



Impacts of School-Based HIV Education on Reported Behavior and Knowledge of Adolescent Girls

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Final Report on the ISAS Study in Cameroon





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1 Introduction

The number of people newly infected with HIV in 2010 is estimated at 2.7 million worlwide and 1.8 million in sub-Saharan Africa alone. More than half of new infections were among those under 25 years of age and among those, women were disproportionately affected. What type of HIV prevention information do these young women need to be better able to avoid infection, and how to effectively deliver this information?

Given that the majority of youths are in school until age 15, an obvious way to deliver HIV information to youths is through schools. And indeed, most countries have adopted a national HIV prevention curriculum that teachers are required to integrate in their classes. But the evidence suggests that implementation of these curricula has been slow. An observational study conducted over 15 sub-Saharan countries between 2007 and 2010 found a very large gap in knowledge between students and their teachers, concluding that teachers lack either motivation or adequate teaching methods (or both) to effectively deliver HIV and sexual education (UNESCO, 2011). Furthermore, evidence on the efficiency of HIV education at enabling behavioral change is mixed: systematic reviews of the effects of HIV education programs in Sub-Saharian Africa show the great heterogeneity in the effectiveness of adult-led and curriculum-based interventions (Paul-Ebhohimhen, 2008; Gallant, 2004). Does this heterogeneity take root in the differences in cultural and socio-economic contexts in which the HIV education takes place? A randomized trial in Kenya found no impact on teen pregnancy and STI rates of the official HIV/AIDS curriculum delivered to upper primary school students by their regular teachers (Duflo, Dupas and Kremer, 2012). In contrast, in the same setting, Dupas (2011) found that a 45-minute session delivered by an outside facilitator with video equipment, with a focused message on the heightened risk of HIV faced by girls having sex with older partners ("sugar daddies"), was effective at reducing unprotected sex among adolescent girls. Can part of this difference come from the fact that focused messages are remembered better, or that HIV information is more credible when delivered by an outside professional?

This paper reports on a field experiment designed to test whether the identity of the HIV information messenger (regular school staff vs. outside health professional) as well as the type of information being provided affect how much information is delivered, is retained, improves HIV knowledge, enables behaviour change, and finally diffuses though social networks. The experiment was conducted with teenage girls in 318 junior high schools from three regions of Cameroon.

Cameroon is the West African country with the highest rate of HIV prevalence at 4.3% of the 15-49 population in 2011 (5.6% among women and 2.9% among men), but with very large differences across regions. Our study encompasses three very distinct study areas – the slighlty affected capital city Yaoundé, the highly affected South (the region with the highest HIV rate in the country) and the West, a large rural region with a much lower infection rate – in order to compare similar interventions in very different contexts and give evidence on the external validity of the effects of these interventions.

The 318 schools in the study sample were randomly allocated to four groups (after stratifying by region and two other school characteristics), one control and three treatments. The treatments consisted in HIV prevention education programs that differed in their delivery mechanism as well as content. Namely, Treatment 1 (the basic treatment) was delivered on an ongoing basis by permanent school staff, while Treatments 2 and 3 were delivered by a professional consultant from outside the school during a one-off visit. Treatments 1 and 2 consisted in general information on HIV prevention methods (abstinence, faithfulness and condom use) and the average HIV prevalence at the national level (the "basic message"), while Treatment 3 included detailed information on HIV prevalence disaggregated by gender and age group and a special module on cross-generational relationships, locally known as relationships with "sponsors", and their contribution to the spread of HIV. In each school, one 8th grade class was targeted for the study.

We measure outcomes after one year for a random subset of girls in the targeted class. To measure spillovers (only for the Treatment 2 and 3 interventions), we measure outcomes

for their same-age friends in other classes of the same school.

Our first result is that lasting impressions of HIV education sessions may not be what matters most when it comes to knowledge and behavior. On the one hand, sessions performed by outside consultants tended to create a much longer lasting impression, especially in Yaoundé. What's more, the relative risk message (Treatment 3) was more likely to be discussed and shared with one's social network than the basic message. On the other hand, long lasting impressions do not correlate well with knowledge and behavior. In the South, the basic message delivered by school staff (Treatment 1) had a larger effect (it significantly reduced risky sexual behavior and reduced teen pregnancy from 32% to 20%) even though Treatments 2 and 3 by outside health consultants were remembered much more vividly. In Yaoundé, girls in Treatment 1 had no recollection of receiving HIV education with more intensity than girls in the control group, but they were significantly more knowledgeable at endline on HIV prevention methods. What's more, the outside consultants delivering the basic message (Treatment 2) in Yaoundé had a perverse effect (an increased rate of unplanned teenage pregnancy), despite the fact that girls in that group distinctly remembered abstinence, faithfulness and condoms being discussed by the consultant. Thus, making HIV prevention sessions more memorable is therefore neither necessary nor sufficient for them to be effective.

Second, our results show that there is no one-size-fits-all when it comes to HIV prevention education. We find that a given message or a given delivery type can have different effects in different areas of Cameroon, sometimes of opposite sign. What appeared to make a significant difference for teenage girls in Kenya (the relative risk information campaign in Dupas, 2011) only indirectly affected pregnancy rates in Cameroon, through information spillovers to friends. What worked in the rural West of Cameroon (the basic message delivered by consultants) had a perverse effect in the urban context of Yaoundé. Finally, what worked in the South (the basic message delivered by school staff) was mostly ineffective in the other

two regions. This suggests that local contexts are critical ingredients to be considered when designing prevention campaigns. We discuss some trails of potential explanation to the heterogeneity of the impact of the interventions on sexual behaviour. We look in particular at the differences in local contexts and implementations aspects. This could open the way for future rigorous research in this domain.

Finally, our results show the presence of large spillovers on friends. Friends of those targeted for the consultant treatments (Treatment 2 and 3) saw a decrease in school dropouts of the same magnitude as their targeted friends. We also find that friends of those targeted for the relative risk information (Treatment 3) saw a large and significant decline in teen pregnancy, despite only being indirectly reached by the program. Information spillovers seem to drive the behavioral spillovers since we observe a large occurrence of conversations on sex-related topics among friends and improved knowledge of friends of girls in the consultant groups.

An obvious shortcoming of our study is that we have no data on actual rates of infection with STIs in our study sample. Our only "biological" outcome is pregnancy, but this may not be a perfect proxy for risky sexual behavior. Duflo et al. (2012) show that programs that reduce pregnancy rates may have no effect on STIs, and programs that may reduce STIs may have no detectable effects on pregnancy rates. What's more, our data on pregnancy as well as all of the sexual behavior data is self-reported, and therefore possibly subject to reporting biases. More studies using biological outcomes should be carried to fill this gap. However, as explained in the Appendix 1, our results give reasons to believe that reporting bias is not driving the main findings in this study.

The paper is organized as follows. Section 2 sets our motivation by presenting a literature review and the resulting research questions that the paper addresses. Section 3 presents the background on HIV education in Cameroon and the experimental design. Section 4 presents our data, outcomes of interest and empirical strategy. Sections 5, 6 and 7 present the

treatment effects respectively on sexual behavior, exposure to HIV education and knowledge (mechanisms), and diffusion to peers and spillovers. Section 8 concludes.

2 Motivation

2.1 Literature Review on HIV Education

Youths have the most to lose from HIV infection, and there is a consensus in the fact that they should be at the centre of HIV prevention efforts. The question is how this should be done. Several prevention strategies focusing on youth have been implemented in developed and developing countries from mass media to voluntary counseling.

Among these strategies, school-based HIV prevention interventions have been considered as a necessary step in the fight against HIV (Ross 2006). Indeed, due to high rate of schooling they can reach large numbers of youth and more importantly reach them before they become sexually active.

Many school-based HIV risk reduction programs have been put in place and part of these interventions have been subject to evaluations. Several systematic reviews have summarized findings from these studies around the world (Kirby 2007), in developing countries (Ross et al., 2006) but also specifically in Sub-Saharan Africa (Mavedzenge et al. 2011). Some reviews also focused on what we are especially interested in here: school-based interventions in sub-Saharian Africa (Paul-Ebhohimhen et al., 2008, Gallant and Maticka-Tyndale, 2004). According to these systematic reviews, almost all school-based interventions were successful at improving knowledge and to lesser extent attitude-related outcomes. However, sexual risk behaviors were more difficult to change. Indeed, if most of the studies show that HIV education does not hasten or increase sexual activity, evidence that it *reduces* risky sexual behavior remains mixed.

