion of primary and even secondary and higher levels of education must be built on a clear understanding of the interrelationships between schooling and reproductive health and behavior during adolescence.

Using data from the 2004 National Survey of Adolescents, conducted in Burkina Faso, Ghana, Malawi, and Uganda, we investigate gender differences in the timing of two key transitions in adolescence—school exit and premarital sex—among those who remain enrolled in school at the start of adolescence (age 12). In particular, we focus on events that occur between ages 12 and 19. The advantages of these data are that (1) events can be timed according to the year or age at which they occurred, including puberty, first sex, school entry, and school exit; (2) the sample sizes of both male and female adolescents are relatively large; and (3) reporting or recall bias is likely to be minimal given the recency of events under study.

Because an integrated literature on premarital sex and school exit is still in its infancy, we begin with a brief review of two largely independent literatures on the determinants of school enrollment and attainment on the one hand and on the determinants of adolescent reproductive behavior—in particular the initiation of premarital sex—on the other. A description of the data follows the literature reviews. The statistical analysis proceeds in three parts: (1) a descriptive analysis using life tables to show for each of the four countries and for boys and girls separately the interrelationships between the timing of first premarital sex and school exit; (2) a multivariate analysis of factors associated with the likelihood of school exit, including exit prior to secondary school completion, exit prior to primary school completion, and not progressing to secondary school; and (3) a multivariate analysis of factors associated with the likelihood of first premarital sex.

REVIEW OF THE LITERATURE

Extensive literatures exist on the determinants of both adolescent reproductive behavior and school enrollment and attainment in sub-Saharan Africa, but until recently these literatures have followed separate tracks. The earlier independence of these two literatures, each of which focuses on one aspect of the lives of adolescents, may seem surprising given the long tradition in demography of exploring fertility among adult women according to differentials in their

educational attainment (e.g. Bledsoe et al. 1999). It can probably best be explained by the fact that parents are seen to be the educational decisionmakers on behalf of their children (and adolescents) while adolescents are presumed to be responsible for their own reproductive behavior, thus necessitating different behavioral models. Our own multivariate analyses of school exit and premarital sex, which follow, build on these earlier literatures.

The determinants of school enrollment, retention, and attainment

Numerous empirical papers have been written on the factors affecting children's school enrollment, retention, and attainment in sub-Saharan Africa. Most analyses have relied on cross-sectional data from household-based sample surveys looking primarily at individual and family factors affecting various aspects of educational participation and attainment, including parental education, household economic status, living arrangements, and orphanhood status (e.g., Lloyd and Blanc 1996; Case et al. 2004). With more recent improvements in survey design allowing the linking of school and household characteristics, measures of school access and quality have been incorporated in some analyses as additional determinants of school enrollment, retention, and attainment along with individual and family factors.[1] Because our data are household based, we include a few of the most critical household and family factors—in particular, household economic status and orphanhood status—that have been found to be important determinants of schooling outcomes.

A large literature documents a positive association in the cross-section between parental income or wealth and children's schooling outcomes (NRC/IOM 2005). A recent comparative analysis of data from 51 countries (35 from sub-Saharan Africa) supports earlier findings in demonstrating the continuing importance of household economic status, as measured using an asset index, in explaining differences between children in educational outcomes (Ainsworth and Filmer 2006). Parental education is of equal or even greater importance in most studies, with some studies showing mother's education and some studies showing father's education as more critical (NRC/IOM 2005; Behrman 1997).

Comparative analysis of the role of orphanhood in explaining differences in the current enrollment of children ages 7–14 found that, while orphans have lower enrollment than non-orphans in some countries, the differences are relatively small and dwarfed by differences in households' economic status (Ainsworth and Filmer 2006). Some analysts have begun to rely on longitudinal data to analyze the effects of the family environment, including orphanhood, on subsequent schooling outcomes. Case and Ardington (2006), using data from South Africa from 2001 to 2004, found that the death of the mother, but not the death of the father, has a negative causal effect on children's enrollment and grade attainment. These results apply to both younger (ages 6 to 10) and older children (ages 11 to 16). Indeed, it appears that the educational deficit of maternal orphans accumulates over time. The researchers did not find that female orphans are differentially disadvantaged in terms of school outcomes. A five-year panel study of 20,000 Kenyan children also found a substantial decrease in school participation following parental

death, with the largest effects for maternal orphans and for those children who, prior to the parental death, had been doing poorly in school (Evans and Miguel 2007).

Among students who remain in school until adolescence, additional individual factors help to explain ultimate educational attainment and the timing of school exit as young people themselves assume a larger role in determining educational outcomes. Transitions through puberty, premarital sex, pregnancy, motherhood, and marriage can potentially compromise school careers. From focus group discussions with female and male 14–19-year-olds in Burkina Faso, Ghana, Malawi, and Uganda in 2003, a strong, commonly held view was that girls still bear the brunt of negative consequences related to premarital pregnancy. Young men who become fathers before marriage are teased or pitied, but girls in this situation are talked about as having to drop out of school or being chased out of the home (Amuyunzu-Nyamongo et al. 2005). While we know empirically that adolescent students in sub-Saharan Africa are less likely to have had sex than their out-of-school peers (NRC/IOM 2005) and more likely to use protection if they do have sex (Lloyd 2006), we know little about how various aspects of reproductive health and behavior affect the likelihood of school exit. In an analysis of DHS data from five West African countries, Lloyd and Mensch (2006), using hazard models and time-varying variables, found that the probability of school exit for adolescent girls was significantly and positively associated with the initiation of first premarital sex in four of the five countries. While these results do not establish causation, they show how these transitions are temporally related to each other and suggest that educational progress cannot be fully assessed without attention to other concurrent adolescent transitions.

Adolescent reproductive health literature

A recent analysis of trends in marriage and the timing of sexual initiation in sub-Saharan Africa found that, while the age at first sex has either remained the same or has risen in conjunction with a rise in the age at marriage, there has been an increase in the proportion of first sex that occurs before marriage (Mensch, Grant, and Blanc 2006). Further details on the context—in particular, whether premarital sex is more likely than in the past to occur among adolescent students —have not yet been investigated.

The population field has had a long tradition of analyzing the relationship between education and fertility, including adolescent fertility (Bledsoe and Cohen 1993), as well as the relationship between education and age at sexual initiation (NRC/IOM 2005). Typically such studies use cross-sectional data that examine completed education in relation to reproductive outcomes. In the vast majority of studies, educational attainment is consistently and negatively associated with the probability of initiating sex. However, because pregnancy and parenthood are often reasons for leaving school, the apparent preventive effect of educational attainment on sexual initiation could instead be the effect of sexual activity on the likelihood of school exit. To understand the potential role of schooling in adolescent reproductive outcomes, it is necessary to identify characteristics or experiences that predate sexual initiation and that can be linked to subsequent reproductive outcomes.

The results of a few studies suggest that individual schooling experiences as well as schooling characteristics are likely to be important factors in subsequent adolescent reproductive outcomes among those who remain enrolled at the onset of adolescence. Grant and Hallman (2006), using retrospective data from a South African survey of adolescents collected in 2001, found that adolescents who had started school late were at significantly greater risk of becoming pregnant while enrolled than those who started school on time. In addition, girls who repeated a grade before becoming pregnant were twice as likely to drop out of school when they became pregnant than those who had not repeated. Marteleto, Lam, and Ranchhod (2006), using a longitudinal sample from Cape Town, South Africa, found that both boys and girls with higher literacy and numeracy scores were much less likely to have had their first sex in the three years between the two surveys. Using data from the DHS for five West African countries, Lloyd and Mensch (2006) found that adolescents who were in the lowest category of the grade-for-age index (a measure of school progress) were more likely than those in the highest category to have a first birth during their teenage years.

In a study that collected detailed independent data on the characteristics of schools attended by Kenyan adolescents, Mensch et al. (2001) found that in schools characterized by a gender-neutral atmosphere, as measured by the percent of students of either sex who report that the sexes are treated equally at school, girls were significantly less likely to engage in premarital sex.[2] The same was not true for boys. In a randomized trial of various school interventions among adolescents in Kenya with the goal of limiting the spread of HIV/AIDS, Duflo et al. (2006) found that reducing the cost of education by providing funds for school uniforms simultaneously lowered dropout rates, teen marriage, and childbearing, thus reinforcing the notion that these three behaviors may have common underlying causes. Other interventions such as training teachers in an HIV/AIDS curriculum and sponsoring a debate and essay writing on the role of condoms in schools were not as effective in reducing teen childbearing and therefore had no impact on school retention rates.

The family environment, both earlier in childhood and currently, also plays a key role in the timing of sexual and reproductive health transitions in adolescence. One possible mechanism is through negative experiences in childhood—such as the death of a parent or alcohol abuse in the household—that can disrupt normal development and lead to high-risk behaviors in adolescence and adulthood, including early sexual activity or unwanted sexual activity. Retrospective cohort studies in the United States have found positive associations between adverse childhood experiences and teen pregnancy and paternal involvement in teen pregnancy. Moreover, the relationship between adverse childhood experiences and teen pregnancy is graded: the higher the number of negative experiences, the higher the likelihood of teen pregnancy (or paternity in a teen pregnancy) (Anda et al. 2002; Hillis et al. 2004).

