

Prevalence and risk factors for forced or coerced sex among school-going youth: national cross-sectional studies in 10 southern African countries in 2003 and 2007

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To cite: Andersson N, Paredes-Solís S, Milne D, *et al*. Prevalence and risk factors for forced or coerced sex among school-going youth: national cross-sectional studies in 10 southern African countries in 2003 and 2007. *BMJ Open* 2012;**2**:e000754. doi:10.1136/bmjopen-2011-000754

► Prepublication history for this paper is available online. To view these files please visit the journal online (<http://dx.doi.org/10.1136/bmjopen-2011-000754>).

Received 13 December 2011
Accepted 20 January 2012

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ABSTRACT

Objectives: To study prevalence at two time points and risk factors for experience of forced or coerced sex among school-going youth in 10 southern African countries.

Design: Cross-sectional surveys, by facilitated self-administered questionnaire, of in-school youth in 2003 and 2007.

Setting: Schools serving representative communities in eight countries (Botswana, Lesotho, Malawi, Mozambique, Namibia, Swaziland, Zambia and Zimbabwe) in 2003 and with Tanzania and South Africa added in 2007.

Participants: Students aged 11–16 years present in the school classes.

Main outcome measures: Experience of forced or coerced sex, perpetration of forced sex.

Results: In 2007, 19.6% (4432/25 840) of female students and 21.1% (4080/21 613) of male students aged 11–16 years reported they had experienced forced or coerced sex. Rates among 16-year-olds were 28.8% in females and 25.4% in males. Comparing the same schools in eight countries, in an analysis age standardised on the 2007 Botswana male sample, there was no significant decrease between 2003 and 2007 among females in any country and inconsistent changes among males. In multilevel analysis using generalised linear mixed model, individual-level risk factors for forced sex among female students were age over 13 years and insufficient food in the household; school-level factors were a lower proportion of students knowing about child rights and higher proportions experiencing or perpetrating forced sex; and community-level factors were a higher proportion of adults in favour of transactional sex and a higher rate of intimate partner violence. Male risk factors were similar. Some 4.7% of female students and 11.7% of male students reported they had perpetrated forced sex. Experience of forced sex was strongly associated with perpetration and other risk factors for perpetration were similar to those for victimisation.

Conclusions: Forced or coerced sex remained common among female and male youth in 2007.

ARTICLE SUMMARY

Article focus

- Cross-sectional studies 2003 and 2007.
- History of coerced sex and its perpetration.
- Individual, school and community risk factors.

Key messages

- No evidence of decline 2003–2007.
- Community factors include views of transactional sex.
- School factors show clustering.

Strengths and limitations of this study

- Cross-sectional study limits causal inferences.
- School base excludes out of school youth.

Experience of sexual abuse in childhood is recognised to increase the risk of HIV infection. The association the authors found between forced sex and school-level factors suggests preventive interventions in schools could help to tackle the HIV epidemic in southern Africa.

INTRODUCTION

Sexual violence against children is a major public health problem in its own right, and it is directly and indirectly relevant to the HIV epidemic. The physical trauma of sexual violence can increase the risk of HIV transmission directly^{1–3} and the psychological damage related to abuse can result in increased risk-taking behaviours, re-victimisation^{4–7} and perpetration of sexual violence.^{8 9} Even for those not directly involved, having a friend or neighbour who suffers sexual abuse builds an environment where sexual violence is seen as an everyday occurrence.¹⁰ Gender violence in general

(including forms other than sexual violence) is an important factor increasing the risk of HIV infection among young women in southern Africa.¹¹

Sexual abuse of children is believed to be common in East and southern Africa but there are few quantitative studies, mostly in South Africa.^{12 13} Different methods of data collection and differing definitions of what is included within the term sexual violence can produce very different estimates of occurrence. A national South African study using a self-administered questionnaire reported 10% of school-going youth (both females and males) suffered forced or coerced sex each year, with around 35% affected by the age of 18 years.¹⁴ A smaller study with face-to-face questioning, also in South Africa, reported only 1.6% of girls experienced forced sex before the age of 15 years.¹⁵ A study among young women in Swaziland found that 35% of girls reported being 'touched sexually or forced to have sex' by the age of 18 years.¹⁶

Despite its importance as a public health problem and human rights violation, and its clear relevance to the HIV epidemic in southern Africa, there is little empirical data available on sexual violence against children in this region, especially data allowing comparisons between countries and over time. Internationally comparable surveys such as the Demographic and Health Survey do not collect information about sexual violence in this age group. Using data from nationally representative samples in eight southern African countries in 2003 and these same countries plus another two in 2007, we examined the frequency, changes over time and risk factors for experience of forced or coerced sex among school-going youth aged 11–16 years, as well as the frequency and risk factors of perpetration of forced sex in 2007. The surveys used the same instruments, training and data collection methods in the same settings on both occasions.

METHODS

Sample

In 2002/2003, we drew a stratified (urban/rural) random sample of census enumeration areas (EAs) in Botswana, Lesotho, Malawi, Mozambique, Namibia, Swaziland, Zambia and Zimbabwe, covering 25–30 EAs in each country. The schools' sample reported here comprised the schools serving these EAs that included grades 6–9 (students aged approximately 11–17 years). In 2007, we added South Africa and Tanzania to cover a total of 259 EAs and 445 schools across the 10 countries. Within each school, the field teams randomly selected one class per grade for the survey, in grades covering students aged 11 years and above. In a few schools, at the request of the head teacher, they covered all the two to three classes per grade.

Data collection

For both surveys, we standardised training in one country and then repeated this in each country, training

25–30 field workers in each country over 1 week. The training specifically covered methods of ensuring privacy of responses in a crowded classroom, asking about sensitive issues and how to handle students who might become upset or who might have questions or seek advice because of their participation in the survey. Field coordinators approached the head teacher of each sample school and explained the survey aims. They only rarely needed to share the actual questionnaire and then only shared it with the head teacher. Head teachers of many schools chose to send information to parents about the survey (without sending details of the contents); they did not seek opt-in consent from parents for their children to participate. In each classroom, with the teacher absent, the facilitator first explained that participation was entirely voluntary and that students could leave out any questions they did not want to answer or leave the questionnaire blank. He or she then advised students to use open exercise books to ensure privacy of their responses and read each question in turn, in the language of choice of the class, encouraging participants to wait until they *heard* each question before writing their answer on the scannable form. Most answers required respondents to fill in one or more bubbles for response options. In each class, at least one assistant (two or more in particularly big classes) checked that the privacy arrangements were working and alerted the facilitator if any students were having difficulty with the process. The whole session, including the explanations and instructions and collection of completed response forms, took <1 hour.

The questionnaire, translated into 27 languages, asked the respondent 'has anyone ever forced or persuaded you to have sex when you did not want to?' We counted as suffering sexual violence those who responded positively to this closed direct question. The questionnaire used exactly the same words in 2003 and 2007. The questionnaire also asked if the respondent had ever perpetrated sexual violence ('forced sex with someone without their consent').

The questionnaire also documented age and sex of the respondent, whether they drank alcohol, the degree of crowding in their homes and whether there was enough food in their house in the last week (as an indicator of serious poverty).