Kirby (2006), reviewing 83 studies (more than half in the United States), found that

approximately two thirds of the programs significantly improved at least one measure of reported sexual behavior. Ross et al. (2006) found a similar proportion among 22 interventions in developing countries. However, reviews focusing on sub-Saharan Africa provide a less optimistic picture: Paul-Ebhohimhen et al. (2008) and Gallant and Maticka-Tyndale (2004) found almost no improvement in behavior; Mavedzenge et al. (2011) reports that, among 11 studies, 7 had a positive effect on at least one measure of reported sexual behavior but the number of significant changes in behavior in each study is very low (especially for Randomized Control Trials).

These systematic reviews try to assess the main components of successful programs in terms of: theory-based, instructor, activities, age etc. These appear to be very complex as the structure, the length and the content of interventions varied widely. Some components seem to emerge: Kirby (2000) describes 17 "best practice" guidelines for having a well designed school based interventions (mainly from developed countries studies). These characteristics describe: the development of the curricula, the overall design and teaching strategies of the curricula and the implementation of the curricula. Some reviews used this framework to categorize the interventions among three different dimensions: curriculum-based versus non curriculum-based (often less structured e.g. one to one meeting upon students' demand, dramas etc.), with or without the 17 characteristics of effective curriculum-based interventions, and adult led versus peer-led interventions. They found that "curriculum-based + adult-led interventions" is the most effective category. These interventions are the most common; they are typically more intensive, based on theory and previous research and are led by teachers or other adults that have more knowledge and skills than peers.

Thus, worldwide it seems possible to identify a category of effective school-based interventions. However, about a third of the interventions in this category did not prove effective, and their "failure" rate is even higher in developing countries, especially sub-Saharan Africa. Our understanding of what work and what does not work in sub-Saharan Africa thus remains limited.

One important question that emerges from the various reviews to date is whether the identity of the HIV information messenger matters. This literature (Kirby 2006, Ross et al. 2006, Mavedzenge et al. 2011) makes the point that trained adults (schoolteachers and others) are typically more skilled than peers, while peers could be able to relate more closely to other teenagers. It concludes that curricula teached by trained adults are more effective. But which adults are best placed to deliver this information? Local teachers or trained health professionals? Despite the fact that teacher-led interventions are logistically easier to implement in schools once teachers have been trained, the literature reports that they can have also some limitations because of their status in relation to pupils or their discomfort in discussing sensitive topics such as condoms or sexual behavior in general (Ross 2006, Gallant 2004). Teacher training, structured curricula or involvement of outside professionals has been seen as ways to overcome these obstacles.

A second big subject of debate in the literature concerns the content of HIV prevention curricula. Most curricula in Africa make explicit or implicit reference to all three components of the "ABC" (Abstain, Be Faithful, Use Condoms) approach to prevention. However, because reluctance to discuss condoms is common among school teachers, there is great variation in the extent to which condoms are mentioned. Most curricula remain silent on the issue of cross-generational relationships, which usually involve monetary transfers from the (older) male to the female partner, even though such relationships have been identified as an important factor in the spread of HIV (Luke 2003). Dupas (2011) found that a 45-minute session delivered by an outside facilitator with a focused message on the heightened risk of HIV faced by girls having sex with older partners, was effective at reducing unprotected sex among adolescent girls while the regular HIV/AIDS curriculum delivered by trained teachers and focusing on abstinence and faithfulness promotion had no impact. One can then wonder whether part of this difference could come from the fact that focused messages are remembered better, that the trained professionals were not reluctant to address students' questions regarding condoms, or that HIV information is more credible when delivered by

an outside professional.

Finally, another important dimension from this literature is communication. Indeed, increasing communication with others (parents, peers, friends, and sexual partners) is seen as an important step towards prevention as it exposes youth to information and encourages a dialogue about risks and options (Gallant 2004). Reviews that take this outcome into account show that HIV education generally leads to significant increase in communication (Paul-Ebhohimhen et al, 2008, Gallant and Maticka-Tyndale, 2004). However, this increase in communication does not translate into a change in behavior in most of these papers so this questioned the fact that communication should be considered as a positive outcome per se. As a policy maker, this communication can also be considered as a way to assess interventions' externalities and calibrate the optimal setting of the policy.

To conclude, it is important to note that many of the studies included in these reviews provide unclear descriptions of the interventions, their implementation and have generally holistic approach which does not allow going deeper into the "black box". Many studies also suffer from weak study designs as they were subject to selection bias that potentially drives the differences between the treatment and the comparison group. Finally, most programs were evaluated on their own and this does not allow for any comparison between different ways of delivering the message or different content on the same population. Thus, there is clearly room for more research which rigorously identifies the factors that drive successful school-based HIV prevention program in Sub-Saharan Africa.

2.2 Research Questions

The literature review above leaves as many questions open as it answers. On particular, why is the impact of school-based HIV interventions so heterogenous across studies and contexts? We envision two potential sources of the heterogeneity in the impact of school-based HIV education programs: the heterogeneity in the interventions themselves, and the heterogeneity in the contexts in which they are implemented.

Regarding the interventions, we propose to focus on two characteristics of adult-led and curriculum-based HIV education that might influence their efficiency: first, what are the relative merits of delivering the prevention message through trained regular school staff members versus trained health professionals that rotate across schools. Second, what is the effect of adding information about the dangers associated with cross-generational relationships on top of the standard ABC approach.

Given the discussion in the literature we can expect that having trained health professionals coming from outside the school to deliver the information could allow more discussion with pupils on touchy topics, but also more accurate information, and likely more memorable sessions given that rural schools are rarely visited by outsiders. On the other hand, the frequency of delivery is lower with an outside professional who comes only once in a while, compared to having a trained teacher on the school premise on a daily basis.

Regarding the potential value-added of including information on risks associated with cross-generational relationships, Dupas (2011) argues that partner selection is an additional margin along which teenagers can reduce their exposure to HIV risk, and making that margin salient can be important for those for whom abstinence is too costly. Interventions including this information may change the type of sex regarding partner selection (age of partners, assistance received from partners) but could also increase the quantity of sex compared to more classical information campaigns if, as is often feared with condoms, discussing partner selection would encourage promiscuity.

In addition, the growing literature on psychology and development points to limited attention and memory issues that should be taken into account in the design of optimal interventions (Mullainathan, 2007). According to this literature, students might over-react to one salient piece of information at the expense of others (Mullainathan 2002). Following this literature, information on risks associated with cross-generational sex might decrease the salience of classic messages and thus decrease abstinence, faithfulness or condom use, with unclear consequences on HIV prevention.

Finally, we note that the effectiveness of HIV education programs may vary with local cultural and socio-economic characteristics. Since most interventions that have been rigorously evaluated were done in small and relatively homogeneous areas, tests of heterogeneity in treatment effects for a given program are rare in the literature. We propose to explore the possibility that HIV education might have heterogeneous impacts across settings depending on initial level of knowledge, prevalence of risky sexual behavior, social norms, etc. in a specific population. Is there a "one-size-fits-all" HIV prevention?

3 Background and Experimental Design

3.1 Background on HIV Education in Cameroon

HIV Prevalence in Cameroon

At the onset of this project in 2009, Cameroon was the country with the highest rate of HIV prevalence in the Central and West Africa Region, at 5.3% of the 15-49 population (UNAIDS, 2010). By 2011, this rate had gone down to 4.3% according to the latest Demographic and Health Survey, but this average masks important differences across regions, as shown in Figure 1. The average prevalence in the most affected region, the South, is 6.4% while it is only 1.2% in the least affected region, the Extreme North.

These averages themselves mask very large differences between gender. Indeed, the principal mode of transmission of HIV in Cameroon is heterosexual contact, and as in most of sub-Sarahan Africa, HIV prevalence is significantly higher for women than for men, at 5.6% vs 2.9%. The breakdown by age and gender group is presented in Figure 2. HIV prevalence is more than five times higher among women below the age of 24 than among men below 24. This may be largely attributed to girls becoming sexually active at a younger age as well as physiological differences that make male-to-female transmission more likely than female-to-male transmission (Bertozzi et alii., 2006). In 2006, 14 percent of girls between 15 and 19

years had their first sexual intercourse before the age of 14 in Cameroon (WHO, 2008).