Few comparable studies in Africa of negative childhood experiences and subsequent sexual and reproductive health outcomes have been conducted. The predominant focus instead has been on the contemporaneous absence of parents and adolescent sexual risk and protective behaviors. Moreover, the specific circumstances that could explain why parental absence is

associated with an earlier start to sexual activity, and why this might matter more for girls than for boys, are not entirely clear. For example, a survey-based study in a slum in Nairobi, Kenya showed that when the father lived in the household, never-married 12–19-year-old daughters were much less likely to have ever had sex, to have had an unwanted pregnancy, or to have been recently sexually active than when neither parent or only the mother lived in the household (Ngom, Magadi, and Owuor 2003). Studies that examined outcomes for both females and males indicate that parental presence has a more protective effect for females than for males. In Ghana, national survey data showed a protective effect of living with both parents compared to other kinds of living arrangements on ever having sex for adolescent females, but not for males, although there was no association with number of sexual partners or contraceptive use (Karim et al. 2003). A study in Côte d'Ivoire found that living in the same household as the father in childhood was associated with a delay in first sex for female adolescents but not for males (Babalola, Tambashe, and Vondrasek 2005).

DATA AND ANALYTIC SAMPLE

Data for this study are from nationally representative, household-based surveys of female and male 12–19-year-olds conducted in 2004 in Burkina Faso, Ghana, Malawi, and Uganda.[3] The national surveys were designed to be as comparable as possible and to include a wide range of measures of family context. A first-stage systematic selection of enumeration areas was made in each country, and a second-stage selection of households within the selected enumeration areas was made from a household listing. All 12–19-year-old de facto residents in each sampled household were eligible for inclusion in the survey. Interviews were completed with 5,955 12–19-year-olds in Burkina Faso, 4,430 in Ghana, 4,031 in Malawi, and 5,112 in Uganda.[4]

Analytic sample

For this analysis, our sample is restricted to individuals who were enrolled in school at age 12 and had not yet had sex or married by that age.[5] Table 1 shows the total number of adolescents in the survey, how many had left school before age 12, how many were in school at age 12, and the final number included in the sample. With the exception of Burkina Faso, very few had exited school before age 12 among those who had entered, and only between 1 and 2 percent of those who attended school began after age 12. We assumed that adolescents who did not know the age at which they started school (ranging from 5.5 percent of school-going adolescents in Burkina Faso to 21.8 percent in Ghana) first attended school before age 12. The sample is reduced further by excluding those few adolescents who were in school at age 12 and had married or reported having sex before that age. The total number of cases dropped from those in school at age 12 for all the reasons mentioned ranges from 35 females in Burkina Faso to 183 males in Uganda. In sum, most school and reproductive outcomes will be captured within the sample chosen.

The sample restriction of being in school at age 12 leads to a drop in cases ranging from 10–12 percent of the original sample in Ghana to 5–7 percent of the original sample in Malawi and Uganda. School fees for primary school were abolished in 1994 in Malawi, 1997 in Uganda, and 2005 in Ghana, and the majority of adolescents in these three countries were in school at age 12.

On the other hand, restriction of the analysis to respondents in school at age 12 produces a very select group of adolescents for Burkina Faso (42 percent of 12–19-year-old males and 31 percent of females), where the proportion of adolescents who have ever been to school is relatively low compared to the other three countries. Thus, interpretations of the descriptive and multivariate evidence for Burkina Faso are based on the "leading edge" of students in the younger generation.

Discrete-time approach

We use a discrete-time approach where units of time are measured with years of age. Each person-year corresponds to the year spent at a given age by a given individual; all individuals therefore contribute a series of single-year observations, from age 12 until they either experience the event of interest or are censored. Censoring occurs either because the adolescent is interviewed without experiencing the outcome of interest or because he or she is no longer at risk of experiencing the outcome because marriage removes him/her from the risk of premarital sex or because the completion of a school level removes him/her from the risk of dropping out before that level. Estimates of person-years are derived from retrospective reports of the ages at which particular events, such as puberty, school exit, or premarital sex, occurred.

The lack of precise dating of events, and the corresponding need for discrete-time methods, has important consequences. Because the unit of analysis is the person-year, a conservative censoring approach is used; when individuals either have not experienced the outcome of interest prior to the survey, or experienced the event at the same age as their age at the time of their interview, they are censored one year younger than their age at interview (and deemed not to have undergone the event). This censoring protocol is applied to the multistate life tables showing status by age with respect to school exit, premarital sex, and marriage, and to the multivariate models of school exit, school progression, and premarital sex. This approach prevents biases that would result if either of two alternative approaches were applied. The first alternative, which simply censors individuals who have not experienced the event prior to being surveyed, would result in an underestimate of the probability of the event at that age. For example, including the "age 15" person-year of an adolescent who was interviewed at age 15 and was still in school does not allow for the possibility that school exit can still occur at age 15 for this individual. The second alternative, which would apply the conservative censoring approach only to those individuals who have not experienced the event of interest prior to the survey, would contribute to an overestimate of the probability of the event at that age.

RESULTS

Multistate life tables of schooling and sexual transitions

Adopting a life table approach to examining transitions in adolescence is preferable to examining current status or retrospective information for those who have experienced the transitions, because those who have not experienced the event of interest by age "x-1" or earlier but who are still at risk of the event (i.e., their data are "right-censored") can be included and sampling error is reduced as well (Zaba et al. 2004).

Figures 1–8 are a series of stacked area graphs, representing a synthetic cohort, showing the percentage of each year in the life table spent in each combination of schooling and sexual statuses. These figures, which are based on our sample of adolescents aged 12–19 who were in school at age 12 and had not yet had sex or married, show both the timing of transitions and the scale of exposure to different combinations of statuses. At any point in time, an adolescent can be placed in one of six mutually exclusive statuses: (1) in school, no premarital sex, no marriage; (2) in school, premarital sex, no marriage; (3) in school, married;[6] (4) out of school, no premarital sex, no marriage; (5) out of school, premarital sex, no marriage; and (6) out of school, married. The letter "S" in the legend stands for premarital sex and "M" stands for first marriage. While we focus on school-leaving and premarital sex, marriage is included in the figures to highlight the fact that many girls who have left school and have not had premarital sex are in fact sexually active within marriage and therefore no longer exposed to the risk of premarital sex. The lower three segments represent students and the upper three represent adolescents who are out of school.[7] The slope of the line dividing these two sets of segments represents the pace of dropout from school. The order of the graphs is by country and shows males and then females.

By age 16, well over 80 percent of boys remain in school in Ghana, Malawi, and Uganda.[8] In Burkina Faso, on the other hand, the fraction has fallen to slightly below 60 percent by that age. For girls, the percent dropping out by 16 is greater than for boys in every country, with the biggest gender gap in Uganda. The figures illustrate that those who started adolescence as students (at age 12) spend a large share of their years between 12 and 19 as students who are not sexually active (the bottom part of the graphs).

Overall, by age 16, only 6 percent of boys in Ghana in the analytic sample report having had premarital sex, compared with more than 33 percent in Malawi, 19 percent in Burkina Faso, and 24 percent in Uganda. While percentages reporting premarital sex by age 16 show a narrower range across countries for girls, the gender gap in the percent having premarital sex varies widely. In Ghana more girls than boys report having premarital sex by that age; in Burkina Faso and Uganda the gender differences are small, and in Malawi the gender gap is large, with 33 percent of boys reporting premarital sex and only 8 percent of girls (data not shown).[9]

Some of the students in the sample who have never had sex become sexually active while remaining enrolled, while others leave school first and then begin premarital sex or enter marriage. Among boys in Malawi and Uganda, adolescents spend more time as students and having premarital sex than they spend out-of-school and sexually active. This is because overall enrollment rates remain high during adolescence in these two countries. Among students, on the

other hand, the percentage having premarital sex by age 16 is much lower than the percentage who have not engaged in premarital sex. In Burkina Faso, male students start to leave school earlier and thus shorten the amount of time spent during adolescence when they are both in school and sexually active. Ghana is unusual because overall enrollment is high but time spent having premarital sex while in school is nonetheless low during adolescence.

Girls in all four countries, particularly in Malawi and Uganda, spend a much larger share of adolescence out-of-school and married than boys, particularly after age 16, leaving much less time available for other statuses. Remarkably, within all countries boys and girls appear to spend a similar proportion of time during adolescence out-of-school, not having premarital sex, and not married (the yellow area in the middle of each stacked graph).

Multivariate analysis

The multivariate analysis examines four outcomes, three measuring school transitions and one measuring the timing of premarital sex defined as first sex occurring before marriage or before living with someone of the opposite sex. For school transitions, we look at school exit before secondary school completion, exit before primary school completion, and progression to secondary school among those completing primary. Exit before secondary school completion involves the largest person-year file and the greatest number of events and thus provides us with our most stable models. However, because so few adolescents in these four countries complete secondary school, the more critical outcome is often completion of primary school. We also examine progression to secondary school among those completing primary school, because we are particularly interested in the gender effects. We hypothesize that girls who complete primary school might be such a select population that they are more likely than boys to make the transition to secondary school.

We estimate discrete-time hazard models using logistic regression; the outcome is whether or not the event—school exit before secondary school completion, school exit before primary school completion, and progression to secondary school or to premarital sex—was experienced in that person-year. We estimate both pooled models combining boys and girls and sex-specific models in order to explore the extent and source of gender differences. Because individuals contribute multiple person-years, all models are adjusted for clustering.

We recognize that in estimating the effect of puberty and premarital sex on school exit and the effect of school exit on premarital sex, there is a problem of endogeneity if both outcomes are influenced by the same underlying individual and family factors, some of which are unmeasured and uncontrolled for in the regression models. However, we chose to estimate these models in order to establish the sequence of events, which is not usually possible with developing-country surveys because they lack information on the timing of school-leaving. Thus, at the very least, we are able to establish whether the likelihood of school dropout is greater after experiencing puberty and premarital sex than before experiencing them. Similarly, we are able to establish whether puberty and school dropout are associated with an increased risk of premarital sex.