We derived several school-level variables from 2007 data, potentially related to the risk of experience of sexual violence. Based on the youth questionnaire responses, we categorised schools as having above or below the mean (for each country) proportion of students having experienced forced or coerced sex and having perpetrated forced sex and drinking alcohol. We also documented community-level variables: whether the community was urban or rural, whether it had tar road access and whether it had any active government HIV prevention programmes. Other community-level variables came from a household survey of adults which took place in the sample EAs served by the schools in late

2002 and 2007. Trained interviewers administered a questionnaire to adults aged 16–59 years present in households, covering 24 069 respondents across the 10 countries in 2007. Other publications describe the household survey in more detail.^{17 18} We categorised communities as having above or below the 2007 country mean in access by good tar road; active government HIV prevention programme; proportion of adults saying that “women sometimes deserve to be beaten”; proportion of adults saying it is “okay for an older man to have sex with teenagers”; proportion of adults saying “men have the right to sex with their girlfriends if they buy them gifts” and proportion of adults reporting intimate partner violence in the last year. We also coded school-level variables as above or below the national average: proportion of students reporting experience of sexual violence; proportion of students knowing of three child rights; proportion of students agreeing that boys and girls are equal; proportion of students reporting perpetration of sexual violence and proportion of students reporting drinking alcohol.

Analysis

Operators scanned self-administered questionnaires using Remark¹⁹ and analysis relied on CIETmap open-source software.²⁰ The analysis excluded students who did not answer the questions about sexual violence and those who did not give their age or who reported their age as ‘17 years or older’. We weighted individual country frequency estimates to account for any rural/urban disproportion in the sample compared with the population. In addition, we weighted regional frequency estimates in proportion to population of the countries; some countries were over-sampled and others under-sampled in relation to their population. To compare reported experience of forced or coerced sex between 2003 and 2007, we restricted the comparison to schools included in both surveys in eight countries, examined male and female changes separately and standardised on the age distribution of the Botswana male sample in 2007. Risk analysis of factors related to experience of forced or coerced sex reported in 2007 began by examining bivariate associations using the Mantel–Haenszel procedure.²¹ We adjusted these bivariate estimates of association by country and for clustering (at school level) using a method described by Lamothe^{22 23} based on a variance estimator to weight the Mantel–Haenszel OR for cluster-correlated data. We report the OR and cluster-adjusted CIs. Multivariate analysis of factors significant in bivariate analysis began with a saturated model, with backwards deletion excluding the weakest association, until only significant associations remained. For the multivariate analysis, we used a generalised linear mixed model (GLMM) to examine personal variables like age and sex, together with household variables like crowding and food sufficiency, community-level variables like high or low prevalence of intimate partner violence and negative attitudes about gender and gender violence and school-

level variables like high or low proportion of children who said they were victims or perpetrators of forced sex or drank alcohol. For GLMM, we used the R package lme4,²⁴ achieving a fit of fixed and random effects (country) by the Laplace approximation.²⁵

Ethical aspects

The accredited international ethical review board of CIET international approved the project in addition to an ethical review board in each country: the Health Research and Development Committee, Ministry of Health in Botswana; Research and Ethics Committee, Ministry of Health and Social Welfare in Lesotho; the National Health Sciences Research Committee, Ministry of Health in Malawi; the Comité Nacional de Bioética para a Saude, Ministerio da Saude in Mozambique; the Research Management Committee, Ministry of Health and Social Services in Namibia; the CIET Trust Research Ethics Committee in South Africa; the Scientific and Ethics Committee, Ministry of Health and Social Welfare in Swaziland; the Institutional Review Board, Ifakara Health Research and Development Centre in Tanzania; the Permanent Secretary, Ministry of Health, Zambia and the Medical Research Council of Zimbabwe. In each country, we also received written authority from the Ministry of Education to interview children in school. School head teachers gave consent to survey students in their school and contacted parents to inform them about the survey in general terms and give them the option to opt-out their child.

RESULTS

From 60 646 facilitated self-administered questionnaires in schools in the 10 countries in 2007, we obtained 59 986 usable records (1.1% did not complete or spoiled their questionnaires). We excluded 10 631 respondents (17.7%) who did not report their age or reported their age as ‘17 years or older’ (9623). Of 49 355 respondents aged 11–16 years, 48 586 (98.4%) answered the question about forced or coerced sex. In 2003, 28 896 students aged 11–16 years in eight of the countries completed the questionnaire and 27 772 (96.1%) of them answered the question about forced or coerced sex.

In 2007, some 27.5% (based on 13 216/47 102) of respondents lived in houses with more than three people per room and 13.6% (based on 8498/48 614) reported they had insufficient food in their households in the week before the survey. Some 29.2% (based on 14 178/49 355) correctly recognised three child rights (to go to school, to be safe and not to be abused). Based on direct observation and key informant responses, 46.4% (based on 17 202/42 028 for whom this information was available) lived in a community that could be accessed by good tar road and 67.7% (based on 30 953/44 661) lived near an active government HIV prevention programme.

Experience of forced sex

Weighting for country size and urban/rural proportions in each country, in 2007, 19.6% (based on 4432/25 840)

of female youth and 21.1% (based on 4080/21 613) of male youth aged 11–16 years reported they had experienced forced or coerced sex. Figure 1 shows the age- and sex-specific rates, each point representing the population weighted average across 10 countries, for ages 11–16 years and for male and female respondents. Up until the age of 14 years, male students reported higher rates than female students. Table 1 shows the weighted percentages of male and female students aged 16 years who had ever experienced forced or coerced sex in each of the 10 countries. Across the 10 countries, 25.4% of male students and 28.8% of female students had experienced forced or coerced sex by the time they were 16. There was considerable variation between countries. Among males, the rates ranged from 11.9% in Botswana to 37.8% in Malawi, and in females, they ranged from 15.0% in Botswana to 43.2% in Tanzania.

Table 2 shows country-specific rates of the experience of forced or coerced sex in 2003 and 2007, separately for male and female respondents, age standardised on the age distribution in the Botswana 2007 male sample. The comparison is limited to those schools covered in the survey in eight countries in both 2003 and 2007. Among male respondents, age-standardised rates decreased significantly in two countries, increased significantly in two and did not change significantly in the other four. Among female respondents, in all but one country, there was a lower rate in 2007 than in 2003, but none of the changes on their own were significant.

Table 3 shows the bivariate associations, adjusted for country and clustering, between personal and cluster-level variables and experience of forced or coerced sex, among male and female students. The patterns were similar among the males and females: older youth were more likely to have experienced forced or coerced sex, as were those who did not have enough food in the house in the last week. Students attending schools where experience and perpetration of forced sex was more common

and where more students used alcohol were more likely to report experiencing forced or coerced sex.

Multilevel analysis (GLMM) treated country as a random effect (table 4). The final GLMM model for female youth included one personal factor (age over 13 years), a household factor (insufficient food in the last week), three school group factors (a higher proportion who experienced forced or coerced sex, a higher proportion who perpetrated forced sex and a lower proportion who knew about child rights) and two community factors (where more adults said a man could expect sex if he gave a gift to a woman and where more adults reported intimate partner violence in the last year). Among male youth, there was one household factor (insufficient food in the last week), three school group factors (a higher proportion who experienced forced or coerced sex, a higher proportion who perpetrated forced sex and a higher proportion who reported use of alcohol) and one community factor (where more adults said a man could expect sex if he gave a gift to a woman).

While the school group variables in table 4 each had an effect in their own right, there was also evidence that the factors combined to increase the risk of sexual violence. Of female youth at schools where fewer people reported being a victim and fewer claimed to be perpetrators, 13.2% (1460/11 030) had suffered sexual violence; of those at schools where fewer than average were victims and more were perpetrators, 14.2% (359/2531) suffered sexual violence; of those with more victims and fewer perpetrators, 19.5% (838/4290) suffered sexual violence and of those at schools with more victims and more perpetrators, 22.2% (1775/7989) suffered sexual violence.