HIV Knowledge and Sexual Behavior Among Teenagers

Table 1 presents summary statistics on self-reported sexual behavior collected at baseline among a subset of girls sampled for the experiment. At the time they completed the survey (Jan-Feb 2010), these students were just above 15 years old on average. Just over 22% reported being sexually active, a figure remarkably close to the 21% among the Kenya sample in Dupas (2011). The use of condom is widespread: 83% of sexually active girls declared having ever used a condom. The number of partners is also quite large given the young age of our population, with an average of two partners in the last 12 months per sexually active girls.

Awareness about HIV is almost universal (98% declared they heard about HIV). However, knowledge on transmission is quite poor: 65% think that mosquitos can transmit HIV and 62% think that condom are not very effective at preventing HIV infection when used correctly. The risk of infection is also hugely overestimated since the average girl in our sample thinks that 51% of the population and 38% of 15-19 teenagers are infected. 60% also think that it is absolutely certain that they would get pregnant had they have a single unprotected intercourse.

Despite the overestimation of risks, awareness of ways to prevent HIV infection is not good. Only 42% mention faithfulness or abstinence as a way to prevent HIV infection. 57% mention condoms but as said earlier only 38% think that condoms are highly effective at preventing HIV transmission. Awareness of the distribution of HIV risk across age groups is higher in this sample than in the Kenya one, though still limited: just about half of girls are aware that men above 25 have a higher chance of having HIV than men below 25 (compared to a third for the Kenya sample).

The breakdown of these baseline statistics by region is presented in Table A1. We show

the results for the three regions included in our experiment, the South (a relatively small region but with the highest HIV burden as mentioned above), Yaoundé (the capital city, with a relatively high HIV burden as well) and the West, among the largest but least affected regions. We observe striking differences between the three regions: while their average age is the same, girls in the South are much more likely to be sexually active, at 58% compared to 15% and 19% in Yaoundé and the West, respectively. Accordingly, rates of teenage pregnancy are much higher in the South, at 16% compared to only 2% in the other two regions. While it is remarkable that some girls who have ever been pregnant are still in school (this is not the case in Kenya, as shown in Duflo et al. (2012)), school participation rates among girls appear to be lower in the South, with only 46% of the junior high school population being female in that region.

School-Based HIV Education

The government of Cameroon authorized school-based HIV prevention programs in 2004 as HIV was recognized a national priority. As of 2009, HIV/AIDS prevention education had not been integrated into the standard curriculum for either primary or secondary school. Teacher training was part of the governemental strategy for HIV/AIDS prevention education but very few teachers (2.6% of the schools) were actually trained by 2009. While individual teachers or other school personnel (e.g. counsellors) could take the initiative to discuss about HIV with students, a 2010 survey administered to school staff by the Institute for Research, Socio-economic Development and Communication (IRESCO, a non-profit organization specializing in reproductive health and health education) suggests that while most of them had a relatively good knowledge and understanding of HIV, they did not know how to teach this material and felt they needed a special training. In particular, most school staff members were reluctant to talk about condoms (fearing that discussing condoms in the classroom would be akin to encouraging promiscuity) and those who did teach about HIV focused on abstinence education.

Discussions between the research team, the Ministry of Education and IRESCO suggested a high level of interest in understanding how best to introduce HIV prevention in secondary schools. One key question that arose was that of the "messenger" – namely, who should be delivering HIV prevention information? Regular school teachers trained on this issue, or specialized health professionals that could rotate across schools? The experiment was designed to answer this question. The experiment was implemented by IRESCO under guidance from the research team.

3.2 Experimental Design

The experiment involved 318 junior high schools. These schools were assigned, through block-randomization, to one of four groups: (1) control, (2) basic treatment, (3) treatment with an outside consultant, and (4) treatment with an outside consultant and a "relative risk" message.

Basic Treatment (BT, 80 schools) Each school in this group was invited to send one permanent staff member to a two-day training held in the region capital city. The training was organized by IRESCO and was focused on HIV prevention education pedagogy, providing trainees with ways to talk about HIV and prevention of HIV with students, including a Q&A manual. The training encouraged teachers to promote all modes of avoiding infection (abstinence, faithfulness and condom use). Over half (53%) of schools sent a teacher (most often a biology teacher), around a quarter sent the after-school facilitator (the person in charge of extra-curricular activities after school and on Wednesday afternoons) and the remainder sent other non-teaching staffs (hall monitors, counselors, directors of studies). 70% of the trainees were men, with large regional differences: 50% in the South, 67% in Yaoundé and 76% in the West. After the training, the trained facilitators were responsible for helding as many sessions as they wanted in their school, with a priority for the selected class.

Treatment with an outside consultant (TC, 79 schools) This treatment was implemented by a trained, female outside professional, who came to the school just once to deliver the same basic message as in the BT intervention. The training course and materials that was given to the consutants prior to the intervention had exactly the same content as the training course given to the school staff members. BT and TC thus differ only in the format and style of presentation: The external consultant provided a single session, showed two short videos on abstinence and condom use and facilitated a discussion of these issues among students in the class. In total, the intervention lasted around one hour. In this treatment, the content of the information delivered should be the same as in the Basic Treatment group but the format of the intervention is different in terms of duration, number of sessions, relation of the messenger to students and general ease with sex-related topics.

Treatment with an outside consultant and a relative risk message (TCR, 79 schools) This treatment is just like the TC treatment but in addition to the information delivered in the previous treatment, the consultant provided detailed information on HIV infection rates by gender and age groups, highlighting the risks associated with "sugar daddy" relationships (called "sponsor" relationships in Cameroon) and their responsibility for the cross-generational transmission of HIV. The consultant also showed the two videos on abstinence and condom use and a longer one on risks associated with "sponsors". In total, the intervention was planned to have the same duration as in the TC group so that both groups differ only in the content of the information but not in the format of the session. This treatment is a replication of the Relative Risk treatment tested with similarly-aged girls in Kenya in 2004-2005 (Dupas, 2011). Two external consultants, staff of IRESCO, covered all 158 schools in either the TCR or TC treatments, and they both did about half TCR and half TC.

Allocation of the 318 schools into the four experimental arms was done after stratifying by region, whether the school was a stand-alone junior high school or attached to a senior

high school, the school's tertile in terms performance on the junior high school leaving exam (BEPC), and the school's tertile in terms of student gender ratio. It's important to note that all interventions (training the teachers or sending an outside messenger to the schools) had the same total cost.

3.3 Sampling and timeline

The study took place in three French speaking regions of Cameroon with relatively different background characteristics as discussed above. Yaoundé is purely urban whereas the South and West regions are mostly rural. In total, these three regions totalized 527 junior high schools (middle schools). We excluded from the sample all confessional schools as well as schools with fewer than 10 girls in 8th grade (our target grade). This left 326 schools out of which we randomly sampled 318. Panel A of Table 1 provides summary statistics on the schools in our sample.

In each school, one class was randomly selected for the study. This class was specifically targeted by the trained school staff members (in the T group) and the consultants (in the TC and TCR groups). While the consultants implemented the HIV education session only in the selected class in each school, the school staff members were asked to prioritize the selected class but without any restriction regarding the other classes.

In each class selected for the study, 10 or 11 girls were chosen at random to form the study sample. (For schools with fewer than 10 girls, all girls were enrolled in the study). We discuss how this sampling was done in more detail in section 4.1 below.

The school year in Cameroon goes from September to June. The baseline survey was conducted in end-January 2010. The trainings in the Basic Treatment group took place in February 2010. The consultant visits in the TC and TCR groups took place between February and May 2010. Our estimates of treatment effects are based on an endline survey conducted between February and April 2011.

4 Data and Estimation Strategy

4.1 Data Collection

Administrative data on schools in all three areas of study were collected from the school districts at the onset of the study. These data were used to select and stratify the sample and a subset of these data is presented in Panel A of Tables 1 and A1.

At the individual level, we have two datasets: a baseline and an endline survey. For budgetary reasons, the baseline survey was conducted in only half of the schools randomly chosen. The procedure for sampling girls within each school depended on whether a baseline survey was conducted or not. We therefore describe the two procedures in turn.

Schools sampled for baseline (sample 1) These 159 schools (balanced across the 4 treatment groups) were visited for a baseline survey in January 2010, before any of the interventions started. The baseline questionnaire was self-administered; it included questions on socio-economic characteristics, HIV related knowledge and sexual behavior. All students (girls and boys) in the selected 8th-grade class were invited to fill-in the questionnaire. However, only 10 of the girls present on the day of the baseline were randomly selected to be part of the study sample (if there were fewer than 10 girls enrolled, all girls were selected for the study). A total of 1585 girls were selected from these sample 1 schools. Only the questionnaire answers of the 10 sampled girls were digitized. Data from these questionnaires are presented in Panel B of Tables 1 and A1.