Compared to other household surveys, we have access to a larger set of individual and household covariates, including the timing of puberty (defined as age at menarche for girls and age when boys first noticed a set of physical changes), premarital sex, and school exit, which are all time-varying, and age at school entry. Note, however, that the imprecision in dating discussed earlier presents challenges in the construction of variables dependent on aligning particular events with particular ages. This problem potentially results in a dilution of the effects of time-varying covariates in the models. For example, if an individual experiences a given event (e.g., menarche) at age x, she is not considered as having experienced that event until the person-year corresponding to age x+1. This imprecision with respect to timing and sequencing of events becomes problematic if experiencing the "independent variable" event has a critical effect on the probability of experiencing the "dependent variable" event soon thereafter. This problem may be of particular importance when trying to elucidate associations (in either direction) between first premarital sex and school exit.

The covariates in our models, described in Table 2, include individual and household characteristics. Among the household characteristics, we include a set of variables we label "negative childhood experiences." These include food availability in the household and alcohol abuse in the household prior to age 10. We also construct a series of orphanhood variables that distinguish those whose mother or father died before age 10 and those who lost a parent any time after age 10. Adolescents in the reference category are those whose mother or father was still alive at the time of the survey. For adolescents whose parent died when the child was aged 10 years or older, the variable is time-varying.[10] Two additional dummy variables capture adolescents whose parent died before they turned 10 and adolescents who did not know how old they were when a parent died. Also included as controls are comparable variables for religious affiliation (Catholic [reference group], Muslim, and Protestant/other) and country-specific variables for ethnic group affiliation (with the most common ethnic group singled out in each case).

With regard to household characteristics, the socioeconomic status indicator is generated using a modified version of the household asset index developed for use with Demographic and Health Surveys by Filmer and Pritchett (1999).[11] Each household is assigned a score according to whether it falls into the bottom two quintiles, middle two quintiles (40th to 80th percentiles), or top quintile for its surroundings (urban or rural).

Other household characteristics used as controls include urban/rural status and the household head's education in single years.

Because of our interest in the results for puberty, school exit, premarital sex, and age at school entry, the tables that follow present the results for these variables only, although the covariates described in Table 2 are included in the models. In particular, for the school outcome regressions, we focus on the associations between school outcomes and puberty and premarital sex, whereas for the premarital sex outcome, we focus on the associations between this outcome and school exit and late entry. The full results for the regressions with all the covariates are presented in Appendix Tables 1–4.

School outcomes

We investigate gender differences in our school outcome variables by presenting the results of regressions in which we have pooled the data for boys and girls and examine the effect of a female dummy variable. Table 3 shows that in all four countries, girls still in school at age 12 are significantly more likely than boys to drop out before they complete secondary school (see row one) when we control for other covariates, including age. Odds ratios range from 1.3 in Burkina Faso to 2.0 in Uganda, indicating the increased likelihood of dropout for girls. If we restrict our analysis to dropout before completing primary school, odds ratios drop slightly and all remain statistically significant except for Burkina Faso, where the sample of school-going girls is highly selective and girls do not appear to be much more likely to drop out of primary school than boys. Contrary to our expectations, compared to boys, girls who complete primary school are more likely *not* to progress to secondary, although the results are only significant at conventional levels for Uganda and Burkina Faso. In the case of Ghana, progression to secondary school is measured as the transition to upper secondary because lower secondary is included in basic education (6 grades of primary and 3 grades of lower secondary).

Although girls are more likely to leave school prematurely, it is important to determine whether those who complete primary school do so at the same age as boys. If girls finish primary school at the same age as their male peers, one could conclude they are equally adept at academic work despite the fact that they leave school. To explore this issue, in Table 4 we estimate the mean age at primary school completion for three subsamples: (1) those completing primary school the same year they were surveyed, (2) 18–19-year-olds who did not progress past primary school, and (3) 18–19-year-olds who progressed to secondary school. Because of censoring, calculation of the mean is not straightforward and biases may exist in all three estimates.[12] Caveats aside, with the exception of Burkina Faso the patterns observed in the three subsamples in Table 4 are similar: girls complete primary school at the same age as or at a younger age than boys. This finding suggests that girls who complete primary school may be as capable academically as their male peers. They may be more likely to leave school because of prevailing gender role attitudes and a disinclination among parents to invest in girls' schooling relative to boys'. An alternative explanation is that girls who complete primary school are a more select group than boys who do so. If that were the case, however, one would expect girls who finish primary school to be more likely than boys to progress to secondary school, which is not what we observe in Table 3.

Table 5 summarizes the results for the three school exit models: school exit before completion of secondary school, school exit before completion of primary school, and failure to progress to secondary among those who completed primary, for the two covariates of interest—puberty and premarital sex—separately for males and females. With the exception of Burkina Faso, having experienced puberty and engaging in premarital sex consistently raise the likelihood of school exit and failure to progress to secondary school for girls. However, only for dropout before completion of secondary school are the results significant for all three countries. In Burkina Faso, puberty does not appear to have an effect on dropout for girls, possibly because

of the highly selective group of girls who remain in school after age 12. While the results for the effect of premarital sex on the three outcomes for girls in Burkina Faso are also inconsistent, the odds ratio for the "before completion of secondary school" model is quite large and nearly significant (p =.09).

Thus far, for the female models, we have limited our discussion of covariates to premarital sex and puberty. It is important to note, however, that aside from age, household head's education, and urban residence, premarital sex and puberty have the most consistent and significant effects on school outcomes of any of the covariates in the models. (See Appendix Tables 1–3.)

The results for boys are different from those for girls. Having experienced puberty has inconsistent effects, although it is not apparent whether puberty actually has no association with school outcomes or whether there is measurement error in the timing of puberty for boys. The question on onset of puberty for boys asked about a series of changes that may be harder to identify as occurring at a particular age, whereas for girls the first menstrual period is usually a memorable event.[13] In Ghana, the only country where the effect is statistically significant for boys, having experienced puberty reduces the likelihood of dropout before completion of secondary school relative to not having experienced puberty.

For both boys and girls, having had premarital sex increases the likelihood of school dropout. However, the odds ratios for boys are smaller, and only in Uganda are the results for boys statistically significant for dropout before both secondary and primary school completion. For progression to secondary school, the results for premarital sex are inconsistent for boys. One explanation for this gender difference is that girls who are sexually active are also at risk of pregnancy (less than 30 percent of sexually active, never-married 15–19-year-old girls currently use contraceptives; NRC/IOM 2005: 212). And while girls in sub-Saharan Africa who are visibly pregnant are generally asked to leave school, boys who get girls pregnant do not face this risk (Lloyd and Mensch 2006). This gender difference in effects is also notable for the other covariates. For boys, the socioeconomic variables have larger and more consistent effects on school outcomes than they do for girls. In particular, urban residence and household head's education appear to benefit boys slightly more than girls. (See Appendix Tables 1–3.) In sum, while experiencing puberty and premarital sex are important factors in school outcomes for girls, continuation in school for boys appears to be more closely related to household and community resources.[14]

Premarital sex

The results for the premarital sex models are shown in Tables 6 and 7, where we examine the effect of puberty, being out of school, and late entry into school on the likelihood of premarital sex. Table 6, which presents the pooled sex models, indicates that the likelihood of premarital sex is significantly lower for girls in Burkina Faso, Malawi, and Uganda and significantly higher for girls in Ghana at any given age, controlling for all covariates. This exception for Ghana is consistent with analyses of Demographic and Health Survey data that

found girls in Ghana were more likely to report premarital sex than boys (Curtis and Sutherland 2004).

Table 7, which presents the sex-specific results, shows that in all four countries, puberty, not surprisingly, raises the likelihood of premarital sex for girls; the effect is strongly significant in Ghana, Malawi, and Uganda. The self-reported timing of pubertal changes for boys has no significant association with the likelihood of premarital sex. Enrollment in school has a significant protective effect for both girls and boys in Ghana and for girls in Uganda. School enrollment does not appear to have a significant protective effect in Burkina Faso or Malawi (possibly in Malawi because of the underreporting of premarital sex among girls). To the extent that delayed school entrance is associated with premarital sex, it reduces the likelihood of premarital sex for boys in Malawi and for girls in Burkina Faso.

Interestingly, none of the socioeconomic variables has a consistent and significant effect on the likelihood of premarital sex for either sex in any of the four countries. Aside from an occasional exception, the household wealth quintiles, head's educational attainment, negative childhood experiences, and religion are not associated with premarital sex among adolescents (see Appendix Table 4).[15]

CONCLUSIONS

Adolescence is a time of transitions to adult roles, but rarely are these transitions explored simultaneously. Typically education experts explore the determinants of various school outcomes without considering the implications of other physical and behavioral changes that adolescents experience at the same time. Experts on adolescent sexual and reproductive health typically focus on factors affecting first sex but rarely examine aspects of schooling that may be important as well.

The availability of four comparable, nationally representative surveys of adolescents in sub-Saharan Africa, which focus on adolescent sexual and reproductive health and behavior and also include detailed information on adolescents' progress through school, provides an opportunity to explore these related issues. While marriage and school enrollment are largely incompatible, premarital sex and enrollment are not, and we find variations across countries and by sex in the extent to which adolescents spend time in school while sexually active.

