Sexual Behavior, Pregnancy, and Schooling Among Young People in Urban South Africa

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This study examines transitions in schooling, sexual activity, and pregnancy among adolescents and young adults in urban South Africa. Data are analyzed from the Cape Area Panel Study (CAPS), a recently collected longitudinal survey of young adults and their families in metropolitan Cape Town. We find that teen pregnancy is not entirely inconsistent with continued schooling, especially for African (black) women. More than 50 percent of African women who were pregnant at age 16 or 17 were enrolled in school the following year. We estimate probit regressions to identify the impact of individual and household characteristics on sexual debut, pregnancy, and school dropout between 2002 and 2005. We find that male and female students who performed well on a literacy and numeracy exam administered in 2002 were less likely than those who performed more poorly to become sexually active and less likely to drop out of school by 2005. Surprisingly, 14–16-year-olds who had completed more grades in school in 2002, conditional on their age, were more likely than those who had completed fewer grades to have become sexually active by 2005, a potential indicator of peer effects resulting from the wide dispersion in age per grade in South African schools. Overall, this study shows the importance of accounting for a measure that reflects the knowledge and skills of young people in an examination of their transitions to adulthood. (STUDIES IN FAMILY PLANNING 2008; 39[4]: 351–368)

As social transformation continues in South Africa and the opportunities available to young adults increase, it is important to understand how educational opportunities are related to subsequent transitions to adulthood. The goal of this study is to examine the interactions between education and transitions into sexual activity and pregnancy among urban young people, in part by analyzing how early educational achievement affects sexual debut, pregnancy, and school dropout as adolescents progress through secondary school.

Past research has established a strong association between schooling and the timing of sexual initiation and pregnancy in developing countries (Bledsoe et al. 1999). The vast majority of studies, however, use cross-sectional data to find that educational attainment and school enrollment are negatively associated with the probability of initiating sexual activity and experiencing an early pregnancy. At the same time, research on educational outcomes has shown a weak connection between grade attainment and basic knowledge (Lloyd 2005). School enrollment and grade attainment by themselves do not provide a complete picture of the knowledge and skills of young people, especially in South Africa, where levels of school enrollment and grade attainment among adolescents are high but where persistent inequalities are reflected in high rates of grade repetition and widely varying educational achievement.

The importance of examining the interaction of educational achievement with sexual debut and pregnancy lies in the fact that the timing and order of these transitions may affect subsequent transitions in schooling, employment, and family formation. How adolescents negotiate these transitions has serious policy implications, and understanding how these transitions are made is crucial for young people's well-being. Data limitations for developing countries, particularly the lack of information on sequencing of events and on knowledge acquisition, have constrained the ability to understand the interconnections between educational attainment and sexual and reproductive outcomes. We take advantage of Waves 1–4 of the Cape Area Panel Study (CAPS), a recently conducted longitudinal survey of young people in metropolitan Cape Town, to examine transitions to sexual debut, pregnancy,

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and school dropout in urban South Africa. Our focus is on the interactions between schooling and sexual behavior. We seek to determine whether adolescents with greater acquired human capital become sexually active later and are less likely to become pregnant at an early age than those who have acquired less of such capital.

Our use of this unique dataset allows us to make three advances on the literature concerning transitions to adulthood in developing countries. First, we consider the sequencing of events. Our data allow us to measure educational achievement prior to sexual debut, pregnancy, and school dropout. Educational achievement, which we measure using a literacy and numeracy test administered to all CAPS respondents, reflects the knowledge base and skills of young people. This test provides a more direct measure of learning skills than does grade attainment alone, and supplies information about the educational differences taking place in a country where school enrollment and educational attainment are high for all groups. Second, we look at how the trajectories of adolescents differ across population groups, a particularly important dimension in the South African context in light of the country's large racial differences in school quality and household circumstances. Third, we explore the interconnections between sexual and reproductive transitions and education for young people of both sexes. In contrast to the extensive literature on girls' transitions to adulthood, the literature on boys' transitions is sparse, and these processes may vary substantially by sex.

Interconnections Between Sexual Debut, Teen Pregnancy, and Schooling

A long tradition has developed whereby researchers examine the relationships between education, adolescent sexual initiation, and childbearing in developing countries (Bledsoe et al. 1999; Lloyd 2005). Typically, studies have found that school enrollment and years of schooling completed among adolescents are negatively associated with the probability of sexual initiation and early childbearing (Gupta and Leite 1999; Lloyd and Mensch 2008). Evidence described in the National Academy of Sciences report on transitions to adulthood in developing countries shows that adolescent girls attending school are half as likely as their unmarried peers who are out of school ever to have had sex (Lloyd 2005). One explanation for this association is that success in negotiating sexual initiation and parenthood is more likely to be ensured if other transitions occur earlier.

Examining the timing of sexual initiation is important because early entry into sexual life affects the risks of pregnancy, childbearing, abortion, and acquiring and passing on sexually transmitted diseases (STDs), including HIV/AIDS (Singh et al. 2000). Evidence of the timing of sexual initiation points to several important implications for childbearing and other transitions to adulthood. Empirical evidence from sub-Saharan Africa has shown that girls appear vulnerable to dropping out of school once they become sexually mature and engage in premarital sex (Biddlecom et al. 2008). Studying the interactions between schooling, sexual initiation, and pregnancy is especially interesting in South Africa, where, unlike in most other African countries, girls commonly continue their education after giving birth. Kaufman and her colleagues (2001) found that many South African girls complete their schooling after bearing a child, and that their return to school reflects familial support and paternal acknowledgment of the child. In a recent study conducted in rural South Africa, Madhavan and Thomas (2005) confirm that childbearing impedes school enrollment and schooling, but that young mothers can succeed in completing their education if they are provided with flexible child-care options.

One problem with most past studies of this topic is that the data generally do not provide information on the sequence of events, so that whether leaving school is a consequence of becoming pregnant or vice-versa is not clear. In many studies, pregnancy and sexual debut are assumed to be exogenous; researchers focus mainly on the impact of teen pregnancy on educational attainment. Pregnancy can occur as a result of poor school performance and dropout, however, or other variables can drive both sets of outcomes. Without information on the sequence of events, identifying whether an adolescent had been doing poorly in school and then became pregnant or whether she had become pregnant and was then unable to finish high school is not possible. In fact, a plausible explanation found for the United States was that girls who did not advance in school and who eventually dropped out were doing poorly academically prior to their pregnancy (Geronimus and Korenman 1993).

More recently, a few studies have linked education to sexual and reproductive behaviors in developing countries by considering both the timing of events and additional variables characterizing the educational process. These studies focus on how experiences with school are related to adolescent reproductive outcomes. Lloyd and Mensch (2008) found that adolescents in four West African countries whose school progress was slow had a higher probability of giving birth. Using information from the South African province of KwaZulu-Natal, Grant and Hallman (2008) found that prior school progress, measured by temporary school withdrawal and grade repetition, is a significant predictor both of the likelihood of adolescent pregnancy and of dropping

out of school after a pregnancy. Similarly, Marteleto and her colleagues (2006) found that having repeated a high proportion of grades prior to the start of the reproductive years is associated with teen childbearing as well as with a smaller probability of returning to school after a birth. They also found that family environment in the form of having low social capital early in life is an important factor leading to early childbearing and to preventing girls from returning to school after giving birth. The results suggest that an unsuccessful school career is not the result of an isolated event but rather of a series of cumulative disadvantages throughout a young person's life.

Taken together, these results indicate that early life characteristics and prior school experience are important factors associated with the sexual and reproductive behavior of adolescents. Most past studies examining the role of education in the transition to adulthood are limited to measuring education in terms of school enrollment, years of school completed, and grade repetition and, thus, lack measures of ability, skills, and proficiency. In a context where almost all young adults are in school and where grade repetition is commonplace, what is not clear is how measures of educational performance that capture the wide variation of learning skills and quality of schools are associated with sexual and reproductive behaviors.

Sexual Debut, Childbearing, and Schooling in South Africa

In most developing countries, first sexual intercourse occurs predominantly outside of marriage among males but largely within marriage among females (Singh et al. 2000). South Africa differs from this pattern: sexual initiation occurs primarily outside marriage for both sexes. According to the 1998 South Africa Demographic and Health Survey, the median age at first sex was 17.8 years for women aged 20–24 and 18.4 years for women aged 25–49. The median age at marriage among women aged 25–49 was 24.2 years, suggesting that sexual debut often takes place before marriage (Macro International 2008).

South Africa is characterized by low fertility levels relative to other African countries, although adolescent fertility rates are relatively high. The total fertility rate (TFR) of 2.8 children per woman based on the 2001 census (Moultrie and Dorrington 2004) is one of the lowest in Africa. Although South Africa's TFR ranks fourth lowest in the continent, adolescent fertility ranks only fifteenth lowest (United Nations Population Division 2003). In light of declines in fertility at older ages, the proportion of adolescent fertility relative to total fertility has been increasing in South Africa (Moultrie and Dorrington 2004). As shown in Lloyd's (2007) summary of data from Demographic and

Health Surveys, South Africa has one of the highest proportions of 15-year-old girls enrolled in school and also one of the highest proportions of 15–17-year-old girls who have had sex, compared with other countries in Africa and Latin America. Youthful sexual initiation, relatively high levels of adolescent fertility, and late age at marriage yield high rates of nonmarital childbearing. Most teenage births in South Africa are nonmarital, a pattern we document below with data from the Cape Area Panel Study.

Another critical hazard facing young people in South Africa is the HIV / AIDS epidemic, which, given its pervasiveness, is likely to affect sexual activity. We do not consider the impact of HIV / AIDS directly in this study, in part because CAPS does not conduct HIV testing and does not ask respondents directly about their HIV status. CAPS does include questions about HIV knowledge and perceived HIV risk. Using the CAPS data, Anderson and Beutel (2007) have shown that a relatively high degree of HIV knowledge exists among young people in Cape Town. Anderson and his colleagues (2007) found that female CAPS respondents who reported a higher perceived risk of acquiring HIV infection in 2002 were less likely to have become sexually active between 2002 and 2005, suggesting that the perceived risk of acquiring HIV infection may be affecting sexual activity.