Between February and April 2011, about one year after the interventions, we attempted to administer an in-person endline survey to all 1585 girls in the baseline sample. If still in school, girls were interviewed on the school premise. If out-of-school, girls were visited at home. When girls could not be found in person, we attempted to survey a proxy (typically a friend) on a sub-set of outcomes that are common knowledge in the community (cf. below section 4.2).

Schools without a baseline (sample 2) In the 159 schools where no baseline survey was conducted (also balanced across the 4 treatment groups), we randomly picked 11 girls among those listed on the class register in January 2010 (the expectation being that 1 of them would have dropped out by January 2010 and would not be traceable). We attempted to survey these 11 girls in each school using the same procedure as that described above for sample 1.

All in all, our endline sample (samples 1 and 2 combine) include 3312 girls. 86% of them were interviewed in person and we have a proxy-survey containing a restricted subset of outcomes for an extra 6%.

To measure information spillovers, we also collect data on girl friends[1]. For schools in the TC and TCR groups, consultants, at the time of the intervention, had asked girls to list their girl friends from the same school. Girls were not limited in the number of friends they could list, and it was explicit that they could list friends both in and out of their own class. We identified from that list girl friends in other 8th grade classes in the same school. We interviewed 449 such friends at endline.

4.2 Outcomes of Interest

Self-report Behavior The endline survey included questions on the quantity of sexual activity (occurrence of a sexual activity), as well as quality (characteristics of sexual partners and condom use). To reduce social desirability issues regarding sponsors, we avoided the stigmatized term "sponsor" in the questionnaire but rather used the expression "partners providing assistance."

[1]The original plan was to measure the spillovers on sisters too, but it turned out that the sample of sisters was too small to be informative. The sample of sisters consisted in all sisters aged 13-18. We expected more sisters than what we actually got: only 548 sisters over the 4 treatment groups, meaning that only 1 girl out of 6 in our sample has a sister aged 13-18. We thus suggest future research on intra-family spillovers to use larger samples of girls in the treatment groups to be able to detect reasonable effects. Including younger and older sisters does not seem a good option because communication is less likely to be abundant among sisters with a large age gap, and because younger sisters are less likely to be sexually active while older sisters are less likely to respond to behavioral change.

These self-reported outcomes are only available for girls that could be interviewed in person at endline. As shown in Table 1, panel C, attrition on these outcomes is relatively large, at 16% over a 12 month period, although since these are for girls at a highly mobile age, it is not entirely surprising and remains within the range of attrition rates observed in comparable experimental settings.[2] The attrition rate is significantly lower (-3.9ppt) in the Basic Treatment group than in the other groups. We discuss this differential attrition in detail in the Appendix.

Life outcomes Because self-reported behavior can be unreliable, and the interventions might have affected the likelihood of social desirability bias, we favor more objectives measures of behavior, what we call "life outcomes". Those are childbearing and schooling. The other advantage of these outcomes is that they can be measured without an in-person interview, as girls' childbearing and schooling status is typically common knowledge in the community. As a consequence, attrition for these outcomes is lower than that for self-reported behavior, around 10 percent, and cannot be distinguished across groups (Table 1, panel C).

Intermediate Outcomes The penultimate section of the endline survey (after all questions on sexual behavior had been answered) quizzed girls on their knowledge of modes of transmission and prevention of HIV. We used open-ended questions in the questionnaire, such as "how can one prevent HIV infection?" and listed their answers.

The last section of the endline survey asked girls about the HIV education they received. Here again, we used mostly open-ended questions. For instance, we first asked girls to list their sources of HIV information without mentioning any potential source. We can thus check if they mention "school", unprompted. We then asked them specifically if they had sat in on one or more HIV education sessions at school, and if so, we asked about the content

[2]For example, Godlonton et al. (2012) have a 30% attrition rate among men in Malawi over a 12-month follow-up period.

of those sessions, who held them, etc. As with the self-reported sexual behavior data, this information was only collected for girls who could be interviewed in person.

4.3 Estimation Strategy

Econometric Specifications For each outcome of interest, we show four specifications: one estimating the overall effect across all three regions, and then separately by region. The rationale for looking at heterogeneity of treatment effects by region is obvious from the extreme heterogeneity in baseline behaviors and knowledge across regions we mentioned above, and since the randomization was stratified by region, our estimates of region-specific treatment effects are unbiased (albeit somewhat less precise). We do find, overall, highly heterogeneous effects by region, and much of our discussion of the results below will focus on this.

Each column in these tables corresponds to the estimation results of an equation of the form:

$$Y_t = \alpha + \beta Treatment + \gamma Consult + \delta Relative + \eta Y_{t-1} + X\text{'}\theta + \varepsilon$$

Where $Treatment$ is a dummy for being in any of the three treatment groups, $Consult$ is a dummy for being in one of the two outside consultant treatment groups, and $Relative$ is a dummy for being in the Relative Risk message group. Because these three treatment variables were randomly assigned, they are in expectation uncorrelated with the error term and can therefore be estimated through OLS.

Coefficient β estimates the impact of the basic treatment alone, while the coefficient γ estimates the added effect of relying on a consultant to deliver the same basic message, and the coefficient δ estimates the added effect of including the relative risk message in the consultant intervention. The sum $\beta + \gamma$ estimates the total effect of outside consultant treatment, and we show the p-value for a test that this sum is equal to zero at the bottom of the column. The sum $\beta + \gamma + \delta$ estimates the total effect of the outside consultant with

the relative risk message and we also show a p-value for a test that this sum is equal to zero.

We control for a set of characteristics X that includes strata dummies, a dummy indicating that the questionnaire was administered to a proxy (almost always a close relative), and baseline individual characteristics (age, having ever participated in the school health club, marital status, religion, having a relative how has HIV or died of AIDS, having ever been pregnant, having ever had sex, having a partner, number of partners, having ever used a condom, HIV knowledge index score, perceived risk index score). For outcomes that were measured at both baseline and endline, we also control for the baseline value of the dependent variable. Results without these baseline controls are largely similar although not always (available upon request). We favor the results controlling for observable individual characteristics since the randomization was done at the school level and not the individual level, and we do not have perfect balance on observable individual characteristics as discussed above.

Threats to internal validity Our reliance on the randomized assignment to treatment groups for identification would be misguided in the presence of spillovers (violating the SUTVA) or if the randomization failed to yield balanced groups or if the randomized assignment had not been respected.

To minimize the risk of spillovers, the randomization was done at the school level. We consider the possibility that girls from different schools share information on HIV education as unlikely given the distance between schools.

We check for balance across groups in Table 1. Panel A presents school-level characteristics and Panel B presents girl-level characteristics. All differences in pre-treatment school characteristics are small and insignificant, which is not surprising since we stratified on 3 of these variables (region, performance on BEPC and sex ratio). The sample is less balanced when it comes to individual characteristics (Panel B). Girls in the TC group are significantly more likely to know that mosquitos cannot transmit HIV than girls in the control group

and they have significantly less sexual partners than in the control group. Furthermore, girls in the TC groups are less likely to have a relative or friend who has HIV or died of AIDS. Finally, girls in the TCR treatment group are less likely to know that men above 25 are riskier partners than men below 25 than in the control group and they are more likely to mention abstinence or faithfulness amon top two HIV prevention methods. Overall, we found 6 significant differences out of 75 tests of equality so these differences are most likely due to multiple testing. In the regression analysis, as mentioned above, we include control variables for observable individual characteristics to control for these imbalances.

Regarding compliance with treatment assignment, a handful of schools did not receive the treatment they were assigned to: 3 schools out of 80 in the BT group had nobody from the school staff attending the training; one school in the control group was used to pre-test the TCR intervention, by error; finally, another school in the control group was visited by a staff member of a neighboring school belonging to the BT group to run an HIV education session. The compliance rate is thus very high, at 98.5%, and we focus on the intention-to-treat estimator.