In all four countries we find that at any given age girls are more likely to drop out of school than boys before completing secondary school and before completing primary school, and that those girls who complete primary school are less likely than boys to progress to secondary school. A partial explanation for these gender differences is found in differences between the sexes in the implications for school dropout of puberty and premarital sex occurring while in school. In general, girls appear more vulnerable to dropout once they become sexually mature and once they engage in premarital sex (which can lead to pregnancy and dismissal). However, we observe large variations across the four countries in the strength of these conclusions, suggesting that many contextual factors, including differences in the extent of premarital sex and early marriage, could be critical in explaining cross-country differences.

Our results indicate that the negative consequences for schooling associated with sexual maturation and premarital sex appear to be greater for adolescents in these four countries, especially for girls, than the consequences of leaving school early for the likelihood of premarital sex. While girls were less likely than boys at any given age to report having had premarital sex, school enrollment and the timing of school entry were not consistent factors explaining these gender differences. In Ghana, school enrollment is protective in terms of premarital sex for both boys and girls; in Uganda it is protective for girls but not boys; and in Malawi and Burkina Faso there is no evidence that it is protective for either sex. Surely many factors account for variability in premarital sex both across and within countries. As observed in rural Kenya (Mensch et al. 2001), variation in school quality may account for some of the differences in the likelihood of premarital sex. Future studies that collect more-detailed information on the educational environment should help clarify the associations between school experiences and sexual behavior among young people in sub-Saharan Africa.

NOTES

1 See Glewwe and Kremer (2006: 974–977) for an up-to-date review.

2 As far as we know, this is the only study of adolescent reproductive behavior to incorporate independent measures of school quality in the analysis.

3 Enumeration areas in four districts in the Northern region of Uganda, comprising 7 percent of all enumeration areas in the national sample, had to be dropped during fieldwork in 2004 because of security concerns. These districts are predominantly populated by Luo-speaking people; however, two neighboring Luo-speaking districts were retained in the sample.

4 Informed consent was sought from 18–19-year-olds. Consent from a parent or caretaker was first obtained for adolescents aged 12–17 before the eligible minor adolescent was approached for consent to participate in the survey. The overall individual response rate ranged between 86.6 percent (Uganda) and 95.2 percent (Burkina Faso). In each survey, a protocol of matching the sex of the interviewers to the sex of the respondent was used, though in some cases the protocol was not followed owing to the overriding need of matching language of respondent and interviewer.

5 Also excluded were those who did not know their ages at school exit, first sex, or marriage among those reporting any of these events.

6 This status is exceedingly rare because most school systems do not permit married students to enroll.

7 We are interested in comparing adolescents attending school with those who did not attend at each age, having exited before completing secondary school. For this reason, in the very few cases where adolescents had progressed beyond the secondary level, they are effectively censored at their estimated age of secondary school completion.

8 For purposes of discussion, we provide percentages, although it is not possible to determine the actual numbers from viewing the graphs.

9 This difference raises concerns that girls in the Malawi survey are substantially underreporting premarital sex, given that adolescents typically have sex with same-age peers. Moreover, if premarital sex among girls is underreported, then the time estimated in other statuses will be, correspondingly, overreported.

10 The variable is coded "1" for age intervals subsequent to the respondent's age when the parent died: if the parent died when the respondent was 14 and the respondent is age 16 at the interview, the variable is coded "0" for ages 12 through 14 and then "1" for age 15 (the age 16 person-year is not included in the analysis since it is an incomplete observation).

11 Filmer and Pritchett created an index of household wealth by conducting a principal components analysis on variables that indicate household ownership of specific assets (e.g., radio, bicycle, type of toilet). We refine this methodology by conducting separate principal components analyses for urban and rural households; Montgomery and Hewett (2005) argue that this approach produces an index that is more sensitive to the potentially different contexts of urban and rural poverty.

12 The estimate of the mean among those who have completed primary school may be biased downward since those who have yet to complete that level are still in school. Given that boys are more likely to complete primary school than girls, censoring may be more of a factor for boys and thus the mean may be more of an underestimate. If the analysis is limited to those at an age beyond which most adolescents who are going to complete primary school have already done so, say 18 or 19, then censoring should be less of a factor. However, a further complication is that those who are currently attending secondary school are not asked the age at primary school completion. Thus in order to calculate a mean for those in secondary school, we assumed uninterrupted progression through secondary school. Repetition of secondary school grades will introduce a bias toward an overestimate for the mean age at primary school completion.

13 The survey question in English for boys (though translated into local languages) was, "As boys grow into men, certain changes happen to their bodies, such as growing pubic hair, voices get deeper, or sometimes they have 'wet dreams.' At what age did you first notice any of these changes happening in your body, or have none happened yet?" The survey

question for girls was, "As girls grow into women, changes happen in their bodies, such as the start of menstrual periods. At what age did you have your first menstrual period, or have you not had one yet?"

14 For all models we estimated pooled regressions combining boys and girls in the same analysis and interacted all covariates with the gender variable to determine whether gender differences in covariates observed in Table 5 are statistically significant. While coefficients for gender interactions with puberty and premarital sex have the expected sign—that is, the effects for females are larger than those for males—the interactions are generally not statistically significant, perhaps because the confidence intervals for the male effects are so large (results not shown).

15 As with the school outcomes, we estimated models that pooled males and females and included gender interactions with all covariates. The odds ratios for the interaction effects of gender with puberty are all in the expected direction, with the effect for girls being greater than that for boys, but the coefficients are only significant in Uganda. The gender interactions with the out-of-school and late-entry variables are inconsistent and not significant.

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Table 1. 2004 National Survey of Adolescents: Sample sizes and sample characteristics for each country by sex

	Burkina Faso		Ghana		Malawi		Uganda	
	Males	Females	Males	Females	Males	Females	Males	Females
Completed interviews by de facto adolescent household members	3,016	2,939	2,229	2,201	2,052	1,979	2,510	2,602
Ever attended school, but exited before age 12	208	132	49	42	49	49	31	66
In school at age 12	1,254	920	2,004	1,932	1,941	1,863	2,395	2,407
Analytic sample*	1,197	885	1,942	1,868	1,776	1,801	2,212	2,325

Source: 2004 National Survey of Adolescents in Burkina Faso, Ghana, Malawi, and Uganda

* The analytic sample is restricted to individuals who were in school at age 12 and had not yet had sex or married at that age.

Figure 1. School, marriage, and premarital sex status distributions by age: Burkina Faso, males

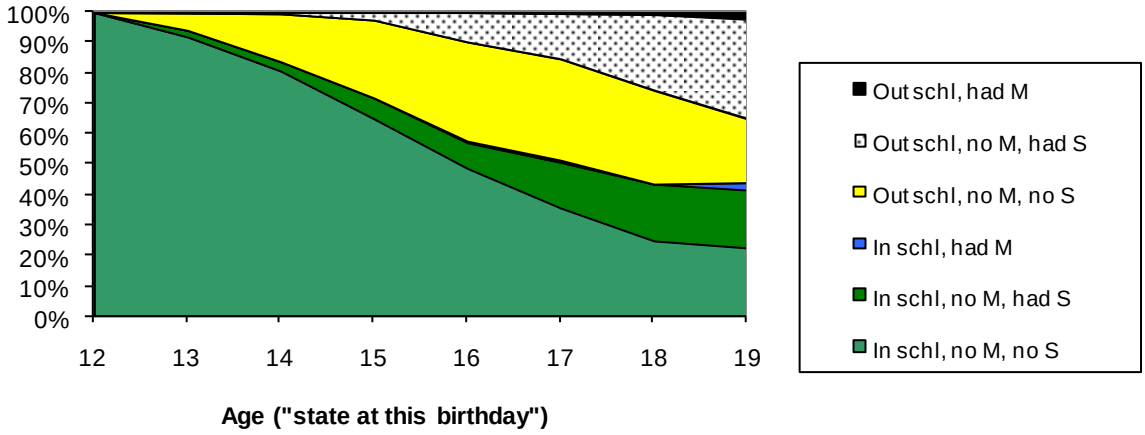

Figure 2. School, marriage, and premarital sex status distributions by age: Burkina Faso, females

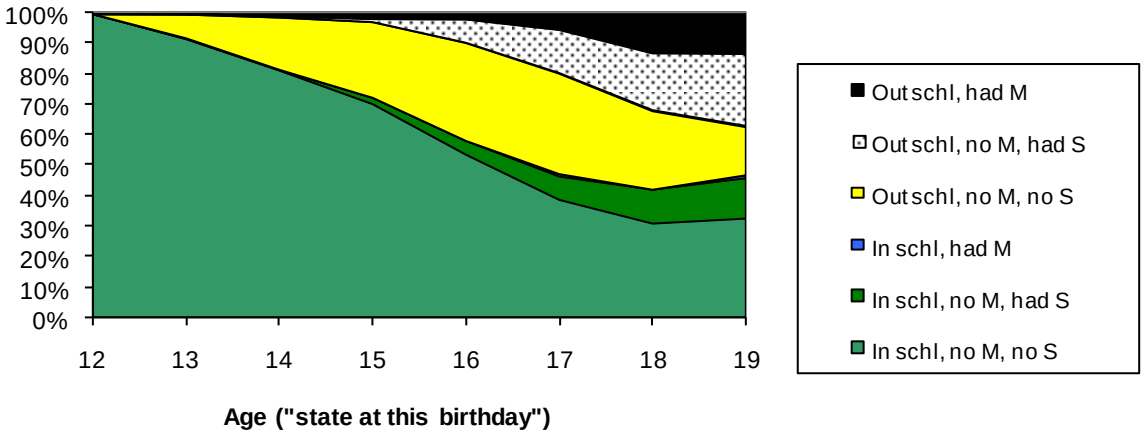

Figure 3. School, marriage, and premarital sex status distributions by age: Ghana, males