Perpetration of forced sex

In 2007, weighted for country population and urban/rural proportions in each country, 4.7% of female

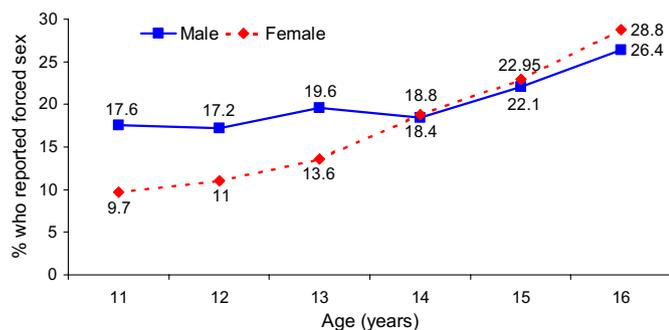


Figure 1 Proportions of male and female youth aged 11–16 years who reported forced or coerced sex. Each point represents the population-weighted average across the 10 countries. Female rates 11–16 years are based on 107/1064, 346/3026, 661/4986, 1039/6373, 1161/5837, 1118/4554, respectively. Male rates 11–16 years are based on 106/716, 339/2061, 692/3814, 876/5080, 974/5180, 1093/4762, respectively.

Table 1 Reported experience of forced or coerced sex among male and female students aged 16 years in 2007, by country

Country	Fraction (weighted %) who ever experienced forced or coerced sex	
	Male students	Female students
Botswana	48/408 (11.5)	44/299 (14.7)
Lesotho	127/587 (22.6)	174/790 (21.5)
Malawi	165/436 (37.8)	87/237 (36.9)
Mozambique	124/472 (27.0)	65/290 (21.5)
Namibia	80/334 (24.4)	93/330 (29.4)
South Africa	142/767 (17.7)	176/955 (18.3)
Swaziland	79/562 (13.9)	84/496 (17.2)
Tanzania	119/356 (32.0)	196/460 (42.6)
Zambia	152/572 (26.6)	159/491 (33.4)
Zimbabwe	45/219 (20.2)	23/140 (15.7)
All countries combined	1093/4762 (25.4)	1118/4554 (28.8)

Table 3 Risk factors for lifetime experience of sexual violence in school-going male and female youth aged 11–16 years in 2007

Characteristics	Categories	Lifetime experience of sexual violence*			
		Male		Female	
		Proportions	OR (95% CI)†	Proportions	OR (95% CI)†
Individual and household variables					
Age group	11–13 years	1137/6591	1.13 (1.03 to 1.23)	1114/9076	1.71 (1.52 to 1.92)
	14–16 years	2943/15 022		3318/16 764	
Area of residence	Urban	1685/10 007	1.10 (0.98 to 1.25)	1840/12 237	1.09 (0.96 to 1.25)
	Rural	2395/11 606		2592/13 603	
Crowding in the house	1–3 per room	2710/14 840	0.96 (0.89 to 1.04)	3055/17 814	0.94 (0.86 to 1.02)
	4–10 per room	1154/5767		1206/7006	
Enough food in the house in the last week	Yes	3199/17 621	1.33 (1.20 to 1.46)	3409/21 041	1.51 (1.35 to 1.69)
	No	824/3724		952/4457	
Community-level variables					
Access by good tar road	Yes	1319/7405	0.93 (0.80 to 1.09)	1496/9190	1.03 (0.88 to 1.20)
	No	2260/11 190		2309/12 673	
Active government HIV prevention programme	Yes	2390/13 124	1.01 (0.86 to 1.17)	2524/15 361	1.01 (0.85 to 1.19)
	No	1185/5551		1196/6538	
Proportion of adults saying that “women sometimes deserve to be beaten”	Below average	1979/10 366	0.94 (0.83 to 1.07)	2139/12 442	0.91 (0.80 to 1.04)
	Above average	1884/10 104		2028/12 142	
Proportion of adults saying it is “okay for an older man to have sex with teenagers”	Below average	2582/13 517	0.98 (1.86 to 1.12)	2865/16 462	0.91 (0.80 to 1.03)
	Above average	1281/6953		1302/8122	
Proportion of adults saying “men have the right to sex with their girlfriends if they buy them gifts”	Below average	2213/11 879	1.06 (0.94 to 1.20)	2515/14 535	0.98 (0.85 to 1.13)
	Above average	1650/8591		1652/10 049	
Proportion of adults reporting intimate partner violence in last year	Below average	1654/8619	0.94 (0.83 to 1.07)	1785/10 435	1.01 (0.88 to 1.15)
	Above average	2209/11 851		2385/14 149	
School-level variables					
Proportion of students reporting experience of sexual violence	Below average	1540/10 909	1.94 (1.73 to 2.17)	1819/13 561	1.84 (1.61 to 2.11)
	Above average	2540/10 704		2613/12 279	
Proportion of students knowing of three child rights	Above average	1678/9588	1.11 (0.98 to 1.25)	2095/12 263	0.99 (0.87 to 1.13)
	Below average	2402/12 025		2337/13 577	
Proportion of students agreeing that boys and girls are equal	Above average	1851/10 491	1.13 (1.00 to 1.27)	2255/13 342	1.01 (0.90 to 1.14)
	Below average	2229/11 122		2177/12 498	
Proportion of students reporting perpetration of sexual violence	Below average	1939/12 293	1.60 (1.42 to 1.81)	2298/15 320	1.48 (1.29 to 1.70)
	Above average	2141/9320		2134/10 520	
Proportion of students reporting drinking alcohol	Below average	2182/12 700	1.34 (1.19 to 1.52)	2370/14 831	1.31 (1.15 to 1.49)
	Above average	1898/8913		2062/11 009	

Values in bold indicate associations significant at the 5% level.

*Defined as those who responded positively to the question: “Has anyone ever forced or persuaded you to have sex when you did not want to?”

†OR and 95% CI from bivariate analysis of group with characteristic compared with counterfactual group (eg, age 14–16 years compared with age 11–13 years), stratified by country and adjusted for clustering.

compared with face-to-face interviews, and this might help to explain the higher rates of forced sex than a study in South Africa that used face-to-face interviews.¹⁵ Our measure of sexual violence was limited specifically to coerced physical sex. This leads to lower estimates of sexual violence than studies that include unwanted touching and verbal abuse as well as forced sex.¹⁶

The school-based surveys probably underestimated the rates of forced and coerced sex among all children since we excluded children not in school, who may have a higher risk of experiencing sexual violence or who may have left school because they experienced sexual

violence. We have no details about enrolment and attendance other than on the day of the survey. The school-based surveys did not contact young women who were unable to attend school due to pregnancy, a possible result of sexual abuse. The percentage of female students illustrates their dropout with age: 60%, 59%, 57%, 55%, 53% and 49% with increasing age from 11 through to 16 years. If girls who experience forced or coerced sex leave school as a result, this could explain the apparently small gender gap or, in many country- and age-specific groups, more frequent reports of sexual violence among male than female respondents.