5 Results: Impacts on Self-reported Behavior, Fertility and Schooling

This section discusses the impacts of the interventions on behavioral and life outcomes measured at endline. We start by presenting the effects of the basic intervention on self-reported sexual behaviour and life outcomes (teen pregnancy and schooling), before turning to the comparative effect of relying on a consultant to deliver the basic message, and the comparative effect of including a relative risk messagein the consultant intervention.

Note that the coefficient on C and the coefficient on R do not represent the effect of TC and TCR compared to the control group. The coefficient on C represents the comparative effect of relying on a consultant to deliver the basic message relative to relying on a school

staff to deliver the same basic message. The coefficient on R represents the comparative effect of including the relative risk message in the consultant intervention relative to the basic message delivered by the consultant. In particular, a negative coefficient on C (resp. R) does not generally mean that TC (resp. TCR) had a negative impact on the outcome, but a lower impact than the basic treatment (resp. the TC treatment). If the reader is interested in the effect of TC (resp. TCR) compared to the control group, please sum the coefficients on BT and C (resp. BT, C and R).

To the extent that self-reported sexual behavior is prone to social desirability bias, we put the emphasis on the life outcome measures, which, while also self-reported, are harder to mis-report in a home-based survey (though they are not completely immune to social desirability bias either, something we discuss in Appendix 3). We do find relatively high level of consistency between the two sets of results, however.

For each outcome, we show the treatment effect estimates for the full sample as well as separately for each study area. The first thing of note is that, even in absence of any intervention, the mean outcomes of interest (shown at the bottom of each column) are extremely different across the three areas. The share of girls sexually active (those having had sexual intercourse in the last 12 months) is 43% in the South compared to 28% in the West and only 20% in Yaoundé. Self-reported unprotected sex is also much more common in the South, at 50% of last sexual intercourse compared to only 23% in the West and 18% in Yaoundé. Consequently, for life outcomes such as teen pregnancy, the differences are equally large. As many as 33% of adolescent girls from the control group in the South have ever been pregnant, compared to just around 7% in the West and 5% in Yaoundé. In all three areas the majority of these teenage pregnancies are unplanned and, consequently, out of wedlock, but this is particularly the case in Yaoundé and the South, were 8 or 9 out of 10 teen pregnancies are out of wedlock, against 6 out of 10 in the West.

Given the very big differences across regions presented in section 4, the scope for heterogeneity in the magnitude of the treatment effects across areas is large. And for the most

part, we find relatively highly heterogeneous treatment effects. For this reason, while the tables show the results for the full sample for each outcome, our discussion below tends to focus on the heterogeneity.

5.1 Effect of basic information delivered by school staff members

Starting with self-reported sexual behavior in Table 2, we find no significant impact of the basic treatment in any region on the likelihood that girls report having sex in the previous 12 months (columns 1-4), but we start to see treatment effects when we look at types of sex. In particular, the basic treatment reduced the likelihood that girls' first sexual experience was unprotected by 67% in the South (col. 7 of Table 2A, row 1). There is also a decrease in the West but the effect is smaller (19%) and insignificant. In contrast, the effect in Yaoundé is a clear zero. To check how persistent the basic treatment effects on condom use are, we can look at whether the last sexual intercourse was unprotected. We find a large decrease of 21 percentage points (off of a base of 50%) in the South, but given the relatively small sample for that region, the effect is not significant at conventional levels (the p-value is 0.13). In the West and Yaoundé, the effect is much smaller and insignificant. So the basic treatment was effective in the South at encouraging more use of condoms. Regarding partner selection, the basic treatment had no impact in any region (Table 2B).

Because self-reported sexual behavior is notoriously unreliable, objective measures of risk-taking are necessary to assess the impacts of the various interventions. Our objective measures are what we call life outcomes, presented in Table 3: pregnancy, marriage and schooling. Here again, we see very big heterogeneity in the treatment effects depending on the area of study. The basic treatment was effective in the South: it led to a very large -32%- and significant decrease in teen pregnancy in the South (Col. 3 of Table 3), consistent with the decrease in unprotected sex seen in Table 2. At the same time, we see an increase in marriage in that region. All in all, it seems that the basic treatment affected two margins. On the one hand, it reduced the likelihood of unwanted, out-of-wedlock pregnancy (see columns

11 and 19). On the other hand, it increased the likelihood that girls start a family. The effect on the first margin was much greater than that on the second margin, however, yielding a net decrease in teen pregnancy. Finally, and surprisingly, the reduction in teen pregnancy in the South translated into only a small decrease in dropout risk in that region. The lack of a one-for-one correspondence between pregnancy and schooling in the South suggests that, in contrast with the Western Kenya context studied in Dupas (2011) and Duflo et al. (2012), schooling and pregnancy are not incompatible in Cameroon.

In the West and in Yaoundé, the effect of the basic treatment on life outcomes is small and insignificant. Overall, the results on self-reported behavior are thus very consistent with the results on objective measures, which is reassuring regarding potential social desirability issues.

5.2 Comparative effect of external delivery of basic information

Having an external consultant deliver the HIV education rather than local school staff appears to be counterproductive in the South and in Yaoundé, whereas rather effective in the West.

In the South, where risky behavior is extremely prevalent to start with, relying on an external consultant mitigates the treatment effects on condom use: the coefficients on row 3 are mostly of opposite sign compared to row 1 for the south (col. 7 and 15 of Table 2). Consistently, relying on a consultant to deliver the basic message was counterproductive: it led to a 16% increase in pregnancy compared to the basic treatment (very close to conventional statistical significance level, the p-value is 0.11) (col. 3 of Table 3). The counterproductive effect of external delivery on teen pregnancy is mostly due to a significant and large (24%) increase in out-of-wedlock pregnancies compared to the basic treatment group (col. 19 of Table 3). Again, the change in teen pregnancy between the basic and the consultant groups does not translate into any change in school dropouts, suggesting that schooling and pregnancy are compatible in the South.

In Yaoundé, where the basic treatment did not make a difference, the basic-message interventions by external consultant actually backfired. The level of unprotected sexual activity went up by 74%: a 13.8pp increase off of a base of 18.6% (col.10 of Table 2). Consistent with the increased in risky sex, the consultant had a significant perverse effect on unwanted and out-of-wedlock teen pregnancy. This effect is very large, with a 66% increase in out-of-wedlock pregnancies (a 3.2 pp increase off of a base of 4.5% in the control group). The effect of consultant on overall teen pregnancy is also very large, a 52% increase, and close to conventional statistical significance (the p-value is 0.11). This increase in teen pregnancy translated into a 69% increase in school dropouts (a 2.5pp increase off of a base of 3.6%). These results suggest that schooling and pregnancy are incompatible in Yaoundé.

In contrast, there is a clear decrease in teen pregnancy (especially unwanted pregnancy) in the West. This decrease is relatively large in percentage terms: a 2.8pp decrease in teen pregnancy off of a mean of 7.3% in the control group, i.e. a 38% decrease (col. 8 of Table 3), a magnitude similar to that of the basic treatment effect in the South. This translated into a 1.8pp reduction in dropout rates off of a base of 8% in the control group (the p-value is 0.11) (col. 24 of Table 3).

5.3 Comparative effect of including Relative Risk information in consultant intervention

Including the Relative Risk message in the consultant intervention increased the incidence of unprotected sex in the West: it led to a 3.1pp increase in unprotected sex at first sexual intercourse off of a base of 9.5%, so a 33% increase. In contrast, adding the Relative Risk information led to a huge decrease (-32pp) in unprotected sex in Yaoundé compared to the classic message delivered by a consultant.

Turning to the second element of risk, partner choice, we find pretty much no effect whatsoever on either partner's age or the number of sponsors in the West and in the South. But in Yaoundé, adding the Relative Risk message reduced the occurrence of sponsor-type

relationships by 5.8pp compared to other groups (a 31% decrease). Consistently, it (insignificantly) reduced the incidence of sponsor-type relationships and increased the reservation transfer in Yaoundé. So including the Relative Risk information was surprisingly inefficient at changing partner selection in the South and in the West but quite efficient in Yaoundé.

The relative risk message yielded no significant impact on any of the life outcomes. In the West -where adding the Relative Risk message increased unprotected sex compared to the classic message, the coefficients on row 5 all go in the wrong direction, suggesting an increase in pregnancies and dropouts. Symmetrically in Yaoundé -where the Relative Risk message decreased unprotected sex and the occurrence of sponsor-type relationships, the coefficients are not significant but they indicate fewer pregnancies and higher enrolment than in the TC group.