South Africa has achieved high levels of school enrollment and grade attainment, although large racial differences in both quality and quantity of schooling continue. As shown below, large racial differences remain in grade attainment. On average, coloreds and Africans do not finish high school nor advance to obtain college degrees, whereas whites progress to university. Marked differences are found also in rates of grade progression and educational achievement (Anderson et al. 2001; Lam et al. 2007). In this regard, South African adolescents' experience mirrors the old racial hierarchy of the apartheid era. White students receive more schooling more rapidly, obtain work experience at younger ages, and are more likely to find employment than young Africans, and colored young adults fall in between. Racial differences in grade attainment tell only part of the story, however. Although greater opportunities exist for school choice in postapartheid South Africa, constraints facing students are such that most African students continue to attend low-quality schools. As shown below, enormous racial differences are found in performance on the literacy and numeracy test administered in CAPS, differences that may have an important effect on subsequent sexual and reproductive transitions.

Many reasons can be advanced to explain why the quantity and quality of schooling experienced by young people have important effects on their transitions to adulthood (Lloyd 2005). Relatively little research, how-

ever, has focused on how prior educational achievement is related to sexual initiation and teen pregnancy in developing countries, possibly because the literature on school quality and academic achievement in developing countries has developed largely independently of the literature on the interconnections between educational outcomes and reproductive and sexual behavior (Buchmann and Hannum 2001). Moreover, few data sets provide direct measures of educational achievement combined with detailed information on family background and sexual and reproductive behavior.

Data

For this study, we use data from Waves 1–4 of the Cape Area Panel Study, a longitudinal survey of young people in metropolitan Cape Town. Details about CAPS are provided by Lam and his colleagues (2006).[1] Wave 1 was conducted in 2002 and included a household questionnaire with data on the entire household as well as a detailed questionnaire administered to as many as three young adults aged 14–22 living in the household. The questionnaire for young adults collected data on a wide range of topics such as schooling, employment, sexual activity, and childbearing. It also included a life-history calendar that provides retrospective information on living arrangements, schooling, and pregnancy. Wave 1 included a literacy and numeracy evaluation, discussed below.

CAPS was designed using a two-stage probability sample of households, with an oversampling of African and white households in order to obtain samples large enough to make meaningful comparisons across groups. The baseline wave of CAPS surveyed 4,751 young adults in 3,304 households. As in most South African household surveys, response rates were high in African and colored areas and low in white areas, largely because whites disproportionately live in gated communities to which interviewers have limited access. Household response rates were 89 percent in African areas, 83 percent in colored areas, and 46 percent in white areas.[2] Young adult response rates, conditional on participation of the household, were high, even in white areas. Given household participation, response rates for young adults were 93 percent in African areas, 88 percent in colored areas, and 86 percent in white areas (Lam et al. 2006).

Wave 2 of CAPS took place in 2003 and 2004. Wave 3 was conducted in 2005 and provides most of the longitudinal information used in this study. We also use data from Wave 4, conducted in 2006, in order to include information for respondents who were interviewed in Wave 4 but not in Wave 3. Table 1 summarizes the sample size by population group and provides information

on sample attrition between waves. We present information for the full sample aged 14–22 in 2002, which is used for some of the analysis, and for the subset aged 14–16 in 2002, the sample we use for our probit regressions analyzing transitions between 2002 and 2005. As seen in Table 1, the original Wave 1 sample included roughly equal numbers of African and colored respondents, by design. The weighted percent column shows that when sample weights are used to adjust for the sample design and differential response rates, the weighted sample is 28 percent African, 53 percent colored, and 19 percent white, proportions that are similar to those found for the same age group in Cape Town in the 2001 South African census (Lam et al. 2006).

As shown in the table, 3,531 of the 4,751 original respondents were successfully interviewed in Wave 3 in 2005. In 2006, we attempted to follow all of the original respondents and located almost 400 additional respondents who were missed in 2005. Because we collect retrospective data on variables such as schooling, sexual activity, and pregnancy to cover the period since the respondent was last interviewed, we can use the Wave 4 interview to include information on 2005 outcomes for respondents who were interviewed in Wave 4 but not in Wave 3. The effective sample for 2005 outcomes, then, is 3,916, implying an 18 percent overall attrition rate between 2002 and 2005.

As Table 1 demonstrates, attrition rates differ significantly by race. The African attrition rate is 20 percent, with proxy reports indicating that most attrition is due to back-migration to the rural Eastern Cape province, the main sending region for Africans living in Cape Town. The colored population has its roots primarily in Cape Town, a factor contributing to its lower (10 percent) attrition rate. The 34 percent attrition rate for whites includes both migration out of Cape Town (including out of South Africa) and a significant number of refusals. The bottom panel of Table 1 shows the sample size and attrition rates for the sample that was aged 14–16 in 2002. Attrition for this group is considerably lower than for the full sample, 11 percent overall, a reflection of the generally positive relationship between age and attrition CAPS has experienced in every wave.

Table 2 provides more detail about attrition for the sample that was aged 14–16 in 2002. Using key baseline characteristics, we compare the 2002 sample with the sample that was followed successfully to 2005 (recalling that 2005 data were sometimes reported retrospectively in 2006). Table 2 also limits the sample to those for whom we have data on sexual activity, the sample we use for our regressions. (This reduces the sample by only a few observations.) The striking feature of Table 2 is that the differences between the original sample and the sample that was followed are very small. For example, attrition is almost en-

Table 1 Survey sample size and attrition from first to final wave, by population group, Cape Area Panel Study, South Africa

Population group	Wave 1 (2002) Interviewed	Wave 1 (2002) Unweighted percent	Wave 1 (2002) Weighted percent	Interviewed in Wave 3 (2005)	Interviewed in Wave 3 or Wave 4 (2005–06)	Attrition (percent)
Full sample aged 14–22 in 2002						
Black/African	2,151	45.3	28.2	1,515	1,724	19.9
Colored	2,005	42.2	53.2	1,679	1,801	10.2
White	595	12.5	18.6	337	391	34.3
Total	4,751	100.0	100.0	3,531	3,916	17.6
Sample aged 14–16 in 2002						
Black/African	664	41.7	26.3	515	570	14.2
Colored	715	44.9	54.8	633	672	6.0
White	212	13.3	19.0	157	171	19.3
Total	1,591	100.0	100.0	1,305	1,413	11.2

tirely unrelated to baseline sexual activity. The proportion of African females aged 14–16 who reported having had sex in 2002 was 24 percent. When we look only at the 86 percent of these respondents who were followed successfully to 2005, the proportion who had sex by 2002 was 23 percent. Looking at characteristics such as school enrollment, grade completion, and household income, the mean for the sample that was followed is typically within 2–3 percent of the mean for the original sample. One exception is a large percent difference in the literacy / numeracy scores of the original sample versus the followed sample for coloreds. This difference is an artifact of their mean's being close to zero on the standardized score. The absolute difference is only 0.01 standard deviations, essentially no difference. Those who were followed were somewhat more likely than others to be living with parents in 2002. In particular, whites living with their fathers in 2002 were more likely to be followed successfully.

Overall, Table 2 gives little evidence that attrition is significantly related to baseline sexual behavior, schooling, or household characteristics. Given CAPS's target sample of highly mobile adolescents making the transition to adulthood, the attrition rates seem reasonable, especially in light of the evidence in Table 2 that confirms no major differences between the characteristics of the 2002 and 2005 samples. Attrition should not create serious problems for our analysis, although it should be kept in mind when our results are interpreted. Selection into the Wave 3 and Wave 4 samples with regard to sexual activity and pregnancy between waves could be either positive or

Table 2 Characteristics of CAPS respondents aged 14–16 in 2002 and of sample followed in 2005, by selected variables, Cape Town, South Africa

Characteristic	African 2002	African 2005	African Ratio	Colored 2002	Colored 2005	Colored Ratio	White 2002	White 2005	White Ratio
Female									
Number of observations	(371)	(319)	0.860	(379)	(353)	0.931	(96)	(77)	0.802
Enrolled in school (percent)	93.5	95.0	1.016	90.5	90.7	1.002	100.0	100.0	1.000
Number of grades completed	7.43	7.42	0.999	8.07	8.09	1.002	8.13	8.10	0.996
Literacy/numeracy score	−0.52	−0.54	1.033	−0.05	−0.04	0.783	1.07	1.07	0.997
Ever had sex (percent)	23.7	22.9	0.966	6.9	6.5	0.942	2.1	2.6	1.238
Mother's highest grade completed	8.26	8.26	1.000	8.47	8.48	1.002	12.36	12.42	1.005
Father's highest grade completed	7.35	7.33	0.997	8.87	8.86	0.999	13.04	13.11	1.006
Living with mother (percent)	66.3	69.3	1.045	81.6	82.2	1.007	93.9	92.4	0.984
Living with father (percent)	38.0	39.8	1.047	50.3	52.3	1.040	66.3	73.4	1.107
Household income per capita (SA rands per month)	353	354	1.003	865	870	1.005	3,917	4,008	1.023
Male									
Number of observations	(292)	(250)	0.856	(335)	(310)	0.925	(112)	(84)	0.750
Enrolled in school (percent)	93.9	95.2	1.014	86.6	87.4	1.009	99.1	100.0	1.009
Number of grades completed	6.83	6.89	1.010	7.63	7.64	1.001	8.02	8.12	1.013
Literacy/numeracy score	−0.68	−0.63	0.928	−0.03	−0.02	0.923	1.17	1.23	1.051
Ever had sex (percent)	27.1	27.6	1.018	9.0	9.4	1.044	2.7	1.2	0.444
Mother's highest grade completed	8.60	8.61	1.002	8.71	8.73	1.002	12.61	12.61	0.999
Father's highest grade completed	7.38	7.38	1.000	8.88	8.86	0.998	12.94	12.95	1.001
Living with mother (percent)	75.4	77.3	1.025	80.9	80.6	0.996	95.6	96.4	1.008
Living with father (percent)	42.3	43.4	1.026	55.2	56.1	1.016	72.8	77.4	1.063
Household income per capita (SA rands per month)	372	372	1.000	888	892	1.004	3,972	3,950	0.995

Note: Results shown are limited to respondents providing information about their sexual activity. All characteristics measured in CAPS Wave 1 in 2002.

negative. On the one hand, young women who become pregnant may be more likely to stay in Cape Town and remain in contact with their Wave 1 household, making them easier to track. On the other hand, pregnancy may lead some young women, especially Africans, to return to their rural areas, where they have access to parents or grandparents to help with child care. For our multivariate regressions, the assumption is reasonable that attrition is unlikely to affect our estimates of the impact of variables such as schooling or household income on outcomes such as sexual debut, when characteristics such as age and race are taken into account.