Table 4 GLMM of factors associated with forced or coerced sex in male and female youth aged 11–16 years

Variables in final GLMM models	Adjusted OR (95% CI)	
	Males (n=22 098)	Females (n=26 292)
Age over 13 years		1.49 (1.38 to 1.61)
Insufficient food in the last week	1.22 (1.12 to 1.34)	1.40 (1.29 to 1.53)
Attending a school where there was a higher proportion of students who said they had suffered sexual violence	1.79 (1.65 to 1.95)	1.76 (1.62 to 1.90)
Attending a school where a lower proportion of students knew about child rights		1.15 (1.08 to 1.25)
Attending a school where there was a higher proportion of students who said they had perpetrated sexual violence	1.22 (1.12 to 1.33)	1.18 (1.09 to 1.28)
Attending a school where alcohol use was more common among students	1.11 (1.03 to 1.20)	
Living in a community where a higher proportion of adults said a man could expect sex if he gave a gift to a woman	1.16 (1.08 to 1.26)	1.16 (1.07 to 1.24)
Living in a community where a higher proportion of adults reported intimate partner violence in the last year		1.09 (1.01 to 1.17)

Country was treated as a random effect in the models. The initial saturated models for males and females included all the variables in table 2. GLMM, generalised linear mixed model.

As with any self-reported experience, some students declined to answer questions and some may have given false answers. We recognise reasons not to report but we have no basis to expect respondents to fabricate a history of coerced sex; we expect this bias underestimated true rates. It is possible that under-reporting of forced or coerced sex was more marked among the female students. If so, this could explain our finding of a similar reported rate of forced sex between the sexes, even if the female youth actually experienced more forced sex.

There is a prevailing belief that child sexual abuse affects predominantly girls. Studies in Europe, the USA and Australia have generally reported higher rates of experience of sexual violence among female than male youth,^{26–31} although a recent study from Ireland

reported male rates of experience of sexual abuse in childhood not much lower than female rates.³² Few studies from Africa report both male and female rates of experience of child sexual abuse. Collings³³ reported that 29% of a small sample of male university students in South Africa had experienced contact or non-contact sexual abuse as children and later reported 35% of female students in the same university had experienced contact forms of sexual abuse as children.³⁴ Two studies from a province of South Africa found similar rates of experience of childhood sexual violence among male and female youth^{35 36} and a large study of school-going youth in South Africa found similar rates of experience of forced or coerced sex among males and females.^{14 37} The problem is much less studied among male youth,

Table 5 GLMM of factors associated with being a perpetrator of forced sex, among male and female youth aged 11–16 years

Variables in final GLMM models	Adjusted OR (95% CI)	
	Males (n=22 098)	Females (n=26 292)
Experienced forced or coerced sex	4.37 (3.96 to 4.82)	5.34 (4.66 to 6.13)
Insufficient food in the last week in household	1.30 (1.16 to 1.45)	
Attending a school where there was a higher proportion of students who said they had suffered sexual violence		1.51 (1.28 to 1.78)
Attending a school where a lower proportion of students knew about child rights	1.29 (1.16 to 1.43)	1.35 (1.16 to 1.57)
Attending a school where a higher proportion of students said they had perpetrated forced sex	2.23 (2.01 to 2.49)	2.13 (1.81 to 2.51)
Attending a school where a higher proportion of students drank alcohol	1.25 (1.13 to 1.38)	1.17 (1.01 to 1.36)
Living in a community that is not accessible by tar road	1.33 (1.20 to 1.48)	1.51 (1.30 to 1.75)
Living in a community where a higher proportion of adults said it is acceptable for an older man to have sex with a teenager		1.17 (1.01 to 1.35)
Living in a community where a higher proportion of adults reported intimate partner violence in the last year		1.23 (1.07 to 1.42)

Country was treated as a random effect in the models. GLMM, generalised linear mixed model.

especially in Africa, with many enquiries limited to female youth.

By definition, sex with children is abuse whether or not the child ‘consents’. The age of consent is complicated, with differing ages in different forms of legislation. The age of consent in the countries included in our study is generally 16 years and 18 years in Tanzania. Thus, nearly all coerced sex reported in our study was child sexual abuse as a matter of definition. The questionnaire asked those who reported forced or coerced sex how old they were when it first occurred. Of the 1,118 sixteen-year-old females who reported forced or coerced sex, 498 said this first occurred when they were aged 16 years or did not give an age when it occurred, similarly among the 1093 sixteen-year-old males reporting forced or coerced sex, 377 said it first occurred when they were aged 16 years or did not specify the age of first occurrence. A sensitivity analysis excluded these 875 youth; we could detect no shift in the pattern of risk factors.

The risk factors we included in the survey and analysis were based on evidence from other studies,^{12 26 27 33 34 38–40} and a belief that since sexual violence is a clustered phenomenon, factors at school and community level may be important. We recognise other risk factors for forced sex among children that this study did not measure.^{12 33 34}

Our findings on perpetration of forced sex are consistent with those reported elsewhere.¹² Male students were more likely to admit to forcing sex on someone else, but some female students also admitted to it. And being a victim of forced or coerced sex was a strong risk factor for being a perpetrator. In this cross-sectional study, we cannot say which came first, but the finding is compatible with the finding that many child perpetrators of rape have themselves been victims of sexual abuse.⁴¹

School-based group variables were strong risk factors for experience of forced or coerced sex and indeed perpetration of forced sex, illustrating the social nature of sexual violence. In this cross-sectional study, we cannot draw conclusions about which came first: personal experiences leading to school characteristics or the other way around. It seems plausible that some schools foster a culture of sexual violence, while others foster a culture of protection. If true, this could be key for school-based strategies to reduction of sexual violence among the students. Raghavan and colleagues⁴² showed that witnessing community violence influenced social support networks, and these in turn influenced gender violence. The counterpoint is that *not* witnessing community violence might also influence gender violence but in a positive way.

Sexual abuse in childhood is profoundly linked to the risk of HIV, largely through high-risk behaviours among survivors¹⁰; the high rates of forced and coerced sex we found among school students are a cause for serious concern. Increasing resources and developing

approaches for reducing sexual abuse of children in southern Africa, including randomised controlled trials of school-based interventions, should be a public health priority.

Acknowledgements These findings emanate from further analysis of the “Soul City regional programme audience reception and impact evaluation”, for which CIET were commissioned to undertake surveys in eight countries in 2002–2003 and 2007. The Tanzania survey was part of the African Development of AIDS Prevention Trials capacities (ADAPT) project, funded by the Global Health Research Initiative through Canada’s International Development Research Centre IDRC grant 104051-005. CIET Trust funded the South African survey. We thank the Ministries of Education that authorised the survey in the 10 countries, CIET field teams in each country and the 60 000 school-going youth who contributed to the survey.

Contributors NA designed the studies, provided oversight and training for fieldwork, conducted the analysis and wrote the present manuscript. SPS, DM, KO, NM and DL conducted the fieldwork and contributed to the writing. AC provided training and field supervision for the 2007 study and assisted with writing of the current manuscript. NA and AC are guarantors.

Funding The Soul City commissioned surveys were funded by the European Union. The Tanzania survey was funded by the Global Health Research Initiative through the International Development Research Centre.

Competing interests None.

Ethics approval Health Research and Development Committee, Ministry of Health in Botswana; Research and Ethics Committee, Ministry of Health and Social Welfare in Lesotho; the National Health Sciences Research Committee, Ministry of Health in Malawi; the Comité Nacional de Bioética para a Saude, Ministerio da Saude in Mozambique; the Research Management Committee, Ministry of Health and Social Services in Namibia; the CIET Trust Research Ethics Committee in South Africa; the Scientific and Ethics Committee, Ministry of Health and Social Welfare in Swaziland; the Institutional Review Board, Ifakara Health Research and Development Centre in Tanzania; the Permanent Secretary, Ministry of Health, Zambia and the Medical Research Council of Zimbabwe. In each country, we also received written authority from the Ministry of Education to interview children in school.