5.4 Summary

All in all, this first set of results raises more questions than it answers. None of the three interventions unambiguously reduced risk-taking in all three study areas: the basic treatment was effective only in the South, while the TC intervention was effective in the West, ineffective in the South and even backfired in Yaoundé. Including the Relative Risk information to the consultant intervention showed some positive effects in Yaoundé but rather negative ones in the West. Can heterogeneity in how the interventions were implemented in each of these regions explain these differences? The next section searches for answers by looking at the content of HIV messages that youth in all three regions report receiving at school and how those affected their knowledge and beliefs

6 Mechanisms

6.1 HIV education exposure

Tables 4 and 5 present evidence on reported exposure to HIV education and the content of HIV education. Table 6 presents evidence on the pedagogy of HIV education at school.

To start with, the great majority of students report school as a channel of information on HIV even in the control group. In contrast, only a minority of students (32% overall in the control group) reports having attended at least one formal HIV education session in the previous 12 months. Average total time in HIV education sessions over the year remains low, from 40 to 60 minutes distributed in 1.5 to 2 sessions, depending on regions. These HIV education sessions are held both by school staff and outside consultant, with a slightly higher mobilization of outside consultant: 23% recall a session held by an outside consultants while 18.5% by school staff, overall in the control group. Conditional on having attending formal HIV education sessions, close to half of students find the HIV education sessions very interesting in Yaoundé and in the West, while only 28% in the South.

Effect of basic information delivered by school staff members

The basic treatment increased substantially HIV education exposure in the South and in the West, but not in Yaoundé. The impact is particularly large in the West, where school staff members proved very responsive to the training. We discuss here the detailed effects of the basic treatment on HIV exposure.

In the South and in the West, the proportion of girls that report school as a channel of information increased, especially in the South where this proportion was initially smaller (84%) than in the West (92%) –columns 3-4 of Table 4 suggest that the intervention closed this gap. The increase in the fraction of students who recall having attended at least one formal HIV education session is substantial: a 40% increase in the South and a 96% increase in the West (col. 7-8 of Table 4), and there is evidence that the increase is due to a higher mobi-

lization of school staff (large but not significant in the South, col. 23-24 of Table 4). Among those who recall formal HIV education, the number of HIV education sessions doubled, from 1.5 to about 3 sessions in the last 12 months. Consequently, students in the basic treatment group recall more discussions of all themes (abstinence, faithfulness and condoms) than in the control group, with the noticeable exception of condom in the South: the point estimate is quite big but insignificant (Table 5), which suggests that some school staff members in the South were still reluctant to discuss condoms during HIV education sessions at school. Interestingly, the increase in girls who recall discussions of each theme (except condom in the South) is of the exact same magnitude as the increase in girls who recall having attended formal HIV education sessions. Finally, school staff-based interventions were successful at enabling students to speak up in class and ask questions about HIV (col. 3-4 and 7-8 of Table 6), again in the same magnitude as the increase in HIV education sessions. Overall, conditional on remembering having had an HIV education session, students were not more likely to have found it interesting than in the control group (col. 11-12). Taken together, these results give clear evidence that the basic treatment increased the quantity of formal HIV education at school without changing its quality (content and pedagogy).

In contrast, interventions by local school staff were not noted at all in Yaoundé (row 1 of Table 4). Consequently, students exposed to the basic treatment in Yaoundé do not recall discussions of any theme (whether abstinence, faithfulness, condoms or sponsors) more than the control group (row 1 of Table 5), nor did they ask more questions and found HIV education sessions more interesting than in the control group (row 1 of Table 6).

Comparative effect of external delivery of basic information

The comparative effect of relying on a consultant to deliver the basic information is quite homogenous across regions. The picture is quite clear: outside consultants provided more memorable HIV education, and students recall more often discussions of most themes, especially the less conventional (condoms and sponsors), than with delivery by local school staff

– even though they were supposed to cover the same themes as the school staff. Hereafter we discuss the detailed additional effects of external delivery.

In all regions, outside consultants interventions were noted by a larger proportion of students than school staff-based interventions (the coefficient is large but not significant in the South, although close to: the p-value is 0.13). This effect on memorization arose despite fewer sessions than with school staff (col. 9-12 of Table 4) and equal or less time in HIV education sessions (the decrease in total time exposure compared to school staff-based education in the West is large and close to conventional significance with a p-value at 0.13).

Interestingly, we find no evidence of crowd-out of HIV prevention efforts by regular school staff when an outside consultant is brought in: the TC and TCR treatments did not affect the likelihood that school staff members held sessions on HIV compared to the control group (row 3, col. 21-24 of Table 4). On the contrary, we see a positive and significant effect of the venue of the outside consultant on the likelihood that they do, suggesting potential encouragement effect, in the West: the sum of row 1 and row 3 indicates that school staff was 72% more likely to hold sessions in the TC and TCR group than in the control group.

As to the content of HIV education, outside consultants seemed to make for a more memorable experience: the likelihood that students recall discussions of most themes was higher in the TC and TCR arms than the basic treatment arm (row 3 of Table 5). The increase in memorization is particularly large and significant regarding less conventional themes like condoms (in all regions) and sponsors (in all regions, although not significantly in Yaoundé).

Relatedly, the videos shown by the consultants were mentioned by over half of the sample in all three regions. Since video screenings are rare (especially outside of Yaoundé), this part of consultant-based interventions appeared highly memorable. But the outside consultant interventions did not increase the likelihood that students were able to speak up and asked questions during the sessions compared to regular school staff education (except in Yaoundé where regular school staff was completely absent of memory). Also, students have generally

found sessions held by outside consultant as much interesting as those held by school staff, except in the South where they have found it more often very interesting (col. 9-12 of Table 6).

Comparative effect of including Relative Risk information in consultant intervention

In the West, delivering Relative Risk information did not add anything to global exposure to, content of and attitude towards HIV education, the only difference being (as per study design) in the emphasis put on sponsors. The emphasis put on sponsors is present in the three regions (col. 13-16 of Table 5), but the effect in the South is smaller in magnitude and just below conventional significance level (the p-value is 0.13).

In Yaoundé, delivering Relative Risk information also increased total time in education sessions by 29 minutes –a 69% increase. Interestingly, it encouraged more effort brought in by regular staff school (a 31% increase compared to all other groups, row 5, col. 22 of Table 4) and 18pp more students found HIV education sessions very interesting than in all other groups (a 37% increase). Including Relative Risk information thus led to some improvements in the quantity and quality of HIV education in Yaoundé.

In contrast, it was clearly detrimental to HIV education in the South. Overall, it decreased memory of formal HIV education sessions held by outside consultant compared to the consultant classic intervention (col. 7 and col. 19 of Table 4). As a consequence, the same proportion of girls who do not recall the intervention as formal HIV education do not recall neither discussions of any theme, except sponsors. These findings suggest that adding the Relative Risk information in the consultant message somewhat killed the formal component of the consultant intervention. Students might have found it more distractive and less serious so that they don't remember it as formal HIV education. Regarding effort brought in by regular school staff, we find a crowd-out effect of about 50% (col. 23 of Table 4).

6.2 HIV Knowledge

Table 7 presents evidence on HIV knowledge. In the absence of any intervention, belief about the effectiveness of condoms is generally false, with only 30% of students who know that condoms are highly effective when used correctly in the control group. However, condom use is the most salient way of preventing HIV infection: 81% of girls mention condom use spontaneously when asked about ways to prevent HIV infection, against 50% mentioning abstinence and 40% mentioning faithfulness. Knowledge on relative risk is not so bad but leaves a large margin of improvement: 41% of students know that men 25-29 are riskier partners than men 15-19. However, partner selection is totally absent: only 1.3% of students mention it as a way to protect against HIV. Overall, HIV knowledge is quite homogenous across regions. The only big difference is the salience of abstinence as a way to prevent HIV infection: abstinence is salient to only 33% of students in the South against 52% in the West and 54% in Yaoundé (col. 13-16 of Table 7).

Effect of basic information delivered by school staff members

While almost all coefficients go in the expected direction, the basic treatment led to only two significant improvements in overall knowledge: first, a 24% increase in the proportion of girls who know that condoms are highly effective when correctly used; second, a 14% increase in the proportion of girls who mentions abstinence as a way to prevent HIV infection. Those improvements tend to be consistently larger in region where initial knowledge is low. The large increase in girls reporting abstinence as a way to prevent HIV infection in the South, a region where abstinence is not as much salient as in the other regions, echoes the decrease in pregnancy that we observed here.