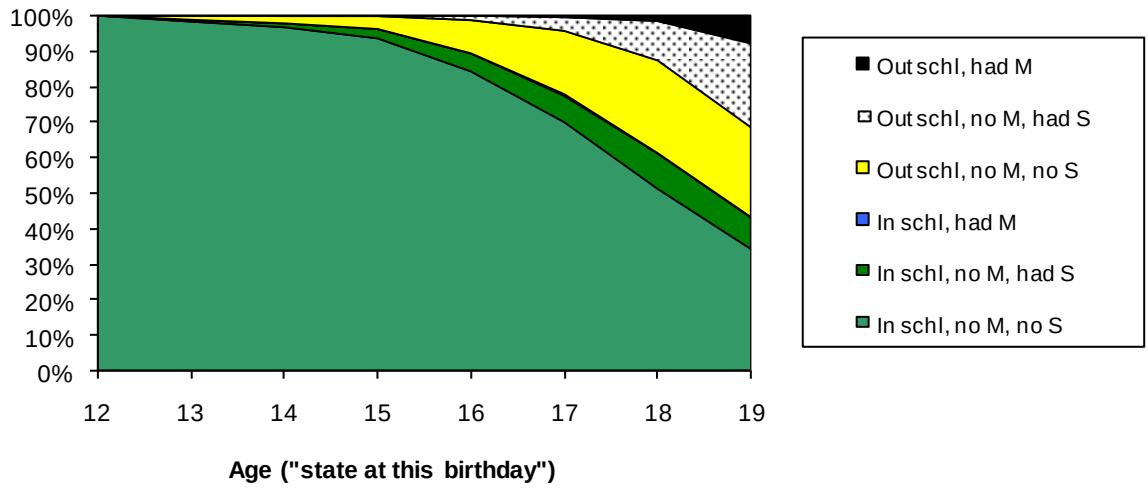

Figure 4. School, marriage, and premarital sex status distributions by age: Ghana, females

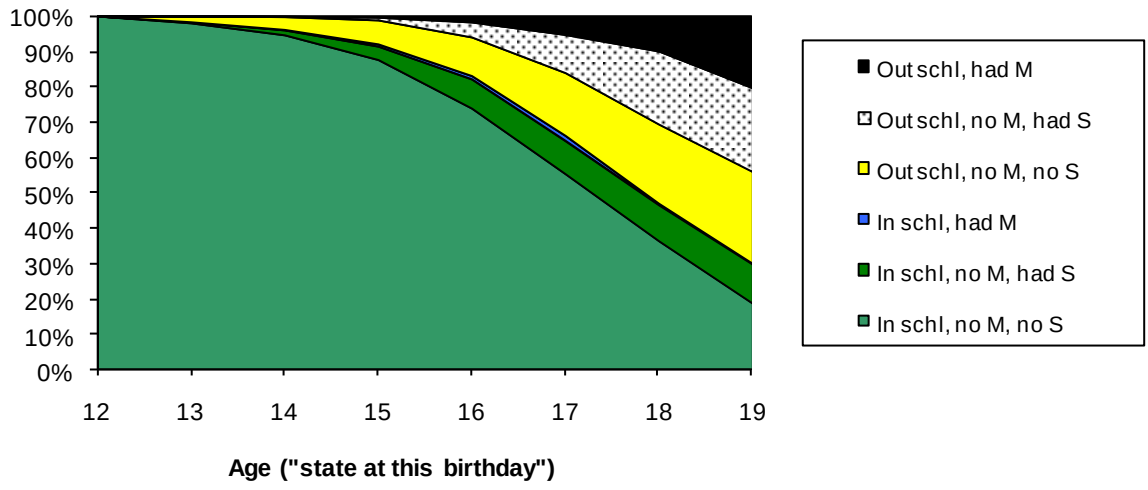

Figure 5. School, marriage, and premarital sex status distributions by age: Malawi, males

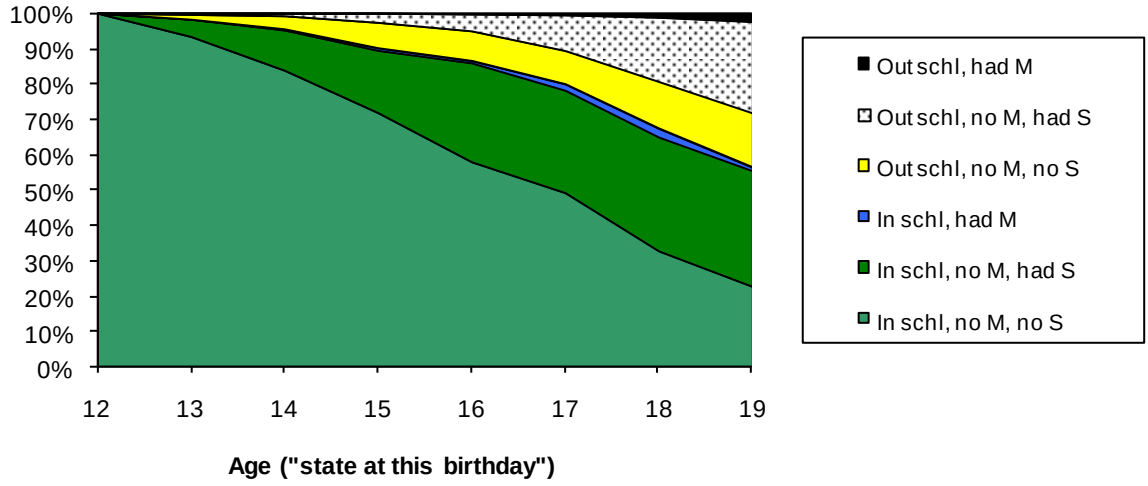

Figure 6. School, marriage, and premarital sex status distributions by age: Malawi, females

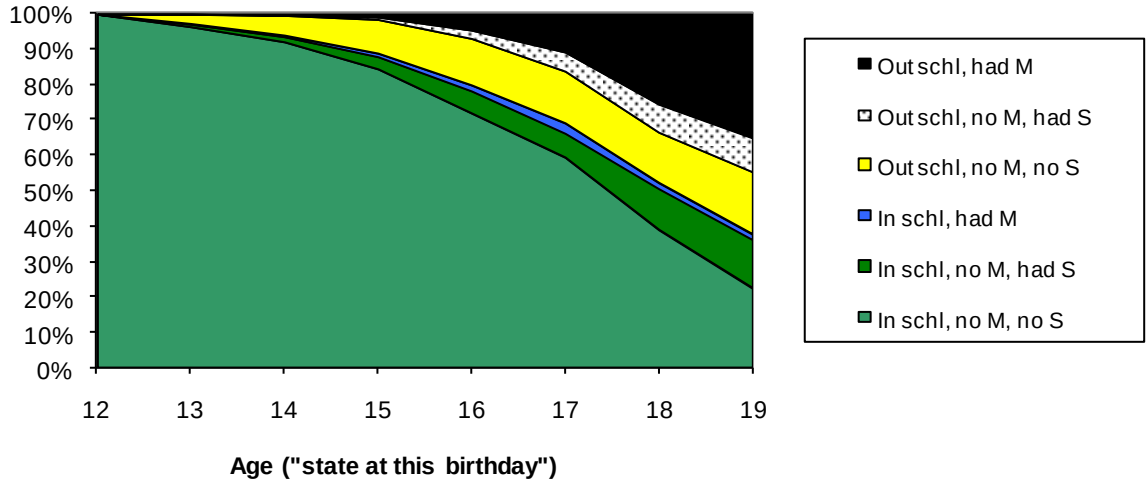

Figure 7. School, marriage, and premarital sex status distributions by age: Uganda, males

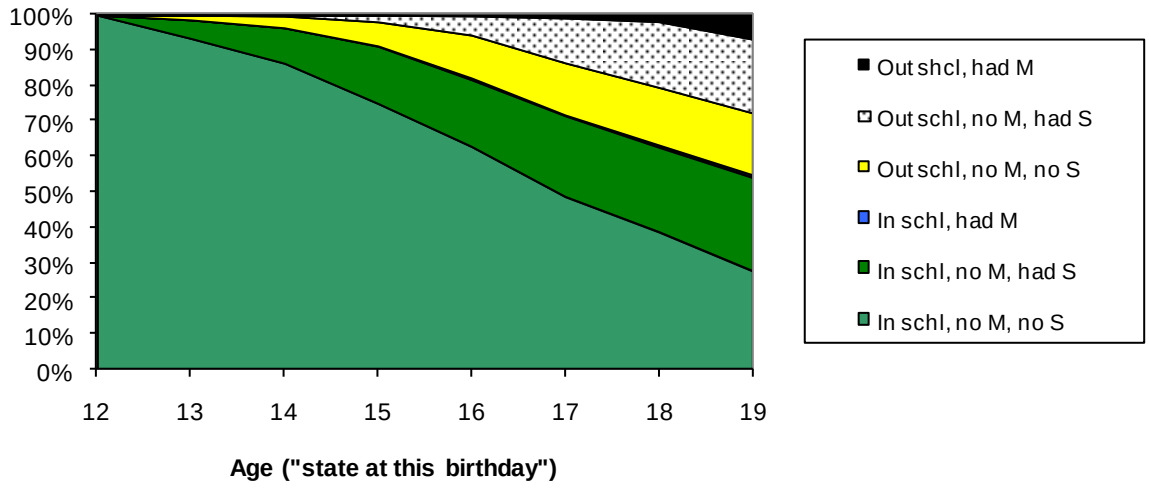

Figure 8. School, marriage, and premarital sex status distributions by age: Uganda, females