Provenance and peer review Not commissioned; externally peer reviewed.

Data sharing statement Data from this study are not in the public domain.

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STROBE Statement—Checklist of items that should be included in reports of *cross-sectional studies*. **Description of where items covered in the manuscript**

	Item No	Recommendation	Where covered in paper
Title and abstract	1	(a) Indicate the study’s design with a commonly used term in the title or the abstract	“Cross-sectional studies” appears in title
		(b) Provide in the abstract an informative and balanced summary of what was done and what was found	Structured abstract provided
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	Para 1 and 2 of introduction, p3
sObjectives	3	State specific objectives, including any prespecified hypotheses	Abstract and third para introduction (p3)
Methods			
Study design	4	Present key elements of study design early in the paper	First para of Methods, p3
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	Methods, p3
Participants	6	(a) Give the eligibility criteria, and the sources and methods of selection of participants	Eligible youth explained Methods, p3
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	Paras 2-4, p4
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	Paras 2-3, p4
Bias	9	Describe any efforts to address potential sources of bias	Potential bias from in-school survey discussed in Discussion
Study size	10	Explain how the study size was arrived at	National representation, urban/rural (see text)
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	P4, para 4, para 5 and p5 para 1
Statistical methods	12	(a) Describe all statistical methods, including those used to control for confounding	P4, para 5 and p5, para 1
		(b) Describe any methods used to examine subgroups and interactions	P5, para 1
		(c) Explain how missing data were addressed	P3, para 4 /P4 para 1 and P5, para 3
		(d) If applicable, describe analytical methods taking account of sampling strategy	Weighting – p4, para 5
		(e) Describe any sensitivity analyses	Not applicable

Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	P5, para 3
		(b) Give reasons for non-participation at each stage	P5, para 3
		(c) Consider use of a flow diagram	Not applicable
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	P5, para 4 and p6 para 1
		(b) Indicate number of participants with missing data for each variable of interest	Denominators given throughout results
Outcome data	15*	Report numbers of outcome events or summary measures	P6 para 2, p7 para 3
Main results	16	(a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	Table 1 and Table 2
		(b) Report category boundaries when continuous variables were categorized	Table 1 and Table 2
		(c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	Not applicable
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	Not applicable
Discussion			
Key results	18	Summarise key results with reference to study objectives	P7 para 3
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	P7 para 4 and p8 para 1
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	P8 para 2
Generalisability	21	Discuss the generalisability (external validity) of the study results	P8 para 3
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	P9 para 1

*Give information separately for exposed and unexposed groups.

Table 1. Reported experience of forced or coerced sex among male and female students aged 16 years in 2007, by country

Country	Fraction (weighted %) who ever experienced forced or coerced sex	
	Male students	Female students
Botswana	48/408 (11.5)	44/299 (14.7)
Lesotho	127/587 (22.6)	174/790 (21.5)
Malawi	165/436 (37.8)	87/237 (36.9)
Mozambique	124/472 (27.0)	65/290 (21.5)
Namibia	80/334 (24.4)	93/330 (29.4)
South Africa	142/767 (17.7)	176/955 (18.3)
Swaziland	79/562 (13.9)	84/496 (17.2)
Tanzania	119/356 (32.0)	196/460 (42.6)
Zambia	152/572 (26.6)	159/491 (33.4)
Zimbabwe	45/219 (20.2)	23/140 (15.7)
All countries combined	1093/4762 (25.4)	1118/4554 (28.8)

Table 2. Age standardised comparison between 2003 and 2007: experience of forced or coerced sex among school-going youth aged 11-16 years, in schools which conducted both surveys

Country	Male					Female				
	2003		2007		Age standardised contrast 2007/2003 RR (95%CI)	2003		2007		Age standardised contrast 2007/2003 RR (95%CI)
	Cases/total	Age standardised Rate	Cases/total	Age standardised Rate		Cases/total	Age standardised Rate	Cases/total	Age standardised Rate	
Botswana	163/1006	0.164	295/2812	0.0995	0.61 (0.49-0.75)	142/1215	0.113	348/3342	0.099	0.88 (0.74-1.05)
Lesotho	352/1917	0.170	416/2071	0.211	1.24 (1.04-1.49)	451/2805	0.156	499/3269	0.137	0.88 (0.75-1.02)
Malawi	521/1829	0.258	517/1904	0.246	0.95 (0.83-1.10)	479/1822	0.249	465/1698	0.255	1.02 (0.89-1.17)
Mozambique	233/947	0.268	479/2043	0.264	0.98 (0.69-1.39)	153/698	0.180	291/1562	0.179	0.99 (0.77-1.28)
Namibia	325/1313	0.234	332/1355	0.238	1.02 (0.84-1.23)	397/1736	0.219	394/1698	0.209	0.95 (0.84-1.12)
Swaziland	259/2024	0.122	249/2389	0.091	0.75 (0.62-0.90)	360/2792	0.121	358/2948	0.116	0.96 (0.83-1.13)
Zambia	501/1807	0.241	418/1699	0.236	0.98 (0.79-1.21)	526/1837	0.249	495/2012	0.221	0.89 (0.75-1.03)
Zimbabwe	202/1247	0.109	511/2772	0.183	1.68 (1.41-1.94)	326/1577	0.192	527/3461	0.154	0.80 (0.53-1.20)

* direct age standardisation on Botswana 2007 male population.

Table 3. Risk factors for lifetime experience of sexual violence in school-going male and female youth aged 11-16 years in 2007

Characteristics	Categories	Lifetime experience of sexual violence ¹			
		Male		Female	
		Proportions	Odds Ratio (95% CI) ²	Proportions	Odds Ratio (95% CI) ²
Individual and household variables					
Age group	11-13 years	1137/6591	1.13 (1.03-1.23)	1114/9076	1.71 (1.52-1.92)
	14-16 years	2943/15022		3318/16764	
Area of residence	Urban	1685/10007	1.10 (0.98-1.25)	1840/12237	1.09 (0.96-1.25)
	Rural	2395/11606		2592/13603	
Crowding in the house	1-3 per room	2710/14840	0.96 (0.89-1.04)	3055/17814	0.94 (0.86-1.02)
	4-10 per room	1154/5767		1206/7006	
Enough food in the house in the last week	Yes	3199/17621	1.33 (1.20-1.46)	3409/21041	1.51 (1.35-1.69)
	No	824/3724		952/4457	
Community level variables					
Access by good tar road	Yes	1319/7405	0.93 (0.80-1.09)	1496/9190	1.03 (0.88-1.20)
	No	2260/11190		2309/12673	
Active government HIV prevention programme	Yes	2390/13124	1.01 (0.86-1.17)	2524/15361	1.01 (0.85-1.19)
	No	1185/5551		1196/6538	
Proportion of adults saying that "women sometimes deserve to be beaten"	Below average	1979/10366	0.94 (0.83-1.07)	2139/12442	0.91 (0.80-1.04)
	Above average	1884/10104		2028/12142	
Proportion of adults saying it is "okay for an older man to have sex with teenagers"	Below average	2582/13517	0.98 (1.86-1.12)	2865/16462	0.91 (0.80-1.03)
	Above average	1281/6953		1302/8122	
Proportion of adults saying "men have the right to sex with their girlfriends if they buy them gifts"	Below average	2213/11879	1.06 (0.94-1.20)	2515/14535	0.98 (0.85-1.13)
	Above average	1650/8591		1652/10049	
Proportion of adults reporting intimate partner violence in last year	Below average	1654/8619	0.94 (0.83-1.07)	1785/10435	1.01 (0.88-1.15)
	Above average	2209/11851		2385/14149	
School level variables					
Proportion of students reporting experience of sexual violence	Below average	1540/10909	1.94 (1.73-2.17)	1819/13561	1.84 (1.61-2.11)
	Above average	2540/10704		2613/12279	
Proportion of students knowing of three child rights	Above average	1678/9588	1.11 (0.98-1.25)	2095/12263	0.99 (0.87-1.13)
	Below average	2402/12025		2337/13577	
Proportion of students agreeing that boys and girls are equal	Above average	1851/10491	1.13 (1.00-1.27)	2255/13342	1.01 (0.90-1.14)
	Below average	2229/11122		2177/12498	
Proportion of students reporting perpetration of sexual violence	Below average	1939/12293	1.60 (1.42-1.81)	2298/15320	1.48 (1.29-1.70)
	Above average	2141/9320		2134/10520	
Proportion of students reporting drinking alcohol	Below average	2182/12700	1.34 (1.19-1.52)	2370/14831	1.31 (1.15-1.49)
	Above average	1898/8913		2062/11009	