One important theme throughout the study is the comparison of schooling and sexual behavior for African, colored, and white young people. These three population groups were subject to vastly different treatment under apartheid, and many remnants of that legacy persist. Whites had advantages in a wide range of areas, including significantly higher government expenditures on their schooling, privileged access to the labor market, unrestricted residential mobility, and better access to social services. Africans had the least access to public services and the most restrictions on work and migration. Expenditure on their schooling was far lower than for the other two groups. The colored population, which is heavily concentrated in Cape Town, occupied an intermediate status under apartheid, receiving higher expenditures on schooling and other services, fewer restrictions on residential mobility, and better access to jobs than did Africans. Whereas roughly 50 percent of Cape Town's population is colored, only about 10 percent of the South African population was colored, according to the 2001 census.[3] Large disparities persist in income and schooling across these groups, and Cape Town continues to be highly segregated residentially.

Important points to consider concerning this study are that the white sample is small, had the poorest response rate in Wave 1, and had the highest attrition between waves. Attrition is highest for older white males with the most schooling in Wave 1 (Lam et al. 2006), an indication of the high mobility of this group. Attrition may be correlated with unobserved determinants of schooling and sexual behavior, although the enormous racial differences observed in almost every dimension are unlikely to be the result of differential response rates or attrition bias. Although we are concerned about how well our white sample represents the full population of young whites in South Africa, we include this sample in our analysis because it provides an interesting point of comparison.

A notable feature of CAPS is the literacy and numeracy evaluation (LNE) that was administered to all young respondents in Wave 1. The LNE was a self-administered written test taken after completion of the young adult questionnaire. The test was designed specifically for CAPS by South African educators to test individuals from a broad range of ages and abilities in a short time period. The test consisted of 45 questions and took about 20 minutes to complete. Respondents could choose to take the test in English or Afrikaans. No version was available in Xhosa, the language most African respondents speak at home. The English-language test was taken by 99 percent of African respondents, 43 percent of colored respondents, and 64 percent of white respondents. Most white and colored students took the test in their first language, whereas Africans took it in a second language, an important consideration for interpreting the results. English is the official language of instruction in African schools, however, and is used for such tests as the grade 12 matriculation exam. We use the LNE scores here as a measure of cumulative learning at the time of the 2002 interview. Test scores reflect many factors, including innate ability, home environment, and the quantity and quality of an individual's schooling up to that point.

Results and Discussion

Transitions Out of School and into Sexual Activity

Figure 1 shows the joint enrollment/sexual initiation status of females and males from age 12 to 22 as reported by CAPS respondents aged 22 to 25 in 2005. The reports combine the retrospective reports from Wave 1 in 2002 with the longitudinal reports from Waves 2, 3, and 4. An advantage of these data is that they represent the actual experience of a cohort of young people rather than the combination of age and cohort effects that are captured in a typical cross-sectional age profile. The figure shows each of the four possible combinations of school enrollment and sexual initiation, where schooling includes postsecondary education. A striking feature of African profiles is that the area in the graph for the category "never had sex, not enrolled" is almost empty for both males and females. Because young people who first have sex after leaving school must spend some time in this category, the very small proportion in this category suggests that sexual debut almost always occurs while these young people are enrolled in school. This situation results from the combination of relatively early sexual debut and continued high rates of school enrollment into the late teens. Combining the "never had sex, enrolled" and "had sex, enrolled" bars, African enrollment rates at age 17 are more than 85 percent for both males and females. Among those 17-year-old Africans enrolled in school, 64 percent of females and 76 percent of males report ever having had sex.

Figure 1 Percentage of CAPS respondents aged 22–25 in 2005, by their transitions out of school and into sexual activity, according to age and race, Cape Town, South Africa

African females · Colored females · White females · African males · Colored males · White males

■ Never had sex, enrolled   ▨ Had sex, enrolled   ▢ Had sex, not enrolled   □ Never had sex, not enrolled
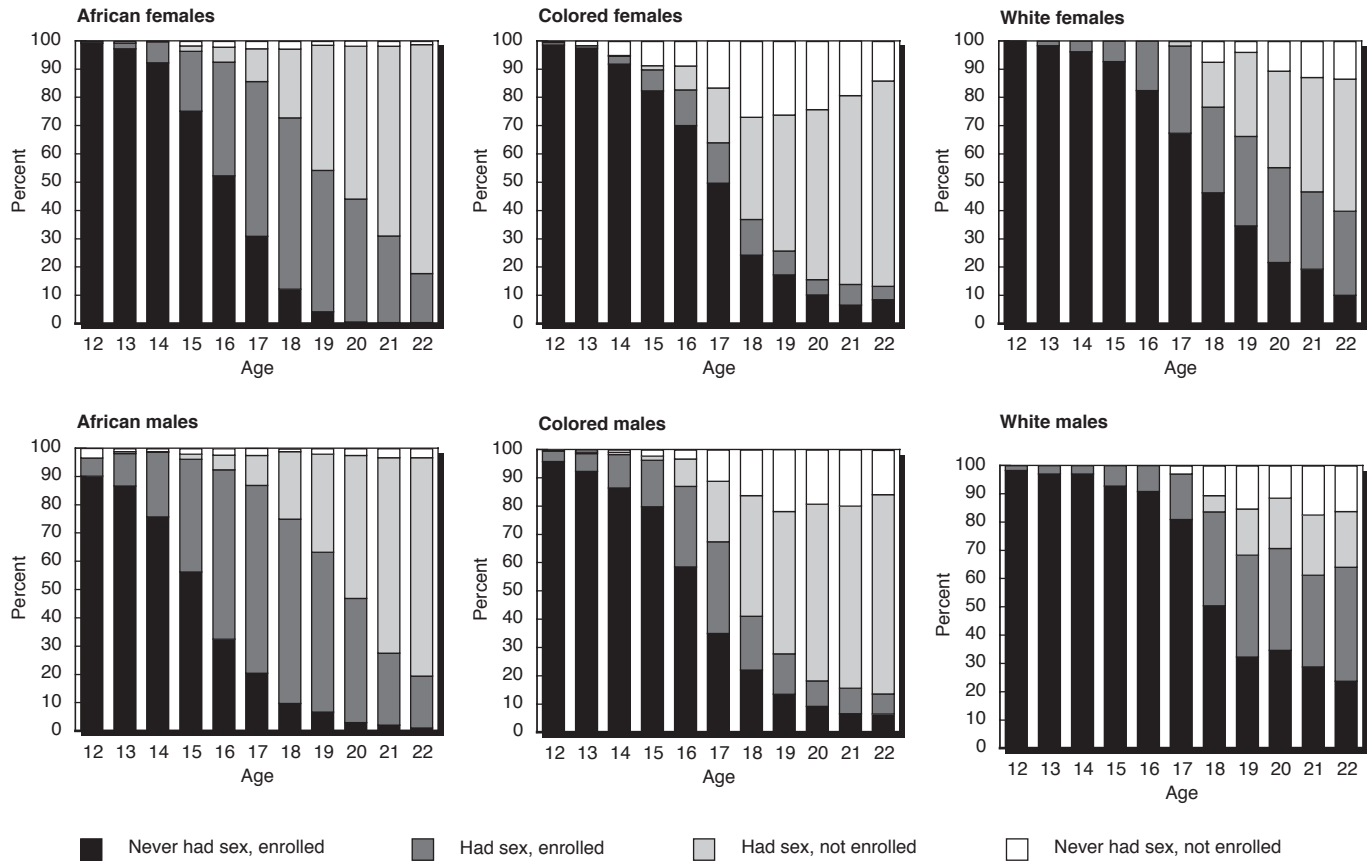
Figure 1 shows large and interesting racial differences in schooling and sexual activity. Whereas a significant fraction of African women are attending school after they become sexually active, colored women tend to spend relatively little time in school after sexual debut. Looking at females aged 17, for example, 55 percent of Africans are in the category "had sex, enrolled," by far the largest of the four categories, whereas only 14 percent of coloreds are in that category. The proportion of African women in the "had sex, enrolled" category is 40–60 percent from age 16 to 20, whereas that of colored women in this category is never greater than 14 percent. Gender differences are also evident; both African men and colored men at most ages are more likely than their female counterparts to be in the "had sex, enrolled" category.

Both male and female enrollment rates are lower for colored young people than for Africans, although these rates are potentially misleading in terms of grade completion. As demonstrated by Lam and his colleagues (2007), colored adolescents are ahead of Africans in grade attainment by age 17. Colored young people begin to drop out of school at a higher rate than Africans around age 17, but a small advantage remains for coloreds in grade attain-

ment at age 22. A similar phenomenon applies to differences by sex for all three racial groups. Starting at about age 18, women have higher grade attainment, primarily because they have lower rates of grade repetition (not shown). The female schooling advantage narrows somewhat above age 18, but women continue to have higher grade attainment than men in all three racial groups at age 22 (Lam et al. 2007).

Figure 1 shows that transitions into sexual activity differ by sex. Boys tend to become sexually active at an earlier age than girls among Africans and coloreds, although this disparity is not true for whites. For example, 46 percent of African females have had sex by age 16, compared with 65 percent of African males. These sex differentials are relatively small compared with the very large racial differences shown, however: only 21 percent of colored females report having had sex by age 16, compared with 38 percent of colored males. Rates are even lower among whites: only 17 percent of white females and 9 percent of white males report ever having had sex by age 16.

Clearly, we have no way of ascertaining the accuracy of respondents' reports of their sexual activity or whether the accuracy of reports differs by race and sex. Although

interviewers were instructed to survey respondents privately, doing so was not always easy in the small, crowded households where many respondents live. Although lack of privacy was greatest in the African households, African teenagers were the most likely to report having had sex. Cultural acceptability of premarital sexual activity undoubtedly differs across groups; for example, many colored and white families reside in socially conservative areas. The low rates of sexual activity reported by white respondents may result from their greater reluctance to admit to premarital sexual activity. White females at every age, however, are found to be more likely than white males to report having had sex, a finding that seems unlikely to be driven by social desirability bias in their responses. For example, 68 percent of white females report having had sex by age 20, compared with 54 percent of white males. This finding may reflect that women are having sex with men who are at least one or two years older than they are.[4]

Transitions from School to Pregnancy

Using the same sample as in Figure 1, Figure 2 shows the transitions out of school and into pregnancy for females, according to race. We use pregnancy reports because, as shown below, more than 95 percent of pregnancies reported in CAPS resulted in live births and because we want to include incomplete pregnancies. Males are omitted from this analysis because we believe that their reports of causing a pregnancy may often be erroneous (although we include these reports in the regressions shown below). Several interesting patterns emerge in Figure 2. First, just as African women are more likely than colored women to be sexually active while enrolled in school, African women are also more likely to become pregnant while attending school. The proportion of African women

in the "had pregnancy, enrolled" category is 12 percent at age 18, compared with 5 percent for colored women.