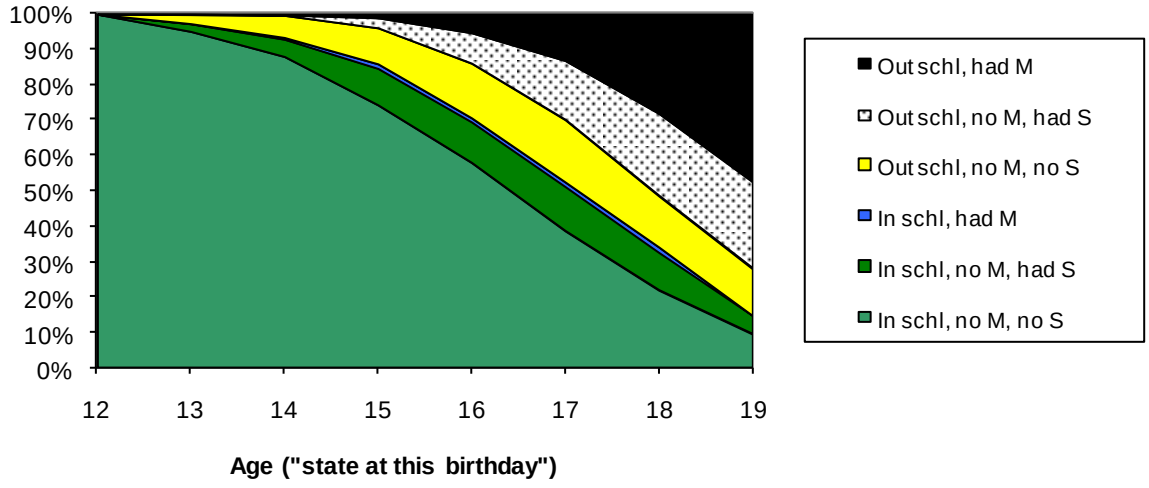

Table 2. Description of covariates in hazard models

Variable Name	Description	Time-varying	Omitted category	Notes
Individual characteristics				
Age 13 - 18	Six dummy variables for age to which that person-year corresponds.		Age 12 Not progressing to secondary school: Burkina Faso = Age 12-13 Ghana = Age 12-15 Malawi = Age 12-14 Uganda = Age 12-13	For the outcome "not progressing to secondary school," the omitted age category is age 12 through the country-specific age when an individual would normally complete primary school, given the different starting ages for primary school and number of grades that constitute basic education in each country.
Premarital Sex	=0 if the person-year-age is less than or equal to the individual's age at first sex; thereafter =1	X	Not had sex	Individuals are censored at marriage if they have not had sex at an earlier age. This variable only applies to school exit model.
Puberty	=0 if the person-year-age is less than or equal to the individual's reported age at puberty; thereafter =1	X	Not had menarche / puberty	The survey question for boys was about the age when they first noticed any of the following changes: growing pubic hair, voice gets deeper, or having "wet dreams." Girls were asked about the age when they had their first menstrual period.
Out of school	=0 if the person-year-age is less than or equal to the individual's age at school exit; thereafter =1		In school	Only applies to first sex models.
School entry	Three dummy variables:		Started at age 6 or before (age 7 for Burkina)	The proportion in each country who do not know their start age is sufficiently large that "don't know" must be included as its own category.
Late entry	Started school at age 7 or 8 (8 or 9 for Burkina Faso)			
Very late entry	Started school at age 9 or later (10 for Burkina Faso).			
Don't know entry	Do not know age at which started school.			
Household characteristics				
Socioeconomic status	Two dummy variables:		Individual's household falls in 0-40th percentile of urban- / rural- specific household asset index	
Socioeconomic status 40-80%	40-80th percentiles			
Socioeconomic status 80+%	80-100th percentiles			
Urban	Location of household = 0 if rural; = 1 if urban		Rural	
Household head's education	Household head's education, in single years.			

Table 2. (continued) Description of covariates in hazard models

Variable Name	Description	Time-varying	Omitted category	Notes
Negative childhood experiences				
Maternal orphanhood status	Three dummy variables:		Mother alive	"Mother died after adolescent's 10th birthday" is time-varying – i.e. for person-years prior to the death, the "mother alive" category applies.
Mother died when child younger than 10	Mother died before adolescent's 10th birthday			
Mother died when child between ages 10 and 19	Mother died after adolescent's 10th birthday	X		
Don't know own age when mother died	Mother died; adolescent does not know own age at time this happened			
Paternal orphanhood status	Three dummy variables:		Father alive	"Father died after adolescent's 10th birthday" is time-varying – i.e. for person-years prior to the death, the "father alive" category applies.
Father died when child younger than 10	Father died before adolescent's 10th birthday	X		
Father died when child between ages 10 and 19	Father died after adolescent's 10th birthday			
Don't know own age when father died	Father died; adolescent does not know own age at time this happened			
Food availability in the childhood household Food shortage somewhat often Food shortage very often	Indicator showing adolescent's perception of frequency of food shortages in his or her childhood household (two dummy variables)		"Rare / do not know"	For Burkina, "rare / do not know" also includes "never"
Alcohol abuse	Indicator showing adolescent's perception of alcohol abuse by members of childhood household, with dummy, = 1 if yes		"No / do not know"	
Religion and ethnicity				
Religion	Two dummy variables: Protestant/Other and Muslim		Catholic	
Ethnicity	Country-specific codes		Most common ethnic group	

Table 3. Effect of female dummy variable on school exit outcomes by country: pooled sex models without interaction terms

Outcome	Burkina Faso		Ghana		Malawi		Uganda	
	Odds ratio	p	**Odds ratio**	p	**Odds ratio**	p	**Odds ratio**	p
Exit before completion of secondary school	**1.34**	0.01	**1.59**	0.00	**1.85**	0.00	**2.02**	0.00
Exit before completion of primary school	**1.25**	0.17	**1.55**	0.00	**1.77**	0.00	**1.79**	0.00
Not progressing to secondary school	**2.07**	0.00	**1.20**	0.33	**1.56**	0.14	**1.40**	0.02

Source: 2004 National Survey of Adolescents in Burkina Faso, Ghana, Malawi, and Uganda

Note: Other covariates included in the model are age, puberty, premarital sex, age at school entry, religion, ethnicity, household wealth quintile, urban residence, household head's education, maternal and paternal orphanhood status, food availability in childhood household, and alcohol abuse in childhood household.

Table 4. Mean age at primary school completion by country and sex

	Males	Females	
Among those who completed primary school the same year they were surveyed			
Burkina Faso	14.3	14.2	
Ghana†	17.0	16.9	
Malawi	16.7	15.8	*
Uganda	15.9	15.3	*
Among 18-19-year-olds who did not progress past primary school			
Burkina Faso	14.8	15.3	
Ghana†	16.6	16.3	
Malawi	17.6	17.3	
Uganda	16.5	15.9	
Among 18-19-year-olds who progressed to secondary school			
Burkina Faso	14.9	15.3	*
Ghana†	16.3	16.0	
Malawi	16.5	15.8	*
Uganda	15.4	14.6	*

Source: 2004 National Survey of Adolescents in Burkina Faso, Ghana, Malawi, and Uganda

* $p < .05$

† Primary includes junior secondary school (through 9 grades)

Table 5. Effect of puberty and premarital sex on school exit before completion of secondary school, school exit before completion of primary school, and not progressing to secondary school

	Males								Females							
	Burkina Faso		Ghana		Malawi		Uganda		Burkina Faso		Ghana		Malawi		Uganda	
	Odds ratio	p	Odds ratio	p	Odds ratio	p	Odds ratio	p	Odds ratio	p	Odds ratio	p	Odds ratio	p	Odds ratio	p
School exit before completion of secondary school																
Puberty	**0.82**	0.40	**0.59**	0.01	**1.32**	0.15	**1.06**	0.72	**1.05**	0.85	**1.57**	0.02	**1.77**	0.00	**1.52**	0.00
Premarital sex	**1.52**	0.16	**1.67**	0.09	**1.19**	0.43	**1.73**	0.00	**2.44**	0.09	**3.20**	0.00	**1.98**	0.02	**1.90**	0.00
School exit before completion of primary school																
Puberty	**0.84**	0.67	**0.87**	0.63	**1.19**	0.39	**0.88**	0.56	**0.42**	0.08	**1.45**	0.22	**1.71**	0.01	**1.57**	0.01
Premarital sex	**1.73**	0.38	**1.34**	0.58	**1.09**	0.73	**1.59**	0.04	**n.e.**	n.e.	**5.30**	0.00	**1.90**	0.05	**1.08**	0.70
Not progressing to secondary school																
Puberty	**1.18**	0.62	**0.60**	0.13	**1.68**	0.36	**1.63**	0.06	**1.57**	0.19	**1.08**	0.82	**2.16**	0.10	**1.22**	0.43
Premarital sex	**0.63**	0.33	**0.61**	0.35	**2.12**	0.06	**1.19**	0.52	**0.46**	0.47	**1.90**	0.10	**3.66**	0.13	**1.97**	0.03

Source: 2004 National Survey of Adolescents in Burkina Faso, Ghana, Malawi, and Uganda
n.e. = not estimated, perfectly collinear

Note: Other covariates included in the model are age, puberty, premarital sex, age at school entry, religion, ethnicity, household wealth quintile, urban residence, household head's education, maternal and paternal orphanhood status, food availability in childhood household, and alcohol abuse in childhood household.

