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Economic resources and HIV preventive behaviors among school-enrolled young women in rural South Africa (HPTN 068)

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Abstract

Individual economic resources may have greater influence on school-enrolled young women's sexual decision-making than household wealth measures. However, few studies have investigated the effects of personal income, employment, and other financial assets on young women's sexual behaviors. Using baseline data from the HIV Prevention Trials Network (HPTN) 068 study, we examined the association of ever having sex and adopting sexually-protective practices with individual-level economic resources among school-enrolled women, aged 13-20 years (n=2,533). Age-adjusted results showed that among all women employment was associated with ever having sex (OR=1.56, 95%CI:1.28-1.90). Among sexually-experienced women, paid work was associated with changes in partner selection practices (OR=2.38, 95%CI:1.58-3.58) and periodic sexual abstinence to avoid HIV (OR=1.71, 95%CI:1.07-2.75). Having money to spend on oneself was associated with reducing the number of sexual partners (OR=1.94, 95%CI:1.08-3.46), discussing HIV testing (OR=2.15, 95%CI:1.13-4.06), and discussing condom use (OR=1.99, 95%CI:1.04-3.80). Having a bank account was associated with condom use (OR=1.49, 95%CI:1.01-2.19). Economic hardship was positively associated with ever having sex, but not with sexually-protective behaviors. Maximizing women's individual economic resources may complement future prevention initiatives.

Keywords

economic resources; assets; HIV; women; risk behaviors; South Africa; prevention

Introduction

Young women throughout sub-Saharan Africa are at increased risk of HIV infection when compared to their male counterparts and other age groups [1]. In countries hardest hit by the AIDS epidemic, HIV prevalence among young women is as high as 30% [2]. In particular, South African young women have HIV infection rates that are 3 to 4 times higher than their male counterparts and have a 1 in 3 chance of acquiring HIV before reaching the age of 21 years [3, 4]. Compared to young men, South African women also have significantly higher rates of early sexual debut and sexual exploitation, which raises their risks of acquiring HIV and other sexually transmitted infections [1, 3, 5].

The complexity of poverty as a contributor to the spread of HIV has been studied for many years, both at a global level among the world's poorest countries and in communities affected by severe income and food insecurities [6-12]. Poverty has been recognized as an important determinant in shaping women's sexual behaviors that increase risk of HIV acquisition [6, 13, 14]. Several mechanisms have been proposed to describe how poverty contributes to HIV vulnerability in young women [7, 14]. One explanation is that limited income and economic control among poor women decreases their ability to negotiate condom use with sexual partners [15-18]. For example, economic dependence on a male partner has been shown to increase rates of unprotected sex among young women [14, 19, 20]. Another explanation is that poverty, as measured by unemployment or other forms of financial distress, constrains young women's livelihood options requiring many of them to resort to exchanging sex for money, housing, or other commodities [14, 21-25]. Previous

research has also shown that financial distress, including debt, income instability, lower earned income, food insufficiency, and large material transfers, have all been associated with higher rates of unprotected sex, inconsistent condom use, multiple sex partners, and sex exchange among women [6, 13, 26, 27].

Few studies have investigated the potential protective influence of economic resources on safer sexual practices among young women. While several studies have demonstrated the gradient of sexual risk-taking among households with lower socioeconomic status [6, 28-31], young women's individual economic measures such as income, employment, debt, or financial control have not been well studied in the context of HIV prevention [6]. This is despite the potential of individual economic resources to have greater influence on young women's sexual decision-making than household measures of wealth, such as familial assets and educational levels [6, 32, 33]. In addition, studies investigating factors associated with sexually protective behaviors among youth have largely focused on non-economic influences, such as knowledge, parental or family communication, religious or moral injunctions, education, social connectedness, and community norms [1, 21, 34-36].

According to asset theory, individuals with increased assets in the present may be more likely to engage in positive future planning to protect those assets (or resources) in the future [29, 35, 37, 38]. This could mean that young women with greater economic resources today may more deliberately adopt behaviors to protect themselves, including avoidance of HIV [29, 39, 40]. However, the extent to which individual economic resources relate to sexually protective behaviors remains unclear among sub-Saharan African young women. The few studies to-date that have examined this relationship have shown mixed results [29, 32, 41-43]. In some settings, increased economic resources have been associated with less sexual vulnerability, such as fewer reports of forced, coercive, or survival sex [41] and changes in attitudes towards sexual risk-taking [29, 32]. In other cases, increased economic resources have been associated with no change in young women's sexual behaviors or sexual control [42] or resulted in higher sexual risk-taking due to delayed marriage, expanded travel, and greater access to sexual partners [41-43]. As such, both measures of poverty and wealth have been associated with sexual behaviors that protect against or increase risk of HIV infection [11, 12, 44].