When the two middle bars in each graph are considered together, however, pregnancy rates for colored women in the teenage years are revealed to be higher than the pregnancy rates for African women, despite the fact that significantly higher fractions of African women report having had sex at every age. For example, the proportion of 17-year-olds who have been pregnant is 19 percent for coloreds and 16 percent for Africans, whereas the proportion who ever had sex is 34 percent for coloreds and 66 percent for Africans, as shown in Figure 1.

Another important pattern seen in Figure 2 is that becoming pregnant and being enrolled in school are by no means mutually exclusive, especially for African women. African women who have been pregnant are more likely than not to be enrolled at every age until age 18. Of the 16 percent of 17-year-old African women who report having experienced a pregnancy, 62 percent are enrolled in school. The pattern for colored women is different: much smaller proportions of women report that they have both been pregnant and are still in school. Of the 19 percent of 17-year-old colored women who report having been pregnant, only 35 percent are enrolled in school. Only a tiny proportion of the white women in our sample report having been pregnant, a finding that makes drawing inferences about them concerning the relationship between schooling and pregnancy difficult.

That teenage African women have lower pregnancy rates than colored women even though African women become sexually active at an earlier age is an intriguing finding. Colored households are generally more prosperous than African households and tend to have better access to most social services. Therefore, colored women are not likely to have less access than African women to contra-

Figure 2 Percentage of female CAPS respondents aged 22–25 in 2005, by their transitions out of school and into pregnancy, according to age and race, Cape Town, South Africa
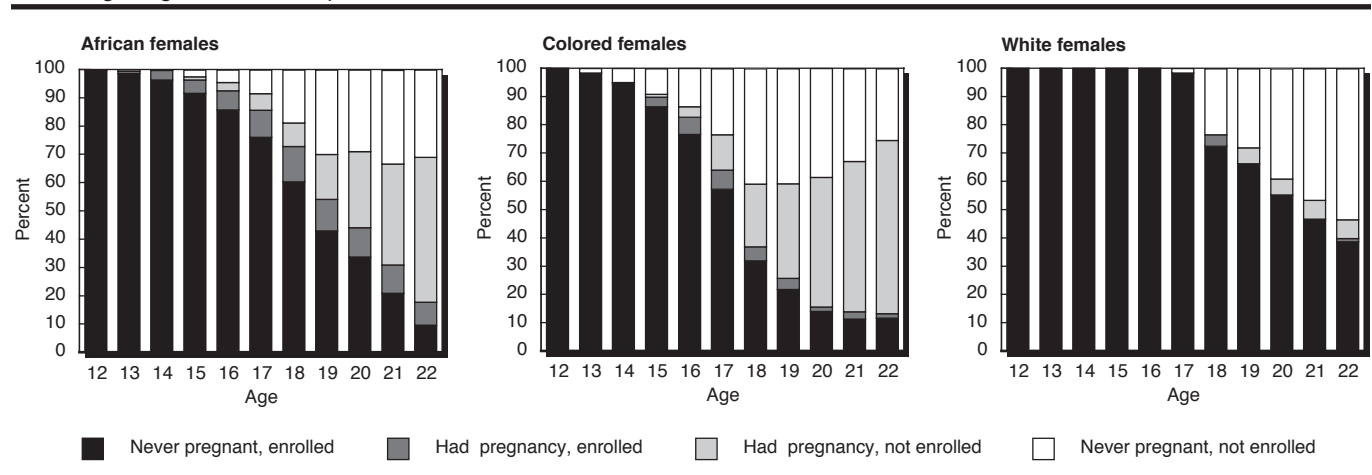
ceptives. Biased reporting may play a role: colored women may be less likely to report having engaged in premarital sexual activity unless it results in a pregnancy. Whatever the explanation of this large difference in the reported timing of sexual activity and pregnancy between these two population groups, sexually active African teenagers clearly have a relatively high capacity for avoiding pregnancy. Therefore, large proportions of these girls can remain in school after they have become sexually active. Moreover, some are able to stay in school even after becoming pregnant, a finding we investigate in greater detail below.

A critical circumstance for understanding the relationship between pregnancy and schooling is whether a pregnancy leads to a birth. CAPS collects details concerning each pregnancy, including its outcome. Table 3 shows data from 2005 that summarizes the outcomes of the first pregnancy reported by all women.[5] About 40 percent of African and colored women surveyed by CAPS had experienced a pregnancy by 2005, by which year they were 16 to 26 years old. If we assume that almost all of the women who were pregnant at the time of the 2005 interview had a live birth, about 95 percent of all pregnancies end in live births for young African and colored women. About 5 percent of pregnancies are reported as stillbirths or miscarriages. White women report a miscarriage rate of 13 percent; this rate corresponds to one miscarriage from six pregnancies. Reports of abortion are rare in our data: only five abortions are reported for 824 pregnancies. Although this number is likely an understatement, we have no way to estimate the degree of underreporting of abortions.[6] Although the extent of underreporting of abortions, miscarriages, and stillbirths cannot be determined, reported pregnancies clearly result in a birth about 95 percent of the time. In light of this finding and the circumstance that some pregnancies are still underway in every CAPS wave, our analysis focuses on pregnancies, with an understanding that almost all reported pregnancies result in births.

Table 3 Percentage of female CAPS respondents aged 16–26 in 2005 who reported ever having been pregnant, and percentage distribution by outcome of first pregnancy, according to race, Cape Town, South Africa

|	African	Colored	White	Total
Ever pregnant	43.4	40.5	3.2	35.8
First pregnancy outcome				
Live birth	92.6	87.7	86.9	89.4
Still pregnant	2.3	7.2	0.0	5.4
Stillbirth	2.1	1.1	0.0	1.5
Miscarriage	2.2	3.2	13.1	3.0
Abortion	0.6	0.5	0.0	0.5
Refuse to say	0.2	0.2	0.0	0.2
Married at first pregnancy	13.2	11.2	46.7	12.4
(N)	(969)	(959)	(198)	(2,126)

School Enrollment, Grade Attainment, and Timing of First Pregnancy

CAPS provides unusually rich data for analyzing the relationship between pregnancy and schooling. From the histories obtained, we can observe schooling trajectories before and after girls become pregnant. Figure 3 shows school-enrollment rates for African and colored girls from age 12 to 20 by their age at first pregnancy. Because our focus is on teen pregnancy, we consider the educational history of girls who had a first pregnancy at ages 15 to 18 and compare them with those who had their first pregnancy after age 23 (including those who had never been pregnant at the time of their last interview). As was inferred from Table 3, 95 percent of these pregnancies resulted in live births; therefore, the teen pregnancies shown in Figure 3 almost always imply a birth.

The enrollment rates shown in Figure 3 are higher than 95 percent for both African and colored girls until age 13. Girls who will eventually experience a teen pregnancy begin to show declines in enrollment rates around age 14, including those who do not become pregnant until age 17. This finding suggests a considerable degree of selectivity in the sample of girls who become pregnant as teenagers, and shows that teen pregnancy cannot be taken as exogenous when examining its impact on subsequent outcomes. For example, 21 percent of Africans and 35 percent of colored girls who had a first pregnancy at age 17 were not enrolled in school at age 16. This point is important because most research on pregnancy in developing countries makes the assumption that those young women who report that they dropped out of school as a result of a pregnancy would have stayed in school otherwise. Other factors such as lack of social and economic opportunities for young women may result in school dropout and poor academic performance (Mensch et al. 2001; Lloyd and Mensch 2008).

Although we must be cautious about attributing causality, clearly a large proportion of girls who were enrolled in school prior to a pregnancy do not continue their education after they give birth. At the same time, a significant proportion of pregnant girls either do not drop out or return to school after dropping out, especially among Africans. About 50 percent of African girls who become pregnant before completing high school were enrolled in school in the year after the pregnancy. Most colored girls, by contrast, have dropped out of school by the year following their pregnancy and rarely return to school after childbirth. This difference in dropout rates may be related to the overall racial differences in these rates. African schools have higher rates of grade repetition, lower dropout rates, and a much larger variance in the distribution of grade for age. Lam and his colleagues (2007) at-

Figure 3 Percentage of African and colored female CAPS respondents enrolled in school at ages 12–20, by age at first pregnancy, Cape Town, South Africa
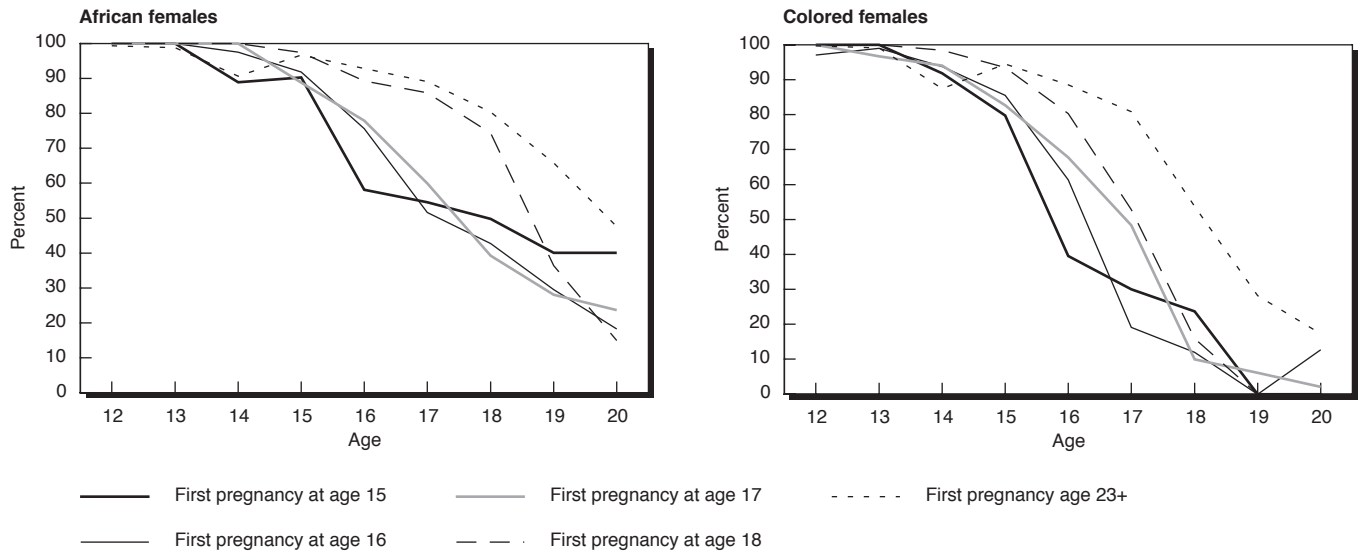
tribute this finding in part to a larger degree of randomness in grade advancement in African schools, whereby grade advancement is, to some extent, a lottery. African schools may be more "forgiving," therefore, with regard to allowing young women to return to school after giving birth. Because any grade encompasses a wide age range and because many students repeat grades, young African mothers can reinsert themselves into the school environment more easily than they could in a school system with a sharper alignment of age and grade.