Notes

1. Defined as those who responded positively to the question: "Has anyone ever forced or persuaded you to have sex when you did not want to?"
2. Odds Ratio and 95% Confidence Interval from bivariate analysis of group with characteristic, compared with counterfactual group (for example, age 14-16 years compared with age 11-13 years), stratified by country and adjusted for clustering

Table 4. GLMM of factors associated with forced or coerced sex in male and female youth aged 11-16 years

Variables in final GLMM models	Adjusted Odds Ratio (95% Confidence Interval)	
	Males (n=22098)	Females (n=26292)
Age over 13 years		1.49 (1.38-1.61)
Insufficient food in the last week	1.22 (1.12-1.34)	1.40 (1.29- 1.53)
Attending a school where there was a higher proportion of students who said they had suffered sexual violence	1.79 (1.65-1.95)	1.76 (1.62-1.90)
Attending a school where a lower proportion of students knew about child rights		1.15 (1.08-1.25)
Attending a school where there was a higher proportion of students who said they had perpetrated sexual violence	1.22 (1.12-1.33)	1.18 (1.09-1.28)
Attending a school where alcohol use was more common among students	1.11 (1.03-1.20)	
Living in a community where a higher proportion of adults said a man could expect sex if he gave a gift to a woman	1.16 (1.08-1.26)	1.16 (1.07-1.24)
Living in a community where a higher proportion of adults reported physical domestic violence in the last year		1.09 (1.01-1.17)

Country was treated as a random effect in the models. The initial saturated models for males and females included all the variables in Table 2.

Table 5. GLMM of factors associated with being a perpetrator of forced sex, among male and female youth aged 11-16 years

Variables in final GLMM models	Adjusted Odds Ratio (95% Confidence Interval)	
	Males (n=22098)	Females (n=26292)
Experienced forced or coerced sex	4.37 (3.96-4.82)	5.34 (4.66- 6.13)
Insufficient food in the last week in household	1.30 (1.16-1.45)	
Attending a school where there was a higher proportion of students who said they had suffered sexual violence		1.51 (1.28-1.78)
Attending a school where a lower proportion of students knew about child rights	1.29 (1.16-1.43)	1.35 (1.16-1.57)
Attending a school where a higher proportion of students who said they had perpetrated forced sex	2.23 (2.01-2.49)	2.13 1.81-2.51
Attending a school where a higher proportion of students drank alcohol	1.25 (1.13-1.38)	1.17 1.01-1.36
Living in a community that is not accessible by tar road	1.33 (1.20-1.48)	1.51 1.30-1.75
Living in a community where a higher proportion of adults said it is acceptable for an older man to have sex with a teenager		1.17 1.01-1.35
Living in a community where a higher proportion of adults reported intimate partner violence in the last year		1.23 1.07-1.42

Country was treated as a random effect in the models.

Time trends and risk factors for sexual violence among school-going youth: national cross-sectional studies in southern Africa in 2003 and 2007.

BMJ.2011.000709

Reviewer: 1 (Michele Decker)

Comment 1. Introduction.

The introduction is surprisingly brief. The authors provide no justification for the risk factors selected, and provide no conceptualization for the risks of sexual violence.

Response 1

We have expanded the Introduction

Comment 2. Introduction.

Their statement that “different measurement methods produce different estimates of occurrence” is correct, but they provide no justification as to the value of comparing and contrasting estimates across time or national contexts.

Response 2

This is covered in the expanded Introduction. There is very little quantitative evidence about the rates of sexual violence against children in southern Africa.

Comment 3. Sample.

Can the authors describe the portion of youth who attend school with any regularity in these settings? Gender differences therein?

Response 3

We do not have details about enrolment and attendance other than on the day of the survey. We know an important limitation of the study is that it could not contact young women who were unable to attend school due to pregnancy, a possible consequence of sexual abuse, or who left school because of the experience of abuse or fear of further abuse. The percentage of youth interviewed who were female illustrates this: 60%, 59%, 57%, 55%, 53% and 49% with increasing age from 11 through to 16 years.

Comment 4. Measures.

Please provide some description of the community-level variables derived from the household survey. What was the sample size, what were the exact items, and what can be said about their psychometric properties?

Response 4

We have already provided references that give details about the methods of the household survey. We added a list of items derived from the household survey; the frequency of responses to these items from adults in the household survey are in Table 3.

Comment 5. Analysis.

The authors describe that analyses were clustered –was this at the school level? At what level?

Response 5

The analysis was clustered at school level. We have made this clearer in the revised paper.

Comment 6. Analysis.

The utility of the school-level perpetration variable is questionable. This is not giving us a tremendous amount of useful information. Why would it be important to know that school-level sexual violence perpetration is associated with sexual violence victimization? The authors provide no interpretation of this finding beyond the “social nature” of the phenomenon of sexual violence, it seems most likely that the perpetrators and victims attend school together. Is this useful? It seems that this is swamping the other factors in the analysis and has very little conceptual basis for inclusion.

Response 6

We have clarified why we considered it important to include school-level variables, some of which turned out to be strongly associated with the experience of forced sex among students. This clustering indicates that some schools might foster a culture of sexual violence, If we can understand more about how this effect operates, it opens an avenue for prevention interventions at school level.

Comment 7. Table 2/Results/Analysis.

There is considerable confusion as to what is being presented in Table 2. The tables do not really reflect the analyses described. In analysis section, authors state that they report Odds Ratios adjusted for covariates, but there is no indication of this in Table 2.

- a. It is unclear whether the ORS in this table are adjusted, and if so, for what. Please provide further details in notation. Later the text, Page 5, suggests that Table 2 is indeed unadjusted. Goes on to describe adjusted results.
- b. Please provide a table to summarize the results of adjusted analyses.

Response 7

We have revised the text and Table 2 notations to make it clearer that the findings in Table 2 are adjusted only for clustering and country and not for other covariates. We have added a new table of the GLMM multivariate analysis, provided in the text in the previous version. The new table shows separate analyses for male and female students.

Comment 8. Analysis.