To build upon the existing knowledge, this study examines the association between individual economic resources and HIV preventive behaviors among a cohort of rural South African women, aged 13-20 years, who were enrolled in school at the time of the study. Education for young women has been shown to be associated with reduced risk of HIV infection [45-48]. We, therefore, investigate whether economic resources among school-enrolled young women differentially influences sexual behaviors. Specifically, we examine the odds of engaging in sexually protective behaviors, including delayed sexual debut, among young women with one or more individual economic resources. Based on the study's results, we also discuss implications for leveraging young women's existing resources for HIV prevention and recommendations for economic-strengthening interventions geared towards young women's vulnerability to HIV infection.

Methods

Study Design

We used baseline data from the HIV Prevention Trials Network (HPTN) 068 study. HPTN 068 is a phase III randomized controlled trial examining the effect of conditional cash transfers on incidence of HIV infection in school-enrolled young women, aged 13-20 years, in rural South Africa. A detailed account of the HPTN 068 study's design and methodology is publically accessible online [49]. The study's eligibility criteria included: i) unmarried young women aged 13-20 years who were enrolled in grades 8, 9, 10, or 11 at one of the study's participating schools; ii) willingness to consent/assent to HIV and HSV-2 testing; iii) able to read; iv) having at least one parent or guardian at home with whom they were living; and v) having or able to open a banking or post office account. Young women who were recruited to the study were then randomized to receive monthly cash transfers conditional on continued school attendance (intervention group) or no conditional cash transfers (comparison group) and assessed at baseline, 12-, 24-, and 36-months post-baseline.

Study Site

The study took place in 28 villages in rural Mpumalanga province located in northeast South Africa. The study villages are within the Agincourt Health and Socio-Demographic Surveillance System (HDSS) catchment area [50, 51]. The Agincourt HDSS area is densely populated and characterized by high poverty and limited economic development. Given the dry landscape and small household plots, most families depend on social welfare pensions, including child support grants, and seasonal or migrant work in neighboring provinces [51, 52]. The area's most recent HIV prevalence data are based on 2010-2011 demographic surveillance of ages 15 to 84 which indicated high HIV prevalence (19.4%) with women having higher prevalence (23.9%) than men (10.6%) [53]. These data also indicate that HIV prevalence for women who were age-comparable to those eligible for study participation was 5.5% among 15-19 years olds, 27.0% among 20-24 year olds, and 37.8% among 25-29 year olds [53].

Data Collection

Baseline data were collected from March 2011 to December 2012. Prior to randomization, baseline assessments using a structured questionnaire were conducted with enrolled young woman using audio computer-assisted self-interviews (ACASI) at the study's participating schools or the Agincourt HDSS site. The ACASI component allowed the respondents to answer questions privately in conjunction with headphones that read out each question and corresponding response options. Interviews required an average of 2 hours to complete. The questionnaire measured young women's educational and reproductive history, sexual behaviors, employment and finances, household/parental factors, mental health, and HIV knowledge. The interview was available in English and Xitsonga, the predominant local language of the Shangaan tribe.

Measures

The primary outcome measures included ever had sex and six HIV preventive behaviors. Young women self-reported if they had ever had vaginal or anal sex and were categorized into one of two groups: young women who had never had vaginal or anal sex (code=0) compared to young women who were sexually-experienced (code=1). Among sexually-experienced young women, we also asked what they had done to reduce their chances of acquiring HIV. The pre-coded preventive behaviors included: “abstaining from sex”, “using condoms each time you have sex”, “changing the way you select who you have sex with”, and “reducing your number of sex partners”. Sexually-experienced young women were also asked if they had ever discussed getting tested for HIV or using a condom with their most recent male sex partner. All HIV preventive behaviors were coded as binary measures using 1 for “yes” and 0 for “no”. Among sexually-experienced young women, we then calculated the total number of preventive behaviors reported per young woman, ranging from 0 to 6 total behaviors. All behaviors were equally weighted in the composite score given the inherent potential of inflating or deflating the magnitude of HIV protection associated with each behavior.

The independent variables of interest were young women's individual economic resources. We operationally defined independent economic resources as measures of a young woman's own financial status which related to her separate, rather than shared, access, ownership, and use of monetary inputs. Using this definition, seven economic resources were assessed as follows. Young women were asked: (i) if they worked for pay, including pay in kind such as food or housing (response categories: yes or no); (ii) where most of their money came from (response categories: job versus another non-formal employment source, such as family, friends, boyfriend, welfare grants, or sex/drug exchange); (iii) how often in the past year they had their own money to spend at their discretion (response categories: always vs. few times or never), as a measure of financial control; (iv) whether in past year they had worried about having enough food for self or family (response categories: yes or no); (v) how often they had borrowed money from a friend or someone outside of their household to get by (response categories: never vs. number of times in past year); (vi) whether they had any cash savings for the future (response categories: yes or no); and (vii) whether they had a bank or post office account (response categories: yes or no). Having economic resources relating to five of the seven items: work for pay, money from a job, money for oneself, having savings, and having a bank account were each coded as 1 for “yes” and 0 for “no”. Two of the seven items, lacking food insufficiency and not having borrowed money, were each coded as 1 for food-sufficient and non-indebted women compared to women who reported an economic hardship, coded as 0. We then summed the total number of economic resources per young woman, ranging from 0 to 7. Information on demographic characteristics such as young women's age, household socioeconomic status (wealth deciles), school grade level, race/ethnicity, age difference in years with most recent sex partner, and partnership status (main vs. casual) were also obtained. Marital status was not included as only unmarried young women were eligible for study enrollment.