Table 6. Effect of female dummy variable on premarital sex outcome by country: pooled sex models

Outcome	Burkina Faso		Ghana		Malawi		Uganda	
	Odds ratio	p	**Odds ratio**	p	**Odds ratio**	p	**Odds ratio**	p
Premarital sex	**0.62**	0.01	**2.01**	0.00	**0.32**	0.00	**0.81**	0.01

Source: 2004 National Survey of Adolescents in Burkina Faso, Ghana, Malawi, and Uganda

Note: Other covariates included in the model are age, puberty, out of school, age at school entry, religion, ethnicity, household wealth quintile, urban residence, household head's education, maternal and paternal orphanhood status, food availability in childhood household, and alcohol abuse in childhood household.

Table 7. Effect of puberty, school exit, and age at school entry on premarital sex by country and sex

	Males								Females							
	Burkina Faso		Ghana		Malawi		Uganda		Burkina Faso		Ghana		Malawi		Uganda	
	Odds ratio	p	Odds ratio	p	Odds ratio	p	Odds ratio	p	Odds ratio	p	Odds ratio	p	Odds ratio	p	Odds ratio	p
Puberty	**1.48**	0.09	**1.20**	0.51	**1.33**	0.07	**0.92**	0.55	**1.64**	0.19	**1.87**	0.00	**1.98**	0.01	**1.68**	0.00
Out of school	**1.02**	0.94	**3.35**	0.00	**1.29**	0.31	**1.28**	0.19	**1.21**	0.57	**2.27**	0.00	**0.83**	0.57	**1.59**	0.01
Late entry	**0.95**	0.86	**0.97**	0.92	**0.71**	0.03	**0.99**	0.96	**0.41**	0.05	**1.10**	0.66	**1.15**	0.57	**0.84**	0.22
Very late entry	**1.87**	0.12	**0.67**	0.31	**0.67**	0.02	**0.92**	0.55	**0.71**	0.72	**1.17**	0.57	**0.92**	0.78	**1.05**	0.77
Don't know entry	**0.40**	0.23	**0.76**	0.39	**0.88**	0.53	**1.12**	0.53	**1.80**	0.45	**1.36**	0.18	**1.09**	0.84	**0.49**	0.02

Source: 2004 National Survey of Adolescents in Burkina Faso, Ghana, Malawi, and Uganda
n.e. = not estimated, perfectly collinear

Note: Other covariates included in the model are age, religion, ethnicity, household wealth quintile, urban residence, household head's education, maternal and paternal orphanhood status, food availability in childhood household, and alcohol abuse in childhood household.

Appendix Table 1. Odds ratios from discrete-time hazard analysis of sex-specific models of school exit before completion of secondary school

	Males				Females			
	Burkina Faso	Ghana	Malawi	Uganda	Burkina Faso	Ghana	Malawi	Uganda
Individual characteristics								
Age 13	2.17 **	0.74	1.80	1.53	1.41	1.00	1.42	1.40
Age 14	2.92 **	1.75	3.56 **	3.79 **	1.84 *	2.43 **	2.15 **	2.66 **
Age 15	6.55 **	7.51 **	2.18 *	6.85 **	3.38 **	3.90 **	3.24 **	4.98 **
Age 16	3.45 **	16.10 **	3.87 **	8.78 **	3.61 **	8.18 **	4.65 **	7.50 **
Age 17	3.49 *	25.51 **	8.45 **	11.87 **	1.43	9.99 **	8.82 **	9.99 **
Age 18	0.33	22.55 **	11.38 **	14.03 **	n.e.	7.72 **	6.14 *	14.83 **
Puberty	0.82	0.59 *	1.32	1.06	1.05	1.57 *	1.77 **	1.52 **
Premarital sex	1.52	1.67	1.19	1.73 **	2.44	3.20 **	1.98 *	1.90 **
Late entry	0.77	0.94	0.71	1.17	0.96	1.36	1.13	0.96
Very late entry	0.66	0.52 *	1.42	1.14	1.21	0.96	2.26 **	0.99
Don't know entry	3.07 **	0.89	1.20	1.24	1.41	1.01	1.57	1.05
Religion; Protestant & other	1.38	1.37	0.83	0.90	0.64	0.70	1.16	0.94
Religion; Muslim	1.29	1.88 *	2.35 *	0.78	0.99	0.57	2.29 *	1.12
Ethnicity, Other vs. Mossi	0.93				0.83			
Ethnicity, Ewe vs. Akan		0.41 **				0.89		
Ethnicity, Other vs. Akan		0.66				0.71		
Ethnicity, Yao vs. Chewe			0.58				0.66	
Ethnicity, Tumbuka vs. Chewe			0.47 *				0.73	
Ethnicity, Lomwe vs. Chewe			1.34				1.37	
Ethnicity, Other vs. Chewe			0.77				1.10	
Ethnicity, Munyankore vs. Muganda				0.76				0.89
Ethnicity, Other vs. Muganda				0.61 **				0.81
Household characteristics								
Socioeconomic status 40-80%	1.16	0.87	0.92	0.91	1.05	0.84	0.74	0.78 *
Socioeonomic status 80-100%	0.57 *	0.45 **	0.62	0.87	1.16	1.07	0.48 **	0.86
Household head's education	0.90 **	0.99	0.96	0.93 **	0.97	0.95 **	0.97	0.99
Urban	0.46 **	0.62 **	0.55 *	0.61	0.65 *	0.99	0.68	0.92
Negative childhood experiences								
Mother died when child younger than 10	0.84	2.21	1.58	1.36	4.34 **	2.48	1.06	1.34
Mother died when child between ages 10 and 19	0.32	1.05	1.71	1.30	0.96	0.34	1.09	0.97
Don't know own age when mother died	0.21	0.80	2.34	1.26	8.04	3.02	1.38	1.52
Father died when child younger than 10	0.49	0.73	0.87	1.19	1.30	1.35	1.54	1.45 *
Father died when child between ages 10 and 19	0.71	0.89	1.20	1.46	0.33	1.17	1.39	0.97
Don't know own age when father died	3.11	1.70	1.50	1.54	0.33	0.34	1.92 *	1.26
Food shortage somewhat often	1.11	0.89	1.52	1.10	1.22	1.39	0.94	1.09
Food shortage very often	1.37	0.93	1.47	0.94	1.57	1.60	0.98	0.89
Alcohol abuse	1.07	1.24	0.77	0.92	0.77	1.20	1.09	1.23
Number of person-year observations	2855	5619	5032	5903	2075	5210	4657	5665
Pseudo-R2	0.1096	0.1739	0.1207	0.1226	0.0581	0.1624	0.1248	0.1368

Source: 2004 National Survey of Adolescents in Burkina Faso, Ghana, Malawi, and Uganda

** p<.01

* p<.05

n.e. = not estimated, perfectly collinear

Appendix Table 2. Odds ratios from discrete-time hazard analysis of sex-specific models of school exit before completion of primary school

	Males				Females			
	Burkina Faso	**Ghana**	**Malawi**	**Uganda**	**Burkina Faso**	**Ghana**	**Malawi**	**Uganda**
Individual characteristics								
Age 13	1.13	0.65	1.88 *	1.28	0.80	0.95	1.50	1.40
Age 14	0.90	1.16	3.78 **	2.96 **	0.74	1.45	2.07 **	2.42 **
Age 15	1.34	2.22 *	2.07 *	4.55 **	0.96	1.65	3.11 **	3.76 **
Age 16	0.37	4.15 **	3.65 **	6.31 **	0.63	1.42	4.17 **	4.89 **
Age 17	n.e.	2.98	6.06 **	7.47 **	n.e.	1.95	6.53 **	3.32 **
Age 18	n.e.	3.50	8.75 **	12.85 **	n.e.	n.e.	6.61 *	1.67
Puberty	0.84	0.87	1.19	0.88	0.42	1.45	1.71 *	1.57 **
Premarital sex	1.73	1.34	1.09	1.59 *	n.e.	5.30 **	1.90 *	1.08
Late entry	1.10	0.80	0.90	1.45	0.82	2.30 **	1.16	0.91
Very late entry	2.10 *	0.86	1.67 *	1.84 *	1.88	2.09 *	2.68 **	1.24
Don't know entry	6.47 **	1.54	1.34	1.62	2.04	1.28	1.79	1.11
Religion; Protestant & other	1.50	1.28	0.84	1.01	0.32 *	1.19	0.96	0.88
Religion; Muslim	1.51	1.71	2.28 *	1.17	1.01	0.86	2.27 *	0.75
Ethnicity, Other vs. Mossi	0.80				0.89			
Ethnicity, Ewe vs. Akan		0.57				1.13		
Ethnicity, Other vs. Akan		0.93				1.03		
Ethnicity, Yao vs. Chewe			0.54				0.70	
Ethnicity, Tumbuka vs. Chewe			0.59				0.68	
Ethnicity, Lomwe vs. Chewe			1.15				1.26	
Ethnicity, Other vs. Chewe			0.80				1.16	
Ethnicity, Munyankore vs. Muganda				0.44 *				1.04
Ethnicity, Other vs. Muganda				0.51 **				1.29
Household characteristics								
Socioeconomic status 40-80%	1.01	0.48 **	1.10	0.85	1.38	0.68	0.87	0.68 **
Socioeonomic status 80-100%	0.70	0.12 **	0.72	1.00	1.27	0.60	0.47 **	0.81
Household head's education	0.94	0.96	0.95 *	0.92 **	0.99	0.95 *	0.95	0.97
Urban	0.71	0.60 *	0.54 *	0.70	0.70	0.70	0.74	0.75
Negative childhood experiences								
Mother died when child younger than 10	0.46	1.31	1.22	1.88 *	1.41	1.33	1.08	1.34
Mother died when child between ages 10 and 19	0.86	1.68	1.87	1.07	0.23	0.48	1.33	0.70
Don't know own age when mother died	n.e.	n.e.	2.70	2.11	10.40	3.53	1.79	1.18
Father died when child younger than 10	0.36	0.52	1.00	1.16	0.85	1.17	1.67	1.20
Father died when child between ages 10 and 19	n.e.	0.89	1.59	1.75 *	0.70	0.84	1.48	0.67
Don't know own age when father died	6.11 *	1.95	0.93	1.32	0.63	0.21	1.45	1.05
Food shortage somewhat often	0.99	1.49	1.93 *	1.12	1.18	1.81 **	0.90	1.03
Food shortage very often	1.11	1.72	1.73 *	0.78	1.31	1.24	0.80	1.22
Alcohol abuse	1.41	1.29	0.77	0.99	1.49	1.29	1.11	1.09
Number of person-year observations	2562	5553	4901	5593	1930	5184	4553	5494
Pseudo-R2	0.0728	0.1083	0.1093	0.0997	0.0513	0.1024	0.1207	0.0759