The only surprising result is for Yaoundé: despite the fact that the basic treatment did not lead to any significant increase in reported exposure to HIV education through school, it had non-negligible and sometimes significant impacts on knowledge. This result leaves thus open the possibility that some school staff members in Yaoundé did not shirk but students

do not denote the extra HIV education they delivered as formal HIV education sessions.

Comparative effect of external delivery of basic information

Delivery by outside consultant was less efficient than delivery by internal school staff at improving HIV knowledge. The negative effect is particularly constant in Yaoundé: delivery by outside consultant led to a 7 to 13pp decrease in the proportion of students knowing each item (effectiveness of condoms, awareness of relative risk across generations, salience of condoms, faithfulness and abstinence as ways to prevent HIV infection) compared to the basic treatment group. In the South and in the West, coefficients are also often negative but rarely significant.

Comparative effect of including Relative Risk information in consultant intervention

In contrast, including the Relative Risk information in the message improved the effect of consultant intervention on knowledge in Yaoundé: it led to a substantial increase in the proportion of girls who know that condoms are highly effective (a 9pp increase, below but close to conventional significance level), as well as girls who know that men 25-29 are riskier partners than men 15-19 (a 10pp increase) and girls mentioning condoms as a way to prevent HIV infection (a 11pp increase) (col. 2, 6 and 22 of Table 7).

However, including Relative Risk information did not improve knowledge of the fact that men 25-29 are riskier partners than men 15-19 in the South and in the West compared to the other groups (the coefficients are positive but not significant). More importantly, the Relative Risk information did not increase the proportion of girls who mention partner selection as a way to protect against HIV in any region (col. 17-20 of Table 7).

Note that in the South, where including Relative Risk information decreased memorization of formal HIV education sessions compared to the other treatments, the TCR group does not exhibit different knowledge than the TC group. This supports the idea that in-

cluding the Relative Risk information did not cause a decrease in effective exposure to HIV education but rather diverted students from feeling in a formal education session.

6.3 Discussion

The picture that emerges from the content of HIV education students in all three regions report having received at school and their HIV knowledge is two-fold.

First, lasting impressions may not be what matters most when it comes to knowledge and behaviour: sessions performed by outside consultants tended to create a much longer lasting impression in all regions, but led to detrimental effect in Yaoundé and in the South compared to the basic treatment group (with an increased rate of unplanned teenage pregnancy). This perverse effect of external delivery came despite the fact that girls remember very well abstinence, faithfulness, condoms and sponsors being discussed. In contrast, the non-salient sessions performed by school staff in Yaoundé had lasting knowledge impacts.

Second, we find some heterogeneity in the implementation of the interventions which provides trails of potential explanation to the heterogeneity of the impact of the interventions on sexual behaviour.

The first obvious source of heterogeneity in treatment implementation is the response of school staff members to the basic treatment. In the South, and most importantly in the West, school staff members responded a lot and their increased effort was successful to make lasting impressions on students. But in Yaoundé the response was lower and unsuccessful to make lasting impressions on students. Could this explain the heterogeneity in the success of the basic treatment? It might explain the lack of efficiency of the basic treatment in Yaoundé but also conversely its efficiency in the South, but we don't think that this is the end of the story because the basic treatment was also unsuccessful at changing behaviour in the West where the response of school staff was very large and noted.

The second source of heterogeneity is the response of local staff to the consultant in-

tervention. In our data, the outside consultant session seem to be beneficial when it is supplemented by more effort made by regular school staff members, but detrimental or ineffective otherwise. In the West, regular school staff increased their effort and sexual behaviour improved in the TC intervention compared to the control group. In contrast in Yaoundé, there was no increase in the effort of the school staff and behaviour worsened in the TC group compared to the control group, whereas school staff effort increased and behaviour improved in the TCR group where compared to the TC group. Finally in the South, there was no change or a decrease of school staff effort, and behaviour worsened, in both consultant groups compared to the basic treatment group. All these connections suggest that the response of the school staff might explain part the heterogeneity in the effects of consultant interventions on behaviour, reflecting the fact that repeated interactions with a trained facilitator are necessary to enable significant behaviour change.

A third source of heterogeneity in treatment implementation concerns the type of information that was delivered. The same type of information should have been delivered in the TC and TB groups, however in the South it seems like this did not happen. Students remember hearing about abstinence, faithfulness and HIV modes of transmission as much in the two groups, but they remember significantly more often hearing about condoms and sponsors in the TC group than in the TB group. Indeed, it seems that some trained school facilitators in the South remained reluctant to speak about condoms in the HIV education sessions since students in the basic treatment do not remember significantly more often hearing about condoms than in the control group. We thus wonder whether the negative impact of external delivery compared to school staff-based delivery may be because the content of the information delivered by the consultants was inappropriate to these students whose sexual activity and pregnancy rate are very high to start with. These girls might have got confused about the behaviour to adopt and did worse, suggesting that a simple message encouraging abstinence like what school staff members are generally inclined to deliver might be more appropriate in the South context. As we said earlier, it could also be the consequences of

a dose response thing as the exposure in the consultant treatments is supposed to be much less than in the basic treatment. However, we can see that this is not the case in the South where the time exposure to HIV education sessions is not significantly higher for girls in the TC group than for girls in the BT group.

Finally, our set of results challenges the idea that the more pieces of information provided to students during the same amount of time, the better their knowledge and behaviour. Indeed, the heterogeneity in treatment effects might also come from some incongruity between specific pieces of information and specific contexts. As mentioned above, hearing about condoms and sponsors in the South in the consultant groups might have distracted students from the piece of information that matters *in this context*: abstinence and faithfulness, explaining the relative failure of consultant interventions compared to the basic treatment. Also in the West, adding the Relative Risk information increased unprotected sex compared to the TC group, suggesting that information on cross-generational risk might have captured attention at the expense of the core message on condoms. Since marriage is ten times higher and out-of-wedlock pregnancies 24pp less frequent in the West than in the two other regions , sponsor-type relationship might be more attractive for girls in the West. It might be that the Relative Risk message is thus inappropriate *in this context* and captured attention at the expense of condom use. These statements assume that the TCR group received, in addition to the relative risk message, the same amount of information about the other modes of avoiding HIV infection (abstinence, faithfulness and condoms). We can wonder if this seems realistic in the same time frame. Having more information in a same duration session could have created "congestion effects" in the West and prevent girls to learn enough on how to protect themselves. However, we find that girls in the TCR group remember hearing about all topics other than sponsors as much as girls in the TC group. The potential detrimental effect of inappropriate pieces of information echoes the recent literature on selective attention, which points to the fact that people not always lack data inflows, but lack of focus on the piece of data that matters (Hanna et al., 2012). Following this argument, the type of information

to deliver should be carefully adjusted to local needs to avoid crowd out effects of key pieces by inappropriate pieces of information.

To our view, our main finding is that there is no silver bullet when it comes to HIV prevention information should encourage further research. The discussion above aimed at providing trails of potential explanations that need to be rigorously tested.

7 Diffusion and Spillovers

7.1 Diffusion

Tables 8 and 9 present evidence on conversations on sponsors, condoms and faithfulness with family members (parents and sisters) and girl friends. In the absence of any intervention, we can observe that parents remain marginal interlocutors of teenagers on sexual behaviour (only 18% of girls discussed about sponsors and 23% about condoms with at least one parents), while girl friends seem to be the key players (54% of girls discussed about sponsors and 74% discussed about condoms with at least one girl friend). Sisters are intermediate interlocutors, much less than friends but still significantly more than parents.

The impact of the basic treatment on the frequency of such conversations is contradictory across regions. In the South, the basic treatment led to fewer conversations with parents and sisters (all the coefficients are negative and non-negligible, and some of them are statistically significant). In the West, the effect is rather positive although smaller (only one coefficient is statistically significant). There is no significant effect in Yaoundé. Delivery by an outside consultant seemed to decrease conversations with parents in Yaoundé, but to increase conversations about sponsors with girl friends in the South, both compared to the basic treatment. Finally, delivering Relative Risk information led to more conversations with parents in Yaoundé and more conversation with girl friends in the West compared to the TC group.