Analysis

Data were analyzed using STATA, Version 13.1 (Stata Corporation, College Station, TX). Bivariate and multivariable logistic regressions were used to examine differences in young women's ever having sex for each of the economic indicators, adjusting for young women's demographic and household socioeconomic factors in multivariable analyses. Among the subset of sexually-experienced young women, additional bivariate and multivariable logistic regressions were used to examine the odds of each preventive behavior across the set of economic resources, adjusting for young women's demographic, sexual partner, and household socioeconomic status. Composite measures of economic resources and preventive behaviors were based on the proportion of young women who had greater than three or four, the equivalent of half or more, of the corresponding HIV preventive and economic resource indicators, respectively. All analyses were considered statistically significant at $p < .05$ or when the 95% confidence interval (CI) did not include the null odds ratio (OR) of 1.0.

Ethical Considerations

This study received ethics approval by the University of North Carolina Institutional Review Board in the United States (U.S.) and the University of Witwatersrand Human Research Ethics Committee (Medical) in South Africa. Ethical review for this secondary analysis was provided by and determined exempt by the Johns Hopkins Bloomberg School of Public Health Institutional Review Board in the U.S. Written informed consent was obtained prior to the start of data collection for all young women aged 18 or older. For young women under the age of 18, parental informed consent was obtained prior to the young woman's assent to participate in the study.

Results

Demographic Characteristics

A total of 2,533 school-enrolled young women were included in the study (Table 1). All study participants were South African and of black race/ethnicity. The mean age was 15.5 years (± 1.7 SD) with majority (88.1%, $n=2,231$) being under the minimum adult age of 18 years. Education levels varied with approximately one quarter (25.3%) of young women enrolled in grade 8, the equivalent of the 8th year of schooling. The distribution of school enrollment in grades 9, 10 and 11 were 27.0%, 27.5%, and 20.2%, respectively. The majority (72.6%, $n=1,840$) of sampled young women reported never having had sex compared to 27.4% ($n=693$) who indicated they had ever had vaginal and/or anal sex. Among those that reported sexual experience, 82.7% ($n=573$) reported vaginal sex only, 3.0% ($n=21$) reported anal sex only, and 14.3% ($n=99$) reported having had both (data not shown). On average, sexually-experienced young women were 1.6 years older than young women who had never had sex (16.7 vs. 15.1 years, respectively, $p < 0.001$) and were enrolled in higher grade levels (36.7% vs. 14.0% enrolled in grade 11, respectively, $p < 0.001$). The mean age of sexual debut was 14.7 years of age (± 3.4 SD). There were no significant differences in the distribution of household socioeconomic decile by ever having sex ($p > 0.05$). The mean age of the most recent sex partner of sexually-experienced women was 19.4 years with 15.5% of most recent partners being greater than or equal to 5 years older than the young woman. Most recent sex partners also had higher levels of education than

young women (78% with grade 11 completed or higher). The majority of most recent sex partners (62.9%) were also described as a main partner or boyfriend.

Economic Factors Associated with Ever Having Sex

Five of the seven economic factors were significantly associated with ever having sex in unadjusted and adjusted models (Table 2), and age was a significant confounding variable for ever having sex in each of the regression models. Young women who worked for pay had a 1.56 significantly greater odds of ever having sex (OR=1.56, 95% CI: 1.28-1.90) compared to unemployed young women after controlling for young women's age, grade level, and household socioeconomic status. The types of employment most commonly reported included: domestic worker, sewing or hairdressing, child care, working in a shop, and clerical or office work (data not shown). Similarly in adjusted analyses, young women whose money came primarily from a job (OR=1.33, 95% CI: 1.06-1.65) and who had an individual bank account (OR=1.41, 95% CI: 1.10-1.80) also had significantly higher odds of ever having sex compared to young women who primarily received money from non-employment sources (i.e., family, friends, boyfriend, welfare grants, sex/drug exchange) or who lacked a banking account, respectively. Having savings (OR=1.17, 95% CI: 0.94-1.45) and having money to spend on one-self (OR=1.20, 95% CI: 0.89-1.63) were also found to be positively associated with ever having sex in adjusted analyses, although the associations were not statistically significant.