Given the robust sample, the analyses are surprisingly unsophisticated. Given the wide literature on violence and risk factors for women worldwide, gender-stratified analyses for the risk factor component would be more appropriate. This is particularly the case given concern that the assessment may intermingle childhood sexual abuse which impacts both boys and girls, with sexual violence during adolescence and early adulthood in which women are differentially impacted.

Response 8

We have provided separate analyses for males and females throughout.

Comment 9. Discussion.

The discussion is quite weak and makes little use of the findings presented in the paper. In particular, what can be said about the perpetration results? What can be said about social norms given that perpetration was associated with low levels of gender equality?

Response 9

We have expanded the Discussion section, including further discussion of the findings about perpetration of forced sex.

Comment 10. Discussion.

The literature on school-based sexual violence suggests that women are differentially affected, with many leaving school following assault or for fear of assault. This research base would suggest

significant biases using the school-based sample to assess lifetime history of sexual violence, particularly for girls, threatening the validity of findings. This should be discussed. The possibility that it explains the lower rate of violence against girls should be addressed.

Response 10

We have expanded our comments in the Discussion about the female rate of forced sex being underestimated because our sample excludes girls forced to leave school as a consequence – including pregnancy – of sexual violence.

Comment 11.

Tables - please provide a table to summarize the results concerning perpetration of forced sex. I assume this is a gender-stratified analysis given the significant gender difference in perpetration?

Response 11

We have provided an additional table showing the analysis of factors associated with perpetration of forced sex, separately for males and females.

Comment 12. Overall frame.

The use of a lifetime measure of sexual violence with an adolescent population presents challenges in that the assessment likely captures both experiences of childhood violence as well as violence during adolescence and early dating experiences. This is a significant limitation, particularly given the literature demonstrating risks for sexual violence among young adult women around the world. The authors assumption the violence captured here occurred during “childhood” is questionable.

Response 12

In most of the countries surveyed, the age of consent for sexual intercourse is 16 years (for Tanzania it is 18 years). For the 80% of participants under the age of 16 years, by definition, the sexual abuse occurred during childhood. Of the 1118 16-year-old females who reported forced or coerced sex, 498 said this first occurred when they were aged 16 or did not give an age when it occurred, similarly among the 1093 16-year-old males reporting forced or coerced sex, 377 said it first occurred when they were aged 16 or did not specify the age of first occurrence. A sensitivity analysis excluded these 875 youth; we could detect no shift in the pattern of risk factors. We clarify this in an addition to the text.

Reviewer: 2 (Matt Breiding)

Comment 1

Let me start with the title as there are two problems with the title that are reflective of issues in the manuscript. First, the authors do not utilize statistical tests that could test trends, but rather examine statistical differences between prevalence estimates at two time points. There is nothing wrong with this approach but labeling it as an analysis of trend is incorrect. It is also incorrect because the authors would need to collect data at a minimum of three time points to make a trend analysis even possible.

Response 1

We have removed references to time trends in the title and elsewhere in the paper.

Comment 2

My second issue with the paper that is reflected in the title is that the authors did not measure sexual violence, but rather forced sex. Sexual violence as a construct is much more broad and can include attempted rape, drug/alcohol-facilitated rape, coerced sex, fondling of a victim, forced touching of a

perpetrator, and even forms of non-touch acts (e.g. sexual harassment, flashing, forced watching of sexual acts or sexual material). Again, there is nothing wrong with what the authors measured, as forced sex is the most serious form of sexual violence, but labeling it as sexual violence is misleading.

Response 2

We have changed the title to make it clear that the paper deals with one form of sexual violence: forced and coerced sex. And we refer to forced and coerced sex throughout the paper.

Comment 3

The authors describe the sample as nationally representative but leave out quite a bit of information that would allow for an understanding as to whether it truly is nationally representative. How were EAs sampled? How were schools within EAs sampled? How many EAs were sampled in each country and how was this determined? They note that 7 classes of 35 children per EA were sampled but how was this number obtained? The authors provide a bit more information on how classes were sampled within schools but this information raises more questions than it answers. They indicate that at least one class was randomly selected per grade. Why would more than one class be selected per grade and how was this undertaken?

Response 3

We have provided some more detail about the sample and sampling in the Methods section.

Comment 4

I think the author's need to explain more about their weighting strategy other than to state that they "weighted regional frequency estimates in proportion to the population of the countries." I'm unfamiliar with this weighting method and am unsure of the justification for such a method.

Response 4

We have given more detail about weighting in the Methods section.

Comment 5

My most pressing concerns about this study are related to whether there were procedures and protections in place to reduce the likelihood of harm to children. It is admirable that they authors sought and received IRB approval in each country and from an "accredited international ethical review board" (side note: why can't they be specific in naming this review board?), it is unclear whether any of these review boards are aware of the difficult ethical issues related to the study of sexual violence, particularly among children. WHO guidelines regarding the study of violence against women (<http://www.who.int/gender/violence/womenfirtseng.pdf>) lay out a number of these issues which are even more critical with regard to children given their added vulnerability. The authors do not provide much reassurance as to how children were protected from potential reprisal if it became known that the study contained questions about forced sex. After all, by asking children to report that they experienced forced sex is, in most countries, to ask them to report a crime. By merely putting them in a position to make that judgment, is to place them in a difficult position as they have no way of knowing to what degree the survey truly is anonymous. What steps were taken to reduce the possibility of distress? The WHO guidelines recommend that only the respondent know the content of the survey. How can this even be accomplished in a school setting? By administering the study in schools, where there is concern in many African countries about teachers' perpetration of sexual violence against children, how could this be accomplished? What were teachers/administrators told about the content of the survey? Parents are another group of potential perpetrators, so what were they told regarding the content of the survey? Finally, what was the protocol in place should a student become upset about the question(s)? I have serious concerns about whether these issues can even be addressed in the school setting. Perhaps they were but it is

critical that the authors explain how they minimized the harm to study participants.

Response 5

These are important ethical issues. We spent a lot of time and effort to address the ethical issues that arise when asking children about their experience of forced sex in a school setting, in design, training, and implementation of the study. We took into account the WHO guidelines on the study of violence against women, as well as other relevant ethical guidelines. In the expanded Methods section we have included more information on the measures we had in place to address ethical concerns. The question of consent from parents was one issue. In one country, the ethical review board initially wanted us to send the questionnaire to parents to seek their explicit written consent for their children to participate in the study (an opt-in process). After we pointed out the evidence that much sexual abuse of children arises in the family, and that this might mean sexually abused children did not participate in the study or risked retribution for their participation, the committee agreed to parents being given general information about the study (without details of the contents) and dropped the requirement for specific written consent from parents, instead having an opt-out arrangement, whereby parents who did not want their children to participate should instruct them not to complete the questionnaire. The consent from school heads was obtained, in nearly all cases, without showing them the details of the questionnaires. In case the questionnaire did need to be shared, this was restricted to the school head only. No teachers were present in the classroom when the facilitators read out the questions. The facilitators explained to the students at the beginning of the session about how to keep their answers private and explained that their answers would be anonymous; they should not write their name anywhere. We provided specific training for facilitators in how to handle students who became upset as a result of the questions or who wished to talk further about personal experiences after the questionnaire session.

Comment 6

I don't recall seeing the overall prevalence estimates for victimization broken down by sex, only a combined estimate. These numbers are almost always stratified by sex (as was done for perpetration). It's also unclear why the authors combined the risk factor analyses for men and women. These are also never combined as females and males often have different risk factors. Why was this done? Do they have evidence to suggest that the risk factors were the same when analyzed separately?