Source: 2004 National Survey of Adolescents in Burkina Faso, Ghana, Malawi, and Uganda

** p<.01

* p<.05

n.e. = not estimated, perfectly collinear

Appendix Table 3. Odds ratios from sex-specific models of not progressing to secondary school, among those who completed primary school

	Males				Females			
	Burkina Faso	Ghana	Malawi	Uganda	Burkina Faso	Ghana	Malawi	Uganda
Individual characteristics								
Completed primary at age 14	0.80			1.47	0.67			1.59
Completed primary at age 15	0.75		1.00	1.66	0.71		0.72	2.26 *
Completed primary at age 16	0.69	1.15	0.59	1.13	0.72	1.54	0.62	2.12
Completed primary at age 17	0.46	2.78 *	0.24 *	1.83	0.09 *	1.41	1.21	5.77 **
Completed primary at age 18	0.76	1.88	0.65	3.13	n.e.	0.58	3.76	36.26 **
Completed primary at age 19	0.09	0.24	0.92	2.14	n.e.	0.96	2.31	no obs
Puberty	1.18	0.60	1.68	1.63	1.57	1.08	2.16	1.22
Premarital sex	0.63	0.61	2.12	1.19	0.46	1.90	3.66	1.97 *
Late entry	1.47	1.26	0.56	1.06	1.42	1.95	0.76	1.49
Very late entry	3.98	5.79	1.95	1.52	6.86 *	3.41	0.52	1.15
Don't know entry	3.10	1.42	1.61	0.77	0.13 *	1.43	1.09	1.98
Religion; Protestant & other	1.46	1.29	1.82	0.75	1.94	0.58	0.97	0.72
Religion; Muslim	1.01	2.20	1.40	0.68	0.70	0.76	0.25	1.18
Ethnicity, Other vs. Mossi	0.99				0.96			
Ethnicity, Ewe vs. Akan		0.33 *				0.90		
Ethnicity, Other vs. Akan		0.35 **				0.76		
Ethnicity, Yao vs. Chewe			2.16				1.52	
Ethnicity, Tumbuka vs. Chewe			0.76				0.52	
Ethnicity, Lomwe vs. Chewe			2.64				1.16	
Ethnicity, Other vs. Chewe			1.16				0.34 *	
Ethnicity, Munyankore vs. Muganda				2.30 *				2.43 **
Ethnicity, Other vs. Muganda				1.91 *				0.85
Household characteristics								
Socioeconomic status 40-80%	1.31	0.92	1.88	0.85	0.96	0.55	0.65	1.08
Socioeonomic status 80-100%	0.63	0.63	0.57	0.80	1.05	0.49	0.28 *	0.69
Household head's education	0.85 **	0.94 *	0.99	0.95 *	0.88 **	0.89 **	1.00	0.98
Urban	0.24 **	0.28 **	0.37 *	0.67	0.23 **	0.49 *	0.30 **	0.57
Negative childhood experiences								
Mother died when child younger than 10	0.94	15.01 **	0.42	1.06	0.53	1.42	1.53	1.24
Father died when child younger than 10	0.88	1.76	0.85	1.19	0.79	0.90	0.93	1.39
Food shortage somewhat often	1.02	0.41 *	0.47	0.96	1.36	1.62	0.61	0.97
Food shortage very often	0.45	0.31 **	2.08	0.87	2.22	1.65	1.96	0.71
Alcohol abuse	1.66	1.87	1.24	1.29	0.72	0.68	0.72	1.30
Number of individuals	583	347	286	541	438	389	341	541
Pseudo-R2	0.1895	0.1956	0.1457	0.0961	0.2009	0.1532	0.1756	0.1497

Source: 2004 National Survey of Adolescents in Burkina Faso, Ghana, Malawi, and Uganda

** p<.01

* p<.05

n.e. = not estimated, perfectly collinear

no obs = No observations

Appendix Table 4. Odds ratios from discrete-time hazard analysis of sex-specific models of premarital sex

	Males				Females			
	Burkina Faso	**Ghana**	**Malawi**	**Uganda**	**Burkina Faso**	**Ghana**	**Malawi**	**Uganda**
Individual characteristics								
Age 13	0.69	1.43	1.55 *	1.02	0.68	3.81 *	1.22	1.19
Age 14	2.57 **	2.32	1.94 **	1.69 **	5.92 **	8.45 **	3.44 **	3.83 **
Age 15	4.58 **	6.19 **	3.48 **	1.95 **	22.14 **	18.60 **	6.45 **	4.34 **
Age 16	5.96 **	7.18 **	3.06 **	3.96 **	32.64 **	21.80 **	6.93 **	5.94 **
Age 17	9.69 **	13.47 **	4.46 **	4.45 **	30.60 **	33.09 **	16.87 **	6.78 **
Age 18	13.66 **	6.23 *	5.93 **	5.50 **	38.36 **	20.85 **	25.91 **	2.57
Puberty	1.48	1.20	1.33	0.92	1.64	1.87 **	1.98 **	1.68 **
Out of school	1.02	3.35 **	1.29	1.28	1.21	2.27 **	0.83	1.59 **
Late entry	0.95	0.97	0.71 *	0.99	0.41 *	1.10	1.15	0.84
Very late entry	1.87	0.67	0.67 *	0.92	0.71	1.17	0.92	1.05
Don't know entry	0.40	0.76	0.88	1.12	1.80	1.36	1.09	0.49 *
Religion; Protestant & other	1.05	1.08	0.98	0.85	0.69	0.87	1.45	0.94
Religion; Muslim	1.20	1.43	1.38	0.98	1.13	1.02	2.33	1.59 **
Ethnicity, Other vs. Mossi	0.81				0.72			
Ethnicity, Ewe vs. Akan		1.79				1.19		
Ethnicity, Other vs. Akan		1.16				0.62		
Ethnicity, Yao vs. Chewe			1.50				2.43 *	
Ethnicity, Tumbuka vs. Chewe			1.05				1.49	
Ethnicity, Lomwe vs. Chewe			1.50 *				2.91 **	
Ethnicity, Other vs. Chewe			1.22				2.22 **	
Ethnicity, Munyankore vs. Muganda				0.75				0.31 **
Ethnicity, Other vs. Muganda				1.08				1.12
Household characteristics								
Socioeconomic status 40-80%	0.85	1.43	1.03	1.07	1.20	0.93	1.16	0.74 *
Socioeonomic status 80-100%	0.61	0.78	0.72	1.00	1.04	0.86	0.71	0.76
Household head's education	1.02	1.02	1.00	0.99	0.98	0.97	1.03	1.01
Urban	1.19	1.05	0.64 *	1.21	0.54	0.63 *	1.12	0.80
Negative childhood experiences								
Mother died when child younger than 10	1.74	1.25	1.18	1.13	0.73	0.77	1.04	0.97
Mother died when child between ages 10 and 19	1.81	1.10	0.88	1.00	2.21	0.81	0.68	1.26
Don't know own age when mother died	1.68	2.33	0.84	1.09	n.e.	1.38	2.03	0.66
Father died when child younger than 10	1.23	1.23	0.97	1.16	0.48	0.46	0.62	1.07
Father died when child between ages 10 and 19	0.47	0.89	0.63	1.40	1.76	1.00	1.36	0.72
Don't know own age when father died	n.e.	0.99	3.31 **	1.74 *	1.14	1.37	1.63	1.38
Food shortage somewhat often	0.47 *	0.99	1.11	0.98	2.45 *	1.49	0.85	1.13
Food shortage very often	3.67 **	1.37	0.99	0.89	1.64	2.52 **	1.21	0.92
Alcohol abuse	1.66	1.64 *	1.04	1.54 **	1.21	1.19	1.29	1.24
Number of person-year observations	3156	5724	4626	5653	2400	5339	4794	5763
Pseudo-R2	0.1362	0.1383	0.0648	0.0503	0.2411	0.191	0.1778	0.1277

Source: 2004 National Survey of Adolescents in Burkina Faso, Ghana, Malawi, and Uganda

** p<.01

* p<.05

n.e. = not estimated, perfectly collinear

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