In contrast, food-sufficient young women had 19% significantly lower odds (OR=0.81, 95% CI: 0.66-0.98) of ever having sex, and unindebted young women (i.e., those who reported having never borrowed money) had 43% significantly lower odds of ever sex (OR=0.57, 95% CI: 0.46-0.71) in adjusted analyses, compared to food-insufficient and financially-indebted young women, respectively. However, as a summative measure, there were no statistically significant differences in ever having sex among young women with four or more economic resources compared to those with fewer economic resources (OR=1.21, 95% CI: 0.93-1.56).

Actions to Prevent HIV among Sexually-Experienced Women

Among young women who reported ever having sex, we also examined reports of what they had done with their most recent sexual partner to reduce their chances of acquiring HIV (Table 3). The most common HIV preventive practices were talking to one's sexual partner about condom use (74.0%, n=513), talking to one's sexual partner about HIV testing (71.6%, n=496), and consistent condom use (44.3%, n=307) (Table 3). A small proportion of young women reported other actions used to reduce their HIV risk including changing their sexual partner selection process (17.3%, n=120), reducing the number of sexual partners (17.2%, n=119), and periodic sexual abstinence (12.3%, n=85). Roughly half (49.9%, n=346) of sexually-experienced young women reported using three or more HIV preventive practices.

Economic Factors Associated with Actions to Prevent HIV

In unadjusted analyses, economic factors were positively associated with several less common HIV preventive behaviors (Table 3). Working for pay (OR=1.80, 95% CI: 1.14-2.85) and having money that primarily comes from a job (OR=2.08, 95% CI:

1.30-3.35) were significantly associated with higher odds of reporting periodic sexual abstinence as an action used to reduce HIV risk in unadjusted analyses. Working for pay (OR=2.29, 95% CI: 1.54-3.43) and having money that primarily comes from a job (OR=1.74, 95% CI: 1.14-2.66) were also significantly associated with higher odds in unadjusted analyses of reporting changing one's sexual partner selection process to reduce HIV risk. Having money to spend on one's self (OR=1.77, 95% CI: 1.01-3.12) was associated with reducing one's number of sexual partners to reduce HIV risk. No economic factors were significantly associated with the two most common HIV preventive practices: talking to one's partner about condom use and talking to one's sexual partners about HIV testing. The next most common action, consistent condom use, was only significantly associated with having a bank account, in which young women with bank accounts had a 1.54 significantly greater odds of reporting consistent condom use (OR=1.54, 95% CI: 1.05-2.25) than young women who were not linked to a financial savings institution.

As a summative measure in unadjusted analyses, young women who worked for pay (OR=1.38, 95% CI: 1.01-1.87) and who had a bank account (OR=1.66, 95% CI: 1.13-2.42) were significantly more likely to report using three or more HIV preventive practices compared to unemployed and unbanked young women, respectively (Table 3). In addition, young women with 4 or more economic assets had significantly greater odds of reporting changing one's sexual partner selection process (OR=1.85, 95% CI: 1.15-2.96), talking with one's sexual partner about HIV testing (OR=1.81, 95% CI: 1.10-2.97), and reporting three or more HIV preventive practices in general (OR=1.73, 95% CI: 1.15-2.60) than young women with fewer economic resources.

After controlling for women's demographic, household socioeconomic, and sexual partner characteristics, money to spend on one's self was significantly associated with reducing number of sexual partners (OR=1.94, 95% CI: 1.08-3.46), talking to one's sexual partner about HIV testing (OR=2.15, 95% CI: 1.13-4.06), and talking to one's sexual partner about condom use (OR=1.99, 95% CI: 1.04-3.80) in adjusted analyses (Table 4). Having a bank account was statistically associated with greater odds of consistent condom use (OR=1.49, 95% CI: 1.01-2.19). The economic resources, work for pay and money that comes primarily from a job, remained significantly associated with reported periodic sexual abstinence (OR=1.71, 95% CI: 1.07-2.75 and OR=2.06, 95% CI: 1.26-3.37, respectively) and changes in sexual partner selection process to reduce HIV risk (OR=2.38, 95% CI: 1.58-3.58 and OR=1.81, 95% CI: 1.17-2.79, respectively) in adjusted analyses. In addition, there was an upward trend in adjusted analyses, although not statistically significant, of women with savings having greater odds of periodic sexual abstinence (OR: 1.54, 95%CI: 0.92-2.59), changing partner selection processes (OR: 1.47, 95%CI: 0.94-2.30), and discussing HIV testing with their most recent sexual partner (OR: 0.97-2.23).