Figure 4 shows girls' grade attainment from age 12 to 20 by age at first pregnancy. The trends in grade attainment for girls who experienced a teen pregnancy are similar until age 14 to the trend for those who did not. Girls who will eventually become pregnant as teenagers already had slightly lower grade attainment even before age 14, however, when none of the girls had been pregnant. At age 15, for example, African girls who do not become pregnant before age 23 show approximately half a grade more schooling than those with a first pregnancy at age 16. These differences in grade attainment prior to pregnancy are also observed for colored girls.

Figure 4 also shows that African girls who become pregnant often complete significant amounts of schooling after they give birth. For example, African girls who are first pregnant at age 15 complete about two additional school grades between ages 15 and 20, completing a mean of 9.5 grades. The situation is clearly different for colored girls. Those who are pregnant at age 15 only gain about half a grade after age 15. Although a strong relationship exists between age at first pregnancy and grade attainment at age 20 for both Africans and coloreds, the disper-

sion is much larger in the colored sample. African girls seem to be more able to negotiate parenthood and schooling, continuing their education after giving birth.

As noted above, one of the important features of the South African school environment is the high level of grade repetition, especially in predominantly African schools. This circumstance creates a wide dispersion in grades of enrollment per age and is likely to reduce the stigma associated with returning to school after having a child. Table 4 shows the distribution of grades enrolled among 16-year-old females and males by race. White females demonstrate what might be considered the target outcome, with 65 percent enrolled in grade 10 and 35 percent in grade 11. African males show the largest divergence from that distribution. African males who were aged 16 in 2002 were distributed from grade 5 to grade 12, with grade 10—the target grade for a 16-year-old who started school at age 7—having only 22 percent of the total, and the modal grade—grade 9—having only 34 percent of the total. African females, who tend to repeat fewer grades than African males, have a somewhat narrower distribution of grades, but still have only 26 percent in grade 10, 39 percent in grade 9, and 16 percent in grade 8. Colored students also have significant grade repetition, although much less than that of Africans. Like whites, the modal grade for 16-year-old colored students is grade 10 (rather than the grade 9 observed for Africans), with about 46 percent of colored males and females in grade 10.

These patterns are important for understanding transitions in schooling, sexual activity, and pregnancy. First, they help explain why African girls can remain in school after having a child. As noted above, the high levels of

Figure 4 Number of grades completed by African and colored female CAPS respondents at ages 12–20, by age at first pregnancy, Cape Town, South Africa
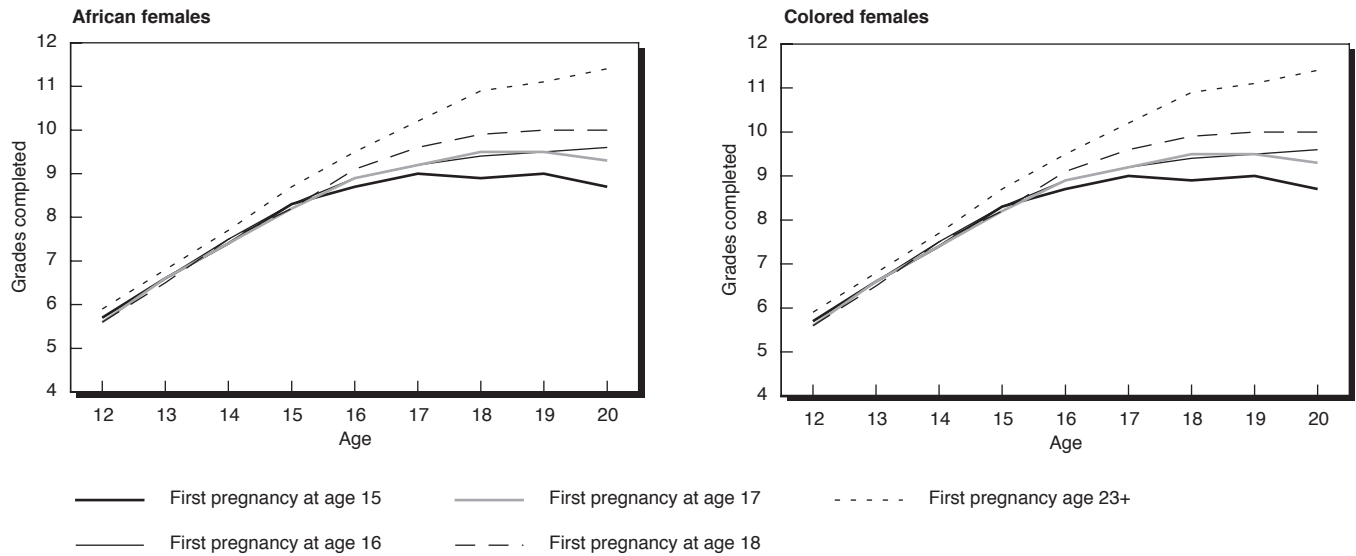
grade repetition and the loose connection between age and grade may make it easier for them to return to school after having a child. Second, the heterogeneity in age in a given grade may cause the sexual activity of older students to have spillover effects on younger classmates. We return to this point below when we discuss the finding that higher grade attainment, controlling for age, appears to encourage rather than deter sexual activity and childbearing.

Prevalence and Correlates of Transitions to Adulthood

Probit regression results are presented below for three outcomes—sexual debut, pregnancy, and dropping out of school—estimated separately for African, colored, and white females and males. A key question that we seek to answer is whether prior educational achievement has a strong impact on each of these transitions. In light of the differences in skills and proficiency reflected in education-

al achievement, we hypothesize that students with higher test scores are more likely to delay sexual debut, avoid pregnancy, and remain in school from 2002 to 2005.

Table 5 presents percentages and standard deviations of our dependent and independent variables, along with other variables that are useful in interpreting the results. The sample for the regressions is CAPS respondents aged 14–16 in 2002 for whom we have data on the relevant outcomes for 2005. The information for 2005 outcomes comes from both Waves 3 (2005) and 4 (2006). Most respondents were 17 to 19 years old in 2005, although the full age range is 16 to 20 in 2005.[7] The first two rows of Table 5 show that 22 percent of African females aged 14–16 reported having had sex by 2002 and that 77 percent of this same group reported having had sex by 2005. As shown in the third row, this finding implies that 68 percent of those who had not had sex in 2002 experienced sexual debut between 2002 and 2005. Once again, we see large racial differences in sexual activity, with sexual debut rates of only 31 percent for coloreds and 28 percent for whites over the same period. The proportion of males experiencing sexual debut between these years is similar to that of females—58 percent for Africans, 33 percent for coloreds, and 32 percent for whites.

The second outcome analyzed is having experienced a first pregnancy between 2002 and 2005. As shown in the table, only 2 percent of African and colored girls aged 14–16 reported experiencing a first pregnancy in 2002. The proportion who were first pregnant between 2002 and 2005 is 21 percent for both African and colored girls, despite the much higher rates of sexual debut for Africans. Few boys report having made a girl pregnant

Table 4 Percentage distribution of 16-year-olds enrolled in school in CAPS Wave 1 in each grade in 2002, by sex and race, Cape Town, South Africa

Grade in 2002	Female			Male		
	African	Colored	White	African	Colored	White
5	0.0	0.0	0.0	1.2	0.0	0.0
6	0.0	0.0	0.0	3.6	0.0	0.0
7	4.5	0.0	0.0	15.4	1.8	0.0
8	16.1	2.9	0.0	10.6	5.4	1.7
9	39.3	20.4	0.0	33.7	29.5	9.3
10	26.4	45.8	64.7	22.2	46.8	57.0
11	10.9	31.0	35.3	8.6	13.1	30.5
12	2.8	0.0	0.0	4.7	3.5	1.5
Total	100.0	100.0	100.0	100.0	100.0	100.0

Table 5 Characteristics of CAPS respondents aged 14–16 in 2002 who provided data for 2005, by selected variables, according to sex and race, Cape Town, South Africa