The picture that emerges from this set of results on communication is uneven. It is

difficult to think of communication as a clear outcome: more conversation on sexuality is ambiguous, indeed. It might reflect a higher concern about risky sexual behaviour and a need to clarify questions and doubts about HIV prevention, which would be a positive outcome. But it might also reflect higher sexual activity and the need/desire to share sexual experience with friends. Looking simultaneously at the effects of the interventions on both communication and behaviour, our results suggest that the more conversations with girl friends, the worse sexual behaviour and life outcomes, while the more conversations with parents, the safer sexual behaviours and the better the life outcomes (although it is not true in the South where the basic treatment led to fewer conversations to parents but safer sexual behaviour and better life outcomes).

7.2 Information Spillovers

Table 10 presents the information spillovers of the consultant interventions. In this table, the econometric specification is different from previous tables because the Basic Treatment group has been dropped from the sample for the spillover analysis. The main comparison is between the control and the consultant groups (coefficient on C), with the coefficient on R still reflecting the additional effect of the Relative Risk message. In order to compare the effects of the consultant interventions on girls in the consultant groups to the effects on their friends, Panel A shows the results for girls in the consultant groups while Panel B presents the results for their friends, using the same specification. This specification does not include other controls than strata dummies since no baseline data are available for friends.

Table 10 gives evidence of information spillovers. Girls in the TCR groups are 9.3ppt more likely to report conversations about sponsors with their friends than girls in the TC and control groups (panel A, col. 3 of Table 10). Moreover, coefficients on C and R are jointly significant for conversations about faithfulness and sponsors (p-values 0.056 and 0.008) and very close to jointly significant for condoms (the p-value is 0.11), suggesting that the consultant interventions somewhat increased conversations of girls with their friends about

all themes. The symmetric result is clear from friend data (panel B): friends in the consultant groups are more than 10% more likely to report conversations about each theme than girls in the control group (the increase in conversations about sponsors is of the same magnitude but insignificant) (col. 1-3 of Table 10). The increase in conversations is not significantly different in the TCR group compared to the TC group (the negative coefficients on R rule out any diffusion exaggeration due to the Relative Risk message).

Friends of girls in the consultant groups also exhibit some improvements regarding their HIV knowledge. First, the fact that they have friends in the consultant groups led to a 22% increase in the proportion knowing that condoms is highly efficient when used correctly. Furthermore, they are 15% more likely to mention abstinence as a way to prevent HIV infection. However, friends of girls in the consultant groups are less likely to mention partner selection as a way to prevent HIV infection, but it should be noted that the decrease is only of 0.9pp (1.3% of girls in the control group mention partner selection to start with). Overall, these results indicate rather positive spillovers of the consultant interventions on friends' knowledge. These positive effects are not significantly different across friends of girls in the TC and TCR groups.

Nevertheless, the information spillovers remain partly obscure: it is puzzling that the improvements in friends' knowledge do not mirror improvements in the knowledge of the girls themselves. The only symmetric knowledge improvement concerns condom efficiency (col.4). In columns 5-9, coefficients are generally of the same signs though not systematically, and significant changes do not appear in the same group about the same piece of knowledge. This could indicate that conversations among girls do diffuse some information, with the pieces of information that will mark the mind of each interlocutor varying a lot.

7.3 Behavioral Spillovers

Do information spillovers translate into behavioural spillovers? Table 11 presents the effects of having one friend in the consultant groups on pregnancy and schooling.

We find a clear decrease in the occurrence of pregnancy among friends of girls in the TCR group (the decrease is much smaller and insignificant among friends of girls in the TC group) (col. 1-4 of Table 11, panel B). This result echoes the decrease in pregnancy among the girls in the consultant groups themselves (panel A). It is suprising that the behavioral spillover is limited to the TCR group while girls in both the TC and TCR groups experienced a decrease in pregnancy, and friends in both the TC and TCR groups report more frequent conversations and exhibit better knowledge. Note that the magnitude of the effect seems at least as big among friends as among girls, if not larger. We also find that the consultant interventions led to a decrease in dropouts among both the girls and their friends, of about the same magnitude (col. 5 of Table 11, panels A and B).

Taken together, these results suggest that behavioural spillovers are very important. Since we observe a large occurrence of conversations on sex-related topics among friends and improved knowledge of friends of girls in the consultant groups, information spillovers seem a good candidate to explain behavioural ones. An alternative mechanism is peer imitation: friends exhibit safer sexual behaviours because they conform to their friends who exhibit safer sexual behaviours. We do not have any evidence on this mechanism which could co-exist with or even stand for the information mechanism, but our results at least don't rule out the possibility that the transmission of information and knowledge is driving behavioural spillovers.

8 Conclusion

This paper reports on a randomized field experiment to study how teenage girls in Cameroon respond to different school-based HIV education programs. This experiment was specifically designed to test whether the type of HIV information messenger as well as the type of information being provided affect how much information is retained, how much information is transmitted to peers, and how reported behavior changes among girls and their friends.

We first see that lasting impressions of HIV education sessions may not be what matters most when it comes to knowledge and behavior. Second, our results show that there is no silver bullet when it comes to HIV prevention information. We find that a given message or a given delivery type can have different effects in different areas of Cameroon, sometimes of opposite sign. This suggests that local contexts are critical ingredients to be considered when designing prevention campaigns. Finally, our results show the presence of large spillovers on friends, which should encourage even more public intervention in the domain of HIV education.

We discussed some potential explanations to the heterogeneity of the impact of the interventions on sexual behaviour based on what we observe in our data, but these potential explanations are just correlations and we cannot draw firm conclusions from that. Our attempt to understand the heterogeneity rather provides new hypotheses that should be rigorously tested in future research on HIV education. In particular, we hypothetized that outside consultant interventions might need to be supplemented by school trained facilitators to be properly assimilated, reflecting that understanding HIV information might require repeated interactions. We also hypothetized that adding content to the HIV education session might prevent girls from focusing on the relevant message (which varies according to the context) due to selective attention issues. We look forward to new evidence in future research to provide answers to these two hypotheses.

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Figure 1. 2011 HIV Prevalence in Cameroon, by Gender and Region

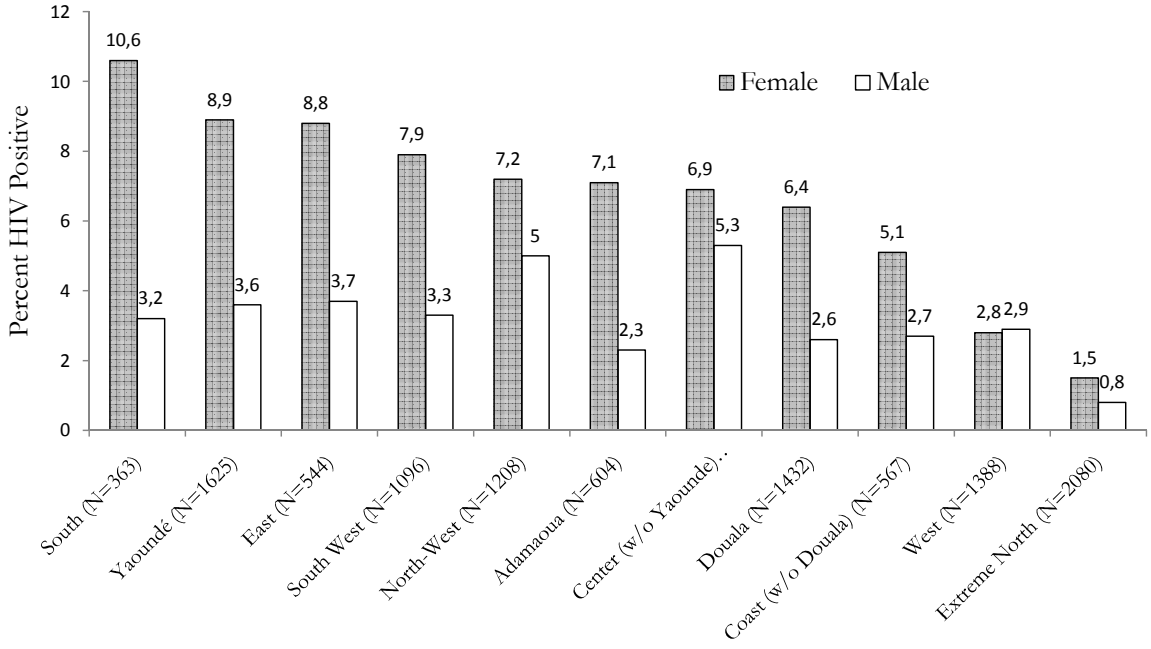