Among the summary measures, young women who worked for pay (OR=1.39, 95% CI: 1.02-1.90), had money to spend on themselves (OR=1.76, 95% CI: 1.06-2.92), or had a bank account (OR=1.69, 95% CI: 1.14-2.49) were significantly more likely to have used three or more HIV preventive practices compared to young women without these resources (Table 4). Having four or more economic resources was also significantly associated with talking with one's sexual partner about HIV testing (OR=2.01, 95% CI: 1.20-3.37), changing one's sexual

partner selection process (OR=1.96, 95% CI: 1.20-3.20), and reporting in general using three or more HIV preventive practices (OR=1.86, 95% CI: 1.23-2.84). There was no evidence of collinearity between individual economic resources and household socio-economic status.

Discussion

The goal of this study was to examine the association between individual economic resources and protective sexual practices for HIV prevention among a cohort of school-enrolled, rural South African young women. Our findings showed that in age-adjusted analyses, school-enrolled young women with greater economic resources were more likely to have sexually debuted and therefore increased their risk of HIV exposure, but after sexually debuting they were also more likely to adopt HIV protective practices. Results showed that individual economic resources were positively associated with young women's efforts to avoid HIV infection, such as consistently using condoms, reducing the number of sex partners, discussing HIV testing, changing the selection of partners, or abstaining from sexual intercourse. There was also evidence demonstrating the protective effects of cumulative economic resources, as young women with several resources were also more likely to report employing a combination of protective sexual practices compared to similar school-enrolled young women with fewer economic resources. Such findings support the premise of asset theory that having increased economic resources may motivate positive behaviors to protect those assets in the future, including preventing HIV acquisition, among young women in predominately low-income settings [29, 35, 37, 38]. On the other hand, we also found that economic hardship, as indicated by borrowing money and food insufficiency, was associated with increased likelihood of being sexually active, and not associated with young women's efforts to avoid HIV.

However, not all economic resources yielded the same associations with HIV protective behaviors. Interestingly, only access to a banking account was significantly associated with consistent condom use, which provides the most protection from HIV apart from sexual abstinence. This may have reflected a level of assertiveness and autonomy among young women who were able to navigate the process of obtaining a banking account which they also applied in negotiating condom use with sex partners [19]. Young women with bank accounts may also have felt more financially secure and have been more inclined to focus on long-term planning, such as avoiding HIV. On the other hand, being employed and having most of one's money come from a job was positively related to reported sexual abstinence as an HIV prevention practice. It is possible that young women who earned income were less financially dependent on sexual partners and therefore able to abstain from sexual relationships at their discretion [13, 20, 22, 54, 55]. Job-supported young women also more commonly mentioned changing their partner selection process to avoid HIV. This could have resulted in young women's use of additional income to exit sexual partnerships created by financial need and select partners perceived to be at lower risk of HIV infection or who were willing to use condoms or other protective measures [22, 55, 56].

Such findings may explain why having money to spend on one's self was positively associated with reported reductions in number of sexual partners and greater partner communication on condom use and HIV testing. It is possible that more financially

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autonomous young women were confident to initiate discussions about sex with partners they were less or not financially reliant upon [20]. We also found that cash, in the form of banked or hand-held savings, was marginally linked to partner discussions on HIV testing. While in theory HIV testing services are free in South Africa, the association between testing and these cash indicators may signify a greater tendency of school-enrolled young women to discuss HIV testing with sexual partners if they have existing financial provisions to pay for real or perceived costs to do so (travel costs, clinical fees, etc.) [57, 58]. Young women with available cash resources may also have been more empowered to discuss HIV testing and condom use with sexual partners if they were less reliant on the economic benefits of sexual partnerships [6, 19, 20].

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It is important to note that although being sexually active is a normal process in school girls' transition to young adulthood, earlier sexual debut has been found to be a risk factor for HIV [59-61]. Research has shown that employed young women are often more sexually active than unemployed young women and are more likely to have multiple sexual partners, which increases their risk of acquiring HIV [41]. This may be attributable to employed young women and those with bank accounts having higher mobility and greater access to sexual partners after school hours, more resources to enter and exit sexual relationships, and greater freedom from controlled interpersonal interactions at home or school [42, 62]. Yet, economic resources have also been shown to be predictive of never having had sex [35]. MacLachlan and colleagues refer to this dichotomy as a paradox between economic prosperity and hardship in which economic resources can both contribute to and reduce sexual protective behaviors [22, 41]. Our findings similarly underscored this dichotomy as age-comparable young women who were unindebted and had greater access to employment, savings, and financial autonomy were more likely to both engage in sex and utilize HIV preventive practices.