Characteristic	Female African		Female Colored		Female White		Male African		Male Colored		Male White	
Sexual activity and pregnancy (percent)												
Had sex by 2002	22.1	(0.42)	5.8	(0.23)	1.7	(0.13)	28.0	(0.45)	8.7	(0.28)	0.9	(0.09)
Had sex by 2005	76.9	(0.42)	37.3	(0.48)	30.6	(0.46)	68.1	(0.47)	40.3	(0.49)	32.4	(0.47)
Sexual debut between 2002–05	68.3	(0.47)	31.4	(0.46)	27.9	(0.45)	57.7	(0.50)	33.2	(0.47)	31.9	(0.47)
Ever pregnant by 2002 [a]	1.8	(0.13)	2.2	(0.15)	0.0	(0.00)	0.5	(0.07)	0.3	(0.05)	0.0	(0.00)
Ever pregnant by 2005 [a]	22.6	(0.42)	22.9	(0.42)	1.4	(0.12)	3.5	(0.19)	7.2	(0.26)	0.0	(0.00)
First pregnancy between 2002–05 [a]	21.1	(0.41)	21.1	(0.41)	1.4	(0.12)	3.1	(0.17)	7.2	(0.26)	0.0	(0.00)
Used contraceptives in 2005	84.9	(0.36)	51.5	(0.50)	94.7	(0.23)	84.6	(0.36)	77.9	(0.42)	96.5	(0.19)
Used condom in 2005	73.9	(0.44)	31.9	(0.47)	78.3	(0.42)	82.6	(0.38)	75.1	(0.43)	73.0	(0.46)
Ever married by 2002	0.0	(0.00)	0.0	(0.00)	0.0	(0.00)	0.0	(0.00)	0.0	(0.00)	0.0	(0.00)
Ever married by 2005	1.2	(0.11)	3.5	(0.18)	0.0	(0.00)	0.0	(0.00)	0.6	(0.08)	0.0	(0.00)
Married or cohabiting in 2005	0.5	(0.07)	4.7	(0.21)	1.2	(0.11)	0.5	(0.07)	1.2	(0.11)	0.0	(0.00)
Schooling												
Enrolled in 2002 (percent)	95.4	(0.21)	91.8	(0.27)	100.0	(0.00)	94.4	(0.23)	89.1	(0.31)	100.0	(0.00)
Enrolled in 2005 (percent)	76.6	(0.42)	50.6	(0.50)	80.9	(0.40)	79.4	(0.41)	49.1	(0.50)	81.7	(0.39)
Dropped out between 2002–05 (percent)	18.9	(0.39)	35.2	(0.48)	13.2	(0.34)	15.1	(0.36)	40.9	(0.49)	2.8	(0.17)
Grades completed in 2002	7.48	(1.38)	8.07	(1.21)	8.08	(0.97)	6.93	(1.60)	7.71	(1.29)	8.25	(1.14)
Grades completed in 2005	9.65	(1.53)	10.14	(1.60)	10.90	(0.89)	9.35	(1.66)	9.55	(1.91)	11.09	(0.90)
Literacy/numeracy score (standardized)	−0.49	(0.80)	0.01	(0.78)	1.05	(0.68)	−0.60	(0.83)	0.02	(0.86)	1.26	(0.60)
Household characteristics												
Household income per capita	398	(503)	940	(897)	4,036	(2,837)	429	(657)	967	(1,022)	3,957	(2,587)
Log income per capita	5.52	(0.96)	6.49	(0.88)	8.04	(0.81)	5.58	(0.94)	6.47	(0.93)	8.08	(0.66)
Household shock 2002–05 (percent)	22.3	(0.42)	15.3	(0.36)	2.3	(0.15)	18.3	(0.39)	13.7	(0.34)	6.5	(0.25)
Mother's highest grade completed	8.40	(2.96)	8.74	(2.92)	12.36	(2.00)	8.70	(2.87)	8.89	(2.73)	12.69	(1.83)
Father's highest grade completed	7.67	(3.85)	9.11	(3.15)	12.96	(2.15)	7.52	(3.88)	9.14	(3.27)	12.85	(1.87)
Living with mother in 2002 (percent)	69.9	(0.46)	81.6	(0.39)	94.4	(0.23)	74.7	(0.44)	80.4	(0.40)	96.7	(0.18)
Living with father in 2002 (percent)	39.8	(0.49)	54.3	(0.50)	76.2	(0.43)	42.4	(0.50)	57.9	(0.49)	80.3	(0.40)
Household shock missing (percent)	14.2	(0.35)	8.4	(0.28)	10.1	(0.30)	11.9	(0.32)	11.0	(0.31)	19.1	(0.40)
Mother's grade completed missing (percent)	11.1	(0.31)	8.0	(0.27)	2.1	(0.14)	10.2	(0.30)	8.9	(0.29)	0.0	(0.00)
Father's grade completed missing (percent)	41.9	(0.49)	33.5	(0.47)	11.3	(0.32)	42.0	(0.49)	28.1	(0.45)	5.6	(0.23)
(N)	(321)		(358)		(83)		(254)		(314)		(88)	

[a] In the case of males, percentages refer to reports of having made girls pregnant.
Notes: Standard deviation in parentheses. Sample is restricted to those who were followed successfully from 2002 to 2005. Sexual debut, pregnancy, and school dropout are conditional on not having had sex in 2002, not having been pregnant in 2002, and being in school in 2002, respectively. Contraceptive use is at last sex, conditional on having had sex. Household income per capita is given in rands per month in 2002. Household shock includes death of a household member, job loss, marital disruption, or loss of a grant or remittance (from data for Wave 3).

between 2002 and 2005—3 percent for Africans, 7 percent for coloreds, and 0 percent for whites. We have little faith in these reports from boys, but we include them in the regressions for completeness.

Table 5 also includes measures of contraceptive use. The first measure is whether respondents used a contraceptive method during their last sexual intercourse. Among whites, contraceptive use is almost universal: 95 percent of females and 96 percent of males reported that they used some method of contraception during their last sexual intercourse. Contraceptive use is also high among Africans, with no difference observed by sex (85 percent for both males and females). Colored females reported the lowest level of contraceptive use of all groups (52 percent), whereas 78 percent of colored males reported having used a contraceptive method during their last sexual intercourse. Condom use is highest among African males (83 percent), but is widespread among all groups, with the notable exception of colored females (32 percent).[8]

Although we do not include it in the regressions, we show the proportion ever married by 2002 and 2005 in

Table 5. By 2005, only 1 percent of African females and 3 percent of colored females report ever being married, although 23 percent of both groups report having been pregnant (with almost all pregnancies leading to a birth). This finding is consistent with the results shown in Table 3 suggesting that virtually all teen pregnancies are nonmarital for both Africans and coloreds. Broadening the definition to include cohabitation, only 1 percent of African females and 5 percent of colored females in this cohort were currently married or cohabiting in 2005. These results suggest that the faster transition from sexual activity into pregnancy for colored girls than for African girls is not driven by differences in proportions married or cohabiting.

The third outcome shown in our regressions is dropping out of school between 2002 and 2005, conditional on having been in school in 2002. Those who complete grade 12 between waves are considered as not having dropped out, whatever their educational status in 2005. As seen in Table 5, the proportion who dropped out ranges from 3 percent for white males to 41 percent for colored males. Although colored dropout rates are higher than African

dropout rates, colored grade attainment in 2005 is higher than African grade attainment for both males and females. Large racial differences in schooling outcomes are evident: the gap between white and African grade attainment in 2005 is 1.3 grades for females and 1.8 grades for males.

Scores on the literacy and numeracy evaluation demonstrate even more striking differences in the amount of learning acquired by 2002. These are standardized scores, with a mean of zero and a standard deviation of one, for the full CAPS young adult sample. African females scored 0.5 standard deviations below colored females and 1.5 standard deviations below white females, with even larger racial differences for males. As shown in Lam et al. (2007), these scores are strong predictors of grade advancement through secondary school between 2002 and 2005. We include them in our regressions to determine whether they are associated with sexual debut, pregnancy, and dropping out of school.

Table 5 also documents the enormous inequality that persists in postapartheid South Africa and that provides an important backdrop for our analysis. Per capita household income (measured in 2002) for Africans is only about half that of coloreds and about 10 percent of the income of whites, an indication of the enormous persistent racial gap in income. African young people are also much more likely to live in households that experience an economic shock. We define household shock as the death of household member, job loss, marital disruption, or loss of a grant or remittance between 2002 and 2005 if the financial impact of this shock was described by the respondent as moderate or large. The proportion of female respondents living in a household that experienced a negative shock is 22 percent for Africans, 15 percent for coloreds, and 2 percent for whites. This shock can only be defined for households interviewed in Wave 3; therefore, it is missing for the roughly 10 percent of our respondents for whom we use Wave 4 data to construct 2005 outcomes. The data for parental schooling shown in Table 5 demonstrates that parents of African young people have about four years' less schooling than those of whites.[9]

Probit Regression Results

Table 6 presents results of probit regressions in which the dependent variable indicates sexual debut, pregnancy, or school dropout between 2002 and 2005.[10] Results are estimated separately for girls and boys, using the sample of respondents who were aged 14–16 in 2002. For each set of regressions, the first column shows the marginal effect of the variable, evaluated at the mean, and the second column shows robust (Huber–White) standard errors in parentheses.[11] Given the rapid changes associated with the period between age 14 and 20, we control for age with a quadratic function of age in months. We also include a

variable for the number of months between the 2002 and 2005 interviews, because the length of this interval can vary across respondents by several months and because longer periods of exposure will lead to an increased probability of sexual debut, pregnancy, and school dropout.

Looking at the regressions for sexual debut, we see that the estimated marginal effect of being enrolled in school in 2002 on sexual debut by 2005 is negative for both males and females, although it is not statistically significant. Because enrollment rates were well above 90 percent in 2002, we have limited statistical power to estimate this effect; in any event, it does not play an important role in driving sexual debut.

One of the intriguing results shown in Table 6 is that the number of grades completed has a significant positive effect on sexual debut for both males and females. These effects, controlling for age, are surprising, because we might expect that young people who are ahead of their age group in school would be less likely to become sexually active. The estimates imply that a girl with one additional grade completed in 2002, given her age, is 6.6 percentage points more likely to have become sexually active by 2005. The effect for boys is slightly larger, at 8 percentage points. This result is not sensitive to alternative specifications. One possible interpretation is that young people who are ahead of their cohort in school interact with an older and more sexually active group of girls and boys. In light of the wide range of grades of enrollment per age, especially in African schools, students of a given age may have classmates of quite different ages. Adolescents could be influenced by the behavior of older same-sex peers and by interactions with older opposite-sex peers (the vast majority of respondents attend mixed-sex schools).