Response 6

We have provided separate figures for males and females throughout the revised paper, as well as separate risk analyses for males and females.

Comment 7

Something should be mentioned, given that the primary focus of this study was not forced sex, that the risk factors examined were likely not selected a priori based on a hypothesized relationship to forced sex, and that other unmeasured risk factors are most likely at play.

Response 7

We did indeed include in the instrument questions about factors we believed were likely to be risk factors for forced sex, but we have added a comment in the Discussion that there are likely to be risk factors we did not measure.

Comment 8

The authors conclude that their estimates are likely underestimates, which is probably true, but also state that it is probably more of an underestimate for females than males. What is the support for this?

Response 8

We have added more detail in the Discussion about why the rates of forced sex are likely to be more underestimated among females than males.

Comment 9

Finally, there is a lot of information presented in the article but very little to tie it together in the discussion to prior work, future studies, or prevention/intervention. Further, a discussion of how these findings relate to the HIV epidemic in Africa is critical yet the authors don't mention HIV until the final words of the manuscript.

Response 9

We have expanded the Discussion, in including adding more about the relevance of the findings to the HIV epidemic in southern Africa.

Reviewer: 3 (Karen Devries)

Comment 1

The paper is interesting and well written, and provides unique data on the prevalence of forced sex among young people attending school in a variety of settings. This is a very important area of research—experience of sexual violence has numerous adverse health consequences and is itself a human rights violation. There are few comparable data available on the topic, especially from lower income settings—measures of sexual violence in this age group are not included in other international surveys such as DHS. However, I think there are several areas where further explanation/discussion are required before this could be considered for publication in a high impact journal of such as BMJ.

Response 1

We have addressed the specific points raised, in particular providing additional information as requested.

Comment 1. Data quality.

I would like further information about the survey data to be assured of quality—levels of literacy in many of these settings, especially in younger children, are likely to be very low. The methods section states that a facilitator read out the questions and children filled in the corresponding bubble on the answer sheet. I worry about one facilitator being able to ensure that what can be very large classes of children are following along and completing the score sheet correctly, especially if they will have difficulty in reading and following along themselves. This method would require all children to be listening and following along at the same pace—data quality would probably go down considerably towards the end of the survey. How long did it take to complete? Did patterns of response any indicate difficulties? It would be helpful for readers to get more information about data collection to ensure that quality is adequate.

Response 1

We have provided more details in the Methods. Levels of literacy were indeed low in some places. This was one reason why we strongly encouraged the students to wait to *hear* the question and the response options before selecting their response. The language used was that chosen by the class; some preferred their local language, some preferred English, some requested a combination. We trained the facilitators in how to give explanations of questions that might arise, and the facilitators encouraged the students to ask if they were not clear about the meaning of any question. At least two researchers were present in every class, and for larger classes three or four researchers, in order

to ensure privacy and that the students were coping with the questions. The session, including the initial explanations and instructions about privacy (see below), the reading out of the questions, and the collection of the completed answer sheets, took less than one hour. In some cases, the facilitators spent longer in order to discuss either with the whole class, or with individual students, additional questions the students wanted to ask.

Comment 2.

I have serious concerns about privacy during data collection, and consequently, disclosure of violence. Did facilitators have any training in how to ensure privacy and confidentiality, and how did they do this in a classroom setting which was likely to be crowded? I would suspect that disclosure would be low with this type of method, which needs some discussion. Were facilitators trained at all in asking about sensitive issues? It is true that anonymous surveys in high income settings have more disclosure, but I'm not sure that the situation described in this study is at all parallel. Likewise, it is also true that general health surveys find lower rates of violence than studies specifically designed to measure violence, which usually have interviewer training and well established procedures around privacy and confidentiality. This should also be mentioned.

Response 2

Privacy was indeed a pivotal concern during training of facilitators and fieldwork, and the classes were crowded. We have added more details in the Methods section. The training of the facilitators included techniques for increasing privacy, which they covered with the students at the beginning of the session. The facilitators advised students to use exercise books to shield their response papers to ensure privacy and co-facilitators circulated to ensure this was working. At the beginning of the session, the facilitators explained that the responses would be anonymous; the students should not write their names anywhere. At the end they showed the students how they sealed the completed responses from the whole class into an envelope. We also provided specific training for the facilitators in how to ask about sensitive issues, and how to deal with students who might be upset by the questions or want to discuss concerns after the session.

Comment 3. The measure of sexual violence.

The authors clearly state the measure, which is around forced sex. It would be helpful to include some discussion of what this measure is not capturing, specifically around coercive sex. In these settings, this may be especially important for girls. There is also the added question of what students reporting forced sex actually experience—there is evidence from other settings that boys reporting forced sex do not find the experience as distressing as girls who report the same. This does not invalidate the measure, but it would be interesting to further discuss this to help interpret the findings.

Response 3

We have stated more clearly that we measured only one form of sexual violence: forced or coerced sex. The specific question was: “Has anyone ever persuaded or forced you to have sex when you did not want to?”. This does include coercion that was not specifically physical force. We did not attempt to investigate in this study what the experience meant to the young people who suffered it, although we agree this is an important issue. The level of reporting is important. While boys who report forced sex might not find it as distressing as girls who report, it might be that boys who find the experience particularly distressing and emasculating are unable to report it. We do not know much about forced sex in male youth in Africa; it has been less studied than forced sex among female youth, sometimes on the assumption that it happens less.

Comment 4.

The difference in prevalence between girls and boys—it is consistent, and needs further discussion. It could be function of disclosure or could be a real difference, but it is at odds with most published

literature. I think it is also essential to present all data and fit all models for young men and women separately. Different epidemiology and to some extent theoretical explanations and risk factors for violence to me preclude presenting any combined estimates for 'children'.

Response 4

We have presented all figures for males and females separately and undertaken separate risk analyses for males and females. In the expanded Discussion we discuss the possible reasons for why we found an equal or higher rate of forced or coerced sex among the male students. It could be differential reporting, although we consider it more probable that under reporting would be more of an issue among males than among females. Another possibility is selection bias in that students who experienced forced sex, especially if it occurred in the school, might have left the school, and that this might have been more of an issue among girls than boys.

Comment 5. Time trends.

I'm not sure you can conclude that there is a time trend in this data. Almost none of the countries show any difference individually, and some are going in different directions—this makes a pooled average of questionable utility. What I think you are showing more convincingly is that there has not been any real decline. It would also be helpful to have information in variation between countries about age-specific prevalence to be clear that these are meaningful averages.

Response 5

We agree that the differences between two time points are not convincing of real decline. We have now stated this more clearly. Age-specific rates in individual countries are not very stable as the numbers for individual ages become relatively small. We dealt with this by age-standardisation based on the age structure of the 2007 Botswana male sample.

Comment 6. Risk factor analysis—exposure to sexual violence and school level measures of exposure to sexual violence.

I find this conceptually difficult, since the participants' experience is represented on both sides of the equation. What you are finding essentially is that there is clustering in sexual violence, which then begs the question of which variables then predict which schools are more violent. To me it would make far more sense to present results in this way. Same with the model where perpetration is the outcome and school level perpetration is the exposure. It is an interesting analysis though, and I think it is very interesting that you have added school and community level variables to the model.

Response 6

We agree the next question is to characterise the high occurrence schools. In this cross-sectional study, we are not drawing conclusions about which came first: individual experiences leading to school characteristics or the other way around. We believe the association between school level variables and individual experience is potentially important as it may open possibilities for intervention.