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Although more research is needed to examine the causal relationship between young women's individual economic resources and sexual behaviors, our results suggest that improving the economic status of school-enrolled young women through innovative economic strategies may strengthen HIV prevention initiatives provided that young women are empowered to leverage economic gains safely and effectively to protect themselves against HIV. The fact that several young women reported efforts to avoid HIV underscores their desire to protect against infection [22], and those with greater economic resources appeared more able to do so. However, careful attention is needed among economic-strengthening interventions for HIV prevention such that increased income or economic control is not linked with greater HIV risk [22]. Given the greater likelihood of adopting sexual protective behaviors among young women with multiple economic resources, cumulatively improving a range of economic factors, not just income alone, may be more effective in reducing the spread of HIV. Nonetheless, while our findings demonstrate quantitative associations between individual economic resources and HIV preventive practices, future qualitative research would strengthen our understanding of the specific economic contexts and actions applied by young women to reduce risks of HIV infection, including specific behavioral pathways influencing the observed risky and protective associations. For example, income from a job may provide a different socio-economic context for sexual health empowerment than financial transfers for continuing school. The

interconnectedness of many of the economic measures assessed in this study cannot be overlooked. For example, working for pay and having savings are unlikely to occur isolation. Although not possible to do with the existing quantitative data, narrative analyses may better elucidate the causal pathways of syndemic financial factors. Future studies should also investigate how individual economic resources influence sexual behaviors among young men, and how economically empowering poor men might mitigate HIV risks experienced among couples.

Limitations and Strengths

The limitations of this study are as follows. The cross-sectional nature of the data limited our ability to draw any causal inferences on the role of individual economic resources and protective sexual behaviors. Although we offer some potential explanations for the observed associations, we cannot infer that they were causally related. Although ACASI was used to reduce social desirability bias, the study's self-reported measures may also have been subject to response biases. In addition, while all reported behaviors were those of the female respondents, some behaviors, such as consistent condom use, were not explicitly female-controlled and more likely a consequence of the interaction of economic resources and male partners. The lower number of school-aged women who had ever had sex may also have weakened the study's ability to detect differences among specific sexual behaviors due to insufficient sample size. Nonetheless, the study's strengths relate to the broad number of individual economic resources and sexually protective behaviors examined among sexually-experienced and non-experienced South African young women who are disproportionately impacted by HIV infection.

Conclusion

This study underscores the complexity of poverty and wealth in shaping young women's sexual behaviors. Increased economic resources were associated with being sexually active which increases HIV risk, as well as being more likely to employ sexually protective practices. Maximizing young women's individual economic resources through innovative economic strategies outside of school may complement prevention initiatives, including empowering young women to use those resources to avoid HIV.

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Table 1
Demographic characteristics of study-enrolled South African young women

Number (% of women)	Never had sex	Ever had sex	<i>p</i>	Total
Sample size	N=1,840 (72.6%)	N=693 (27.4%)		N=2,533 (100%)
<i>Young women's characteristics</i>				
Mean age in years ($\pm$ SD)	15.1 ($\pm$ 1.5)	16.7 ($\pm$ 1.5)	< 0.001	15.5 ($\pm$ 1.7)
Mean age of sexual debut ($\pm$ SD)	-	14.7 ($\pm$ 3.4)	-	-
School grade level			< 0.001	
Grade 8	575 (31.3)	65 (9.4)		640 (25.3)
Grade 9	557 (30.3)	128 (18.5)		685 (27.0)
Grade 10	450 (24.5)	246 (35.5)		696 (27.5)
Grade 11	258 (14.0)	254 (36.7)		512 (20.2)
Black race/ethnicity	1,840 (100.0)	693 (100.0)	-	2,533 (100.0)
<i>Household socioeconomic status</i>				
			p>0.05	
Decile 1	177 (9.6)	74 (10.7)		251 (9.9)
Decile 2	180 (9.8)	72 (10.4)		252 (10.0)
Decile 3	175 (9.5)	77 (11.1)		252 (10.0)
Decile 4	183 (10.0)	68 (9.8)		251 (9.9)
Decile 5	183 (10.0)	69 (10.0)		252 (10.0)
Decile 6	177 (9.6)	75 (10.8)		252 (10.0)
Decile 7	186 (10.1)	65 (9.4)		251 (9.9)
Decile 8	187 (10.2)	65 (9.4)		252 (10.0)
Decile 9	183 (10.0)	69 (10.0)		252 (10.0)
Decile 10	208 (11.3)	59 (8.5)		267 (10.5)
<i>Sex partner's characteristics</i>				
Mean age in years ($\pm$ SD)	-	19.4 ($\pm$ 4.0)	-	-
Sex partner aged $\geq$ 5 years woman's age	-	105 (15.5)	-	-
Education				
Grade 8 - 10	-	156 (22.5)	-	-
Grade 11 or higher		532 (76.8)		
Main sexual partner/boyfriend	-	436 (62.9)	-	-

Table 2
Economic resources associated with ever having sex: frequencies and odds ratios