Although further research is required to determine whether the apparent positive effect of higher grade attainment on sexual debut is the result of peer effects, one point of evidence in support of this interpretation is that the impact of current grade becomes less positive, although still positive and significant, when we omit the literacy and numeracy test score from the regression (not shown). Our interpretation of this result is that offsetting effects occur from being ahead in school. On the one hand, girls who are doing better in school and anticipate good schooling outcomes in the future may be less likely to become sexually active. On the other hand, they interact with older girls and boys who are more sexually active, increasing the probability that they will experience sexual debut. When we control for previous schooling performance with literacy and numeracy test scores, we control for some of the first effect, leaving the second effect to become more pronounced. Additional evidence in support of this interpretation is that when we estimate the probit separately by race (not shown), the positive effect of schooling on sexual debut is largest for the African sam-

Table 6 Probit regressions showing marginal effects on sexual debut, pregnancy, and dropping out of school between 2002 and 2005 among CAPS respondents aged 14–16 in 2002, by selected characteristics, according to sex, Cape Town, South Africa

Characteristic	Female						Male					
	Sexual debut		First pregnancy		Dropped out		Sexual debut		First pregnancy		Dropped out	
Enrolled in 2002	−0.173	(0.120)	−0.303**	(0.110)	a		−0.192	(0.114)	−0.119	(0.073)	a	
Grades completed in 2002	0.066*	(0.026)	−0.078**	(0.029)	−0.019	(0.018)	0.080**	(0.023)	0.030	(0.021)	−0.037*	(0.016)
Literacy/numeracy score	−0.075*	(0.035)	0.041	(0.042)	−0.101**	(0.022)	−0.065*	(0.033)	−0.030	(0.023)	−0.061**	(0.023)
Age (months since age 14)	0.018*	(0.009)	0.006	(0.012)	0.009	(0.006)	0.009	(0.009)	−0.001	(0.007)	0.007	(0.006)
Age (months squared) (× 1,000)	−0.311	(0.240)	0.0035	(0.300)	−0.137	(0.142)	−0.020	(0.240)	0.020	(0.170)	0.035	(0.164)
Colored	−0.353**	(0.054)	0.346**	(0.067)	0.270**	(0.040)	−0.287**	(0.057)	0.099**	(0.037)	0.319**	(0.048)
White	−0.175*	(0.087)	−0.234	(0.140)	0.540**	(0.130)	−0.067	(0.097)	b		0.215	(0.150)
Log household income per capita	−0.011	(0.029)	−0.004	(0.034)	−0.069**	(0.019)	−0.030	(0.030)	0.016	(0.024)	−0.060**	(0.023)
Household shock between 2002–05	0.110	(0.065)	0.137	(0.073)	0.103*	(0.049)	0.068	(0.067)	−0.047	(0.040)	−0.030	(0.041)
Mother's highest grade completed	0.015	(0.010)	−0.007	(0.013)	−0.002	(0.006)	−0.012	(0.011)	0.007	(0.008)	0.002	(0.007)
Father's highest grade completed	−0.033**	(0.010)	−0.007	(0.012)	−0.015*	(0.006)	−0.018	(0.009)	−0.008	(0.007)	−0.010	(0.006)
Living with mother in 2002	−0.062	(0.064)	0.003	(0.072)	−0.040	(0.045)	0.052	(0.069)	0.069	(0.039)	−0.034	(0.057)
Living with father in 2002	−0.110	(0.061)	0.012	(0.079)	0.089*	(0.039)	−0.111	(0.062)	0.040	(0.049)	−0.014	(0.047)
(N)	(638)		(388)		(634)		(542)		(297)		(539)	

*Significant at p ≤ 0.05; **p ≤ 0.01.
[a] Models of dropping out of school are conditional on school enrollment in 2002.　[b] Because virtually no white males reported having made a partner pregnant, the dummy for white was dropped from this model.
Notes: Robust standard errors are given in parentheses. First pregnancy is conditional on having had sex by 2005. Regression also includes dummy variables to indicate missing values for mother's schooling, father's schooling, and household shock. Household income per capita is given in rands per month in 2002. Household shock includes death of a household member, job loss, marital disruption, or loss of a grant or remittance (from data for Wave 3).

ple, the group for which the largest variation in grade per age is found. The coefficient is positive for coloreds and whites, but it is smaller in magnitude and is not statistically significant. Although rigorously testing the possibility that peer effects explain the positive effect of grade attainment on sexual debut is beyond the scope of this study, we feel that the possibility merits further research.

With regard to the literacy and numeracy evaluation (LNE), we estimate significant negative effects of the LNE score on sexual debut for both girls and boys. An increase of one standard deviation in the LNE score implies a 7 percentage point reduction in the probability of sexual debut for both girls and boys, controlling for age and grade. This result could have a number of interpretations. It may indicate that young people who are doing better in school and anticipate better performance in the future want to delay sexual activity in order to avoid the risk of pregnancy or disease that might interfere with their future opportunities. A slightly different interpretation is that some young people are more focused on schooling than on social interactions, with the result that they accumulate more knowledge while being less likely to become sexually active.

We include a quadratic in age, where age is measured in months since turning age 14. The marginal effect on the linear age variable implies that a 1.8 percentage point increase results from one additional month of age, evaluated at age 14. This finding implies a 21 percentage point increase if the respondent was 15 rather than 14 in 2002. The negative coefficient on the age-squared term implies a slight decline in the impact of age for older respondents. Although it is not statistically significant, we include it in the regression in order to permit a flexible relationship between age and our outcome variables.

The marginal effects for the dummy variables for coloreds and whites (African being the omitted category) confirm patterns shown in Table 5 and in the previous graphs. Colored and white girls are less likely to become sexually active in their teenage years than African girls, with similar racial differences among males. The regression results indicate that after controlling for prior schooling outcomes, household income, and parental schooling, colored girls are 35 percentage points less likely than African girls to become sexually active between 2002 and 2005. White girls are 18 percentage points less likely to have experienced sexual debut than African girls.

The next set of variables in Table 6 represent household characteristics that may affect sexual debut. The log of household income per capita has a negative coefficient in both the female and male regressions but is not statistically significant. We estimate a marginally statistically significant positive effect (p = 0.09) of a household shock on female sexual debut. The result implies that girls living in a household that experienced a negative shock between 2002 and 2005 are 11 percentage points more likely to become sexually active during that period. Using CAPS data, Dinkelman and her colleagues (2007) find that negative shocks are also associated with an increase in women's risky sexual behavior, such as having multiple sex partners.[12]

The coefficient for mother's schooling in the female sexual debut regression is positive but statistically insignificant. The impact of father's schooling on sexual debut is negative and statistically significant for girls, implying that one additional grade of the father's schooling reduces the probability of female sexual debut by 3 percentage points. We include dummy variables to indicate whether

the respondent lived with a parent in 2002. The coefficients of both variables imply that those who were living with parents were less likely to become sexually active, although the associations are not statistically significant.[13]

The regressions for the second outcome—experiencing a first pregnancy (or making a girl pregnant) between 2002 and 2005—are conditional on not having been pregnant in 2002 and having had sex by 2005. We estimate a significant negative effect for girls of being enrolled in school in 2002. Controlling for other variables, girls who were enrolled are 30 percentage points less likely to become pregnant than the small fraction of girls who were not enrolled in 2002. The effect of grade attainment is negative for girls, with one additional grade in 2002 implying an 8 percentage point decline in the probability of becoming pregnant. When we estimate this regression without considering only those who had experienced sexual debut (not shown), the estimated impact of grade attainment is not significant for girls. Although girls who are ahead in school are more likely to become sexually active, they are less likely to become pregnant once they become sexually active; the net effect is that no overall relationship is found between grade attainment and pregnancy for girls.

The estimated impact of the LNE score on pregnancy is not statistically significant for either girls or boys. We estimate a large impact of being colored on the probability of pregnancy for both boys and girls, consistent with the patterns shown above. Although colored girls are less likely to become sexually active than African girls, those who do are 35 percentage points more likely to become pregnant than African girls, controlling for other variables in the regression. We estimate a statistically insignificant effect of income on pregnancy for both boys and girls, but a marginally significant positive impact of a household shock for girls ($p = 0.06$).

The third outcome presented in Table 6 is dropping out of school between 2002 and 2005. These regressions are restricted to the sample that was enrolled in school in 2002. One of the most important results in this regression is the impact of the literacy and numeracy evaluation. Girls and boys with higher LNE scores are significantly less likely to drop out between 2002 and 2005. For girls, a one standard-deviation increase in the score is associated with a 10 percentage point decline in the probability of dropping out of school.

We estimate significant positive effects for being colored for both boys and girls. Holding the other variables constant, colored girls are 27 percentage points more likely to drop out and colored boys are 32 percentage points more likely to drop out than are their African counterparts. We also estimate a significant positive impact for girls of being white on the probability of dropping out.

Although this finding is surprising, it is consistent with results estimated by Lam and colleagues (2007) that show that literacy and numeracy test scores and household income can largely explain the racial differences in progress through school.

Household income and shocks are both associated with dropping out of school. The estimated marginal effect of household income is significantly negative for both girls and boys. The coefficients imply that a 10 percent increase in per capita household income is associated with a 0.7 percentage point decrease in the probability of dropping out for girls and a 0.6 percentage point decrease for boys. Household shocks have a significant positive effect on dropping out for girls, implying a 10 percentage point increase in the probability of dropping out. The effect of household shocks is not significant for males. The smaller impact of household shocks on boys' dropout behavior versus girls' is consistent with some previous research, including the analysis of the impact of unemployment shocks in Brazil by Duryea and her colleagues (2007).

In Table 6, we did not include sexual debut or pregnancy in the dropout equation (or dropout in the sexual debut or pregnancy equations) because we consider the three outcomes to be jointly determined. Although we know that girls who drop out of school are more likely to become pregnant, we cannot determine whether one causes the other or whether both are caused by some common unobserved variable. With this important caveat in mind, it is, nonetheless, interesting to look at dropout regressions in which we include sexual debut and pregnancy as independent variables. Table 7 presents dropout regressions estimated separately for African and colored respondents (we omit whites because of the small sample size and the small number of pregnancies). The regressions confirm that after controlling for variables such as baseline schooling, LNE scores, and household income, girls who become sexually active between 2002 and 2005 are less likely to stay in school. The effect of both sexual debut and pregnancy on school dropout is larger for coloreds than for Africans. Colored girls who become pregnant are 22 percentage points more likely to drop out, whereas African girls who become pregnant are 12 percentage points more likely to drop out. These findings confirm that the racial differences shown in bivariate relationships above continue to hold when we control for other variables. The impact of pregnancy on dropout cannot be estimated for African boys because too small a proportion report that they made a girl pregnant.