	Total ^a	Never had sex	Ever had sex	Unadjusted OR (95% CI)	Adjusted OR ^b (95% CI)
Sample size	N=2,533	No. (% of women) N=1,840	No. (% of women) N=693		
Work for pay					
Yes	821 (32.4)	549 (29.8)	272 (39.3)	1.52 ***	1.56 *** (1.28-1.90)
No	1,712 (67.6)	1,291 (70.2)	421 (60.8)		
Money comes from job					
Yes	578 (22.8)	398 (21.6)	180 (26.0)	1.28 *	1.33 * (1.06-1.65)
No	1,877 (74.1)	1,386 (75.3)	491 (70.9)		
Money to spend on self					
Yes	260 (10.3)	184 (10.0)	76 (11.0)	1.11	1.20 (0.89-1.63)
No	2,251 (88.9)	1,641 (89.2)	610 (88.0)		
Food sufficient					
Yes	1,649 (65.1)	1,237 (67.2)	412 (59.5)	0.72 ***	0.81 * (0.66-0.98)
No	862 (34.0)	590 (32.1)	272 (39.3)		
Being undebted					
Yes	1,948 (76.9)	1,472 (80.0)	476 (68.7)	0.55 ***	0.57 *** (0.46-0.71)
No	563 (22.2)	354 (19.2)	209 (30.2)		
Has savings					
Yes	630 (24.9)	455 (24.7)	175 (25.3)	1.03	1.17 (0.94-1.45)
No	1,890 (74.6)	1,375 (74.7)	515 (74.3)		
Has banking account					
Yes	409 (16.2)	271 (14.7)	138 (19.9)	1.44 **	1.41 ** (1.10-1.80)
No	2,117 (83.6)	1,565 (85.1)	552 (79.7)		

Total ^a	Never had sex	Ever had sex	Unadjusted OR (95% CI)	Adjusted OR ^b (95% CI)
No. (% of women)				
Has 4 or more economic resources				
Yes	396 (15.6)	116 (16.7)	1.12	1.21
No	2,137 (84.4)	577 (83.3)	(0.88-1.42)	(0.93-1.56)

* p<0.05,
** p<0.01,
*** p<0.001;
^aPercentages may not total to 1.0 due to missing data;
^bAdjusted for woman's age, education, and household economic status

Table 3
Economic resources associated with sexually-experienced young women's actions to reduce risk of acquiring HIV: frequencies and unadjusted odds ratios

	Periodic Sexual abstinence		Consistent condom use		Changed partner selection process		Reduced number of sex partners		Talked to partner about HIV testing		Talked to partner about condom use		Used 3 or more HIV preventive practices	
	%	OR (95% CI)	%	OR (95% CI)	%	OR (95% CI)	%	OR (95% CI)	%	OR (95% CI)	%	OR (95% CI)	%	OR (95% CI)
Sample size (N=693)	12.3	-	44.3	-	17.3	-	17.2	-	71.6	-	74.0	-	49.9	-
	n=85		n=307		n=120		n=119		n=496		n=513		n=346	
Work for pay														
Yes	16.2	1.80*	41.5	0.83	24.6	2.29***	16.5	0.93	73.2	1.12	73.5	0.94	54.8	1.38*
No	9.7	(1.14-2.85)	46.1	(0.61-1.14)	12.6	(1.54-3.43)	17.6	(0.62-1.40)	70.6	(0.79-1.57)	74.4	(0.66-1.33)	46.8	(1.01-1.87)
Money comes from job														
Yes	18.9	2.08**	40.6	0.79	23.9	1.74*	16.1	0.88	72.8	1.06	70.0	0.75	52.8	1.10
No	10.2	(1.30-3.35)	46.6	(0.56-1.12)	15.3	(1.14-2.66)	18.1	(0.55-1.39)	71.7	(0.72-1.56)	76.0	(0.51-1.10)	50.3	(0.78-1.55)
Money to spend on self														
Yes	10.5	0.84	44.7	1.07	19.7	1.23	25.0	1.77*	81.6	1.82§	81.6	1.57	60.5	1.61
No	12.6	(0.39-1.82)	44.4	(0.65-1.74)	17.2	(0.67-2.25)	16.4	(1.01-3.12)	70.3	(1.00-3.35)	73.1	(0.85-2.88)	48.9	(0.99-2.61)
Food sufficient														
Yes	13.8	1.38	44.4	0.97	17.0	0.92	17.7	1.07	70.4	0.88	71.4	0.71	50.0	1.00
No	10.3	(0.85-2.24)	44.5	(0.71-1.33)	18.0	(0.61-1.37)	16.5	(0.71-1.61)	73.2	(0.63-1.24)	78.3	(0.49-1.02)	50.0	(0.74-1.36)
Being unindebted														
Yes	10.9	0.64	45.4	1.11	16.4	0.79	17.0	0.94	73.3	1.28	73.7	0.95	50.2	1.02
No	15.8	(0.40-1.04)	42.6	(0.79-1.54)	19.6	(0.61-1.45)	17.7	(0.61-1.45)	67.9	(0.89-1.83)	75.1	(0.65-1.39)	49.8	(0.74-1.41)
Has savings														
Yes	16.0	1.56	44.6	1.03	21.1	1.42	17.1	1.01	76.6	1.36	73.1	0.89	53.1	1.17
No	11.1	(0.95-2.54)	44.5	(0.73-1.46)	16.1	(0.92-2.20)	17.3	(0.64-1.59)	70.1	(0.92-2.02)	74.6	(0.60-1.31)	49.1	(0.84-1.66)
Has banking account														

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Periodic Sexual abstinence		Consistent condom use		Changed partner selection process		Reduced number of sex partners		Talked to partner about HIV testing		Talked to partner about condom use		Used 3 or more HIV preventive practices		
%	OR (95% CI)	%	OR (95% CI)	%	OR (95% CI)	%	OR (95% CI)	%	OR (95% CI)	%	OR (95% CI)	%	OR (95% CI)	
Yes	10.9	0.84	52.9	1.54 *	21.7	1.43	21.7	1.45	77.5	1.49	75.4	1.12	60.1	1.66 **
No	12.7	(0.46-1.51)	42.4	(1.05-2.25)	16.3	(0.90-2.27)	16.1	(0.91-2.30)	70.1	(0.96-2.33)	73.9	(0.72-1.73)	47.6	(1.13-2.42)
Has 4 or more economic resources														
Yes	17.2	1.60	48.3	1.17	25.9	1.85 *	18.1	1.05	81.0	1.81 *	74.1	0.96	61.2	1.73 **
No	11.3	(0.93-2.77)	43.5	(0.78-1.75)	15.6	(1.15-2.96)	17.0	(0.63-1.77)	69.7	(1.10-2.97)	74.0	(0.61-1.52)	47.7	(1.15-2.60)

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*p<0.05,
*p<0.01,
***p<0.001

Economic resources associated with sexually-experienced young women's reported actions to reduce risk of acquiring HIV: adjusted odds ratios

	Periodic Sexual abstinence	Consistent condom use	Changed partner selection process	Reduced number of sex partners	Talked to partner about HIV testing	Talked to partner about condom use	Used 3 or more HIV preventive practices
Sample size (N=693)	aOR ^a (95% CI)	aOR (95% CI)	aOR (95% CI)	aOR (95% CI)	aOR (95% CI)	aOR (95% CI)	aOR (95% CI)
Work for pay	1.71 [*] (1.07-2.75)	0.86 (0.63-1.18)	2.38 ^{***} (1.58-3.58)	0.93 (0.62-1.41)	1.08 (0.80-1.53)	0.97 (0.68-1.39)	1.39 [*] (1.02-1.90)
Money comes from job	2.06 ^{**} (1.26-3.37)	0.80 (0.56-1.15)	1.81 ^{**} (1.17-2.79)	0.90 (0.57-1.43)	1.02 (0.69-1.52)	0.76 (0.52-1.13)	1.12 (0.79-1.59)
Money to spend on self	0.79 (0.35-1.78)	1.01 (0.61-1.68)	1.24 (0.66-2.32)	1.94 [*] (1.08-3.46)	2.15 ^{**} (1.13-4.06)	1.99 [*] (1.04-3.80)	1.76 [*] (1.06-2.92)
Food sufficient	1.39 (0.85-2.29)	0.95 (0.69-1.31)	0.87 (0.57-1.31)	1.08 (0.72-1.64)	0.87 (0.61-1.23)	0.72 (0.50-1.04)	1.00 (0.73-1.36)
Being unindebted	0.65 (0.40-1.06)	1.06 (0.75-1.48)	0.82 (0.53-1.26)	1.01 (0.65-1.56)	1.35 (0.93-1.94)	0.95 (0.64-1.39)	1.07 (0.76-1.48)
Has savings	1.54 (0.92-2.59)	1.02 (0.71-1.47)	1.47 (0.94-2.30)	1.02 (0.64-1.63)	1.47 (0.97-2.23)	0.97 (0.65-1.46)	1.21 (0.85-1.72)
Has banking account	0.87 (0.47-1.62)	1.49 [*] (1.01-2.19)	1.39 (0.86-2.24)	1.44 (0.90-2.30)	1.55 (0.98-2.46)	1.19 (0.75-1.87)	1.69 ^{**} (1.14-2.49)
Has 4 or more economic resources	1.56 (0.88-2.76)	1.16 (0.77-1.75)	1.96 ^{**} (1.20-3.20)	1.13 (0.67-1.92)	2.01 ^{**} (1.20-3.37)	1.09 (0.68-1.76)	1.86 ^{**} (1.23-2.84)

^{*} p<0.05,

^{**} p<0.01,

^{***} p<0.001;

^a Adjusted for woman's age, education, household socioeconomic status, difference of partner age, partner education, partnership type