Table 7 also allows us to see how variables interact with race. The impact of the LNE score and household income on dropping out is much larger for coloreds than for Africans, although the effect is only statistically significant for girls. This finding is consistent with the re-

Table 7 Probit regressions showing marginal effects on dropping out of school between 2002 and 2005 among CAPS respondents aged 14–16 in 2002, Cape Town, South Africa

Variable	Female				Male			
	African		Colored		African		Colored	
Sexual debut between 2002–05	0.136***	(0.036)	0.189**	(0.074)	0.055	(0.041)	0.224***	(0.073)
Pregnancy between 2002–05	0.120*	(0.065)	0.223**	(0.091)	a		0.407**	(0.204)
Grades completed in 2002	−0.039**	(0.018)	−0.024	(0.029)	−0.025*	(0.013)	−0.072*	(0.041)
Literacy/numeracy score	−0.014	(0.020)	−0.152***	(0.039)	0.006	(0.022)	−0.084*	(0.049)
Age (months since age 14)	−0.011*	(0.006)	0.015*	(0.008)	0.014**	(0.007)	−0.011	(0.011)
Age (months squared) (x 1,000)	0.355**	(0.155)	−0.367*	(0.221)	−0.318	(0.205)	0.580*	(0.310)
Log household income per capita	0.010	(0.018)	−0.094***	(0.035)	−0.016	(0.022)	−0.110**	(0.047)
Household shock between 2002–05	0.048	(0.048)	0.102	(0.077)	−0.046	(0.028)	−0.052	(0.087)
Mother's highest grade completed	0.006	(0.007)	−0.008	(0.010)	−0.000	(0.007)	0.002	(0.013)
Father's highest grade completed	−0.004	(0.006)	−0.009	(0.011)	−0.002	(0.007)	−0.031**	(0.012)
Living with mother in 2002	0.058**	(0.028)	−0.111	(0.075)	−0.066	(0.081)	−0.101	(0.116)
Living with father in 2002	−0.023	(0.042)	0.182***	(0.066)	0.035	(0.051)	0.038	(0.092)
(N)	(204)		(283)		(138)		(229)	

*Significant at $p \leq 0.10$; **$p \leq 0.05$; ***$p \leq 0.01$.

aNot estimable because too few males report having made a girl pregnant.

Notes: Robust standard errors are given in parentheses. First pregnancy is conditional on having had sex by 2005. Regression also includes dummy variables to indicate missing values for mother's schooling, father's schooling, and household shock. Household income per capita is given in rands per month in 2002. Household shock includes death of a household member, job loss, marital disruption, or loss of a grant or remittance (from data for Wave 3).

sults reported by Lam and his colleagues (2007), who argue that it indicates that African schools do a poor job of matching actual learning with measured performance and grade promotion. African students remain in school even when they are failing grades, whereas colored students tend to drop out when they fail a grade.

Conclusion

Using longitudinal data from the Cape Area Panel Study, we show that schooling and sexual activity are overlapping spheres for young people in urban South Africa. The combination of high rates of school enrollment into the late teens and relatively early sexual debut means that most young people become sexually active while they are enrolled in school. This finding may have important implications for reproductive health programs targeted at young people, because programs initiated in secondary schools will reach a high proportion of sexually active teenagers. We find significant racial differences in the combination of school enrollment and sexual activity, however. African adolescents become sexually active earlier than colored and white young people and often spend several years enrolled in school after sexual debut. More than 50 percent of 17-year-old African girls in the study sample were categorized as "had sex, enrolled," an indication of the large overlap in schooling and sexual activity in adolescents' lives. Colored adolescents have later sexual debut and spend less time in school after sexual debut.

Teen pregnancy rates are relatively high for both Africans and coloreds; higher rates are found for coloreds despite their lower rates of sexual debut. In retrospective reports of 22–25-year-olds, 19 percent of colored women

and 15 percent of African women report having been pregnant by age 17. More than 95 percent of the pregnancies reported in CAPS end in live births; therefore, the great majority of these pregnancies result in teen childbearing. African women are much more likely than colored women to combine pregnancy and schooling. Of the girls who experienced a pregnancy by age 17, more than 60 percent of Africans were enrolled in school while pregnant, compared with only 35 percent of colored girls who were pregnant at the same age.

Although women who become pregnant as teenagers complete fewer grades of schooling than women who do not, our analysis of schooling trajectories suggests that caution must be used in assigning a causal impact to teen pregnancy. Those who become pregnant while enrolled in school tend to report lower enrollment rates and lower grade attainment several years before the pregnancy took place, suggesting that even in the absence of a pregnancy they were unlikely to achieve the same level of schooling as those who were not pregnant as teenagers. Our schooling trajectories also show that school-age pregnancies are followed by continued increases in grade attainment, especially among Africans. African women who were pregnant at age 15 completed almost two additional grades of schooling between age 15 and 20. Colored women, however, were much more likely to drop out of school after becoming pregnant and gained little additional schooling thereafter. We hypothesize that this racial difference is a manifestation of a more general difference between African and colored schools in dropout rates, and of the higher rates of grade repetition in African schools that make returning to school after a pregnancy easier for young African women. Although African girls' ability to return to school after pregnancy helps enhance the human capital

accumulation of young mothers, African students may be more likely to be sexually active than they would be if the cost of pregnancy were higher. The earlier sexual initiation of African girls compared with colored girls may be influenced by African schools' being more forgiving in terms of grade repetition and school disruption caused by pregnancy. This leniency may also explain why rates of sexual activity among teenagers are higher in South Africa than in many other parts of sub-Saharan Africa.

Results from our probit regressions indicate that human capital accumulated by 2002 is a significant determinant of sexual debut and school dropout by 2005 for both girls and boys aged 14–16 in 2002. Girls who scored one standard deviation lower on the CAPS literacy and numeracy evaluation in 2002 were 8 percentage points less likely to start having sex and 10 percentage points less likely to drop out of school between 2002 and 2005. This test score picks up a wide range of variables that affect learning, including innate ability, family background variables, early life disruptions, and school quality up to that age. This result supports the hypothesis that early schooling outcomes affect both sexual behavior and schooling outcomes during later adolescence. A surprising result in our regressions is that the number of grades completed by 14–16-year-olds has a positive impact on sexual debut of both boys and girls, controlling for age and other characteristics. This finding runs counter to the idea that students who are doing better in school will be less likely to become sexually active. We hypothesize that this result may be evidence of peer effects resulting from the large dispersion in age per grade in South African high schools, although we are not able to test that explanation directly. We also find that household shocks and low household income increase the probability of school dropout for girls, and that household shocks marginally increase the probability of early sexual debut and first pregnancy for girls.

These effects of test scores, grade attainment, and household shocks are further evidence of the difficulty in assigning a causal impact of sexual behavior and pregnancy on schooling or of schooling on sexual behavior. They also suggest that the persistent disadvantages of Africans in terms of school quality and household shocks have important effects on adolescent transitions in both schooling and sexual behavior, making it difficult for Africans to complete school at the same rate as colored and white adolescents and complicating their transitions to adulthood in all spheres. From a policy perspective, one interpretation of our results is that neither poor-quality secondary schools nor pregnancy is the primary reason for school dropout in South Africa. Rather, the problems begin much earlier than in secondary school, potentially shifting the focus of interventions to poor-quality prima-ry schools and the multiple disadvantages of growing up in poor households.

Notes

1   The Cape Area Panel Study is a collaborative project of the University of Michigan and the University of Cape Town, funded by the United States National Institutes of Health and the Mellon Foundation. Additional details and technical documentation are available at <http://www.caps.uct.ac.za>.

2   As discussed in Lam et al. (2006), household response rates were lower in high-income areas. Sample weights adjust for differential response rates within sample clusters, which partially account for differential response rates that are correlated with cluster characteristics such as income. In practice, results are little affected by sample weights when the analysis is conducted separately by race or when race controls are included in regressions.

3   Under apartheid, the colored population was distinct from the Indian population, which is heavily concentrated in Durban. The colored population includes descendants from indigenous Khoisan people and slaves from Malaysia and elsewhere imported to Cape Town by the Dutch. The colored population is predominantly Afrikaans speaking, and about 20 percent identified themselves as Muslim in the CAPS interview.

4   Although we do not have space to analyze them here, CAPS collected data on the age of each respondent's sexual partner. The first sexual partner of CAPS female respondents was, on average, two years older for whites, three years older for coloreds, and three and a half years older for Africans. Reconciling these gaps with the finding that males tend to be sexually active at an earlier age than females among coloreds and Africans is a challenge posed by data from many populations and is a subject for future research. Dinkelman and Lam (2008) discuss gender discrepancies in reported sexual behavior and demonstrate that discrepancies that appear to violate simple adding-up constraints can often be explained by the likelihood that groups such as sex workers are undersampled.

5   As noted above, this information may have been collected in Wave 3 (2005) or Wave 4 (2006), but refers to pregnancies that occurred through 2005.

6   The postapartheid government adopted one of the most liberal abortion laws in the world, but qualitative research suggests that abortion remains highly stigmatized (Varga 2002).

7   Depending on the date of birth and the timing of interviews, respondents may have had two, three, or four birthdays between the 2002 and the 2005 interviews. We control for the number of months between interviews.

8   Dinkelman and her colleagues (2007) found that the CAPS data reveal an increase in condom use between 2002 and 2005.

9   Parents' schooling data are drawn from the household questionnaire when the parent is coresident, and is collected from the young adult directly when the parent is not coresident. Therefore, we have information about parents' education in many cases even when the respondent was not coresident with parents. Such data are missing, however, for 11 percent of African mothers and 42 percent of African fathers.

10 We estimated the same models using logit regressions, with almost identical results. We use probits rather than hazard models because we believe the data are best used to look at whether the respondents

do or not make our three transitions over the three-year period from 2002 to 2005, rather than to look at the timing of the transitions.

11 For example, the marginal effect of the LNE score uses the probit coefficient to calculate the derivative of the probability of sexual debut with respect to the LNE score, holding other variables at their mean values. In the case of a dummy variable such as enrollment, this value reflects the impact of changing from "not enrolled" to "enrolled" on the probability of sexual debut, continuing to hold other variables at their mean values.

12 We have not tried to time exactly whether a household shock occurred before sexual debut, pregnancy, or dropout, because identifying precisely when a severe illness began is difficult and because death and job loss may be preceded by periods of disruption. Therefore, we consider whether a shock occurred any time between 2002 and 2005.

13 CAPS collects data on parents' schooling even when respondents do not live with their parents. Variables indicating missing data for mother's schooling, father's schooling, and household shocks are included in order to avoid dropping cases lacking data for those variables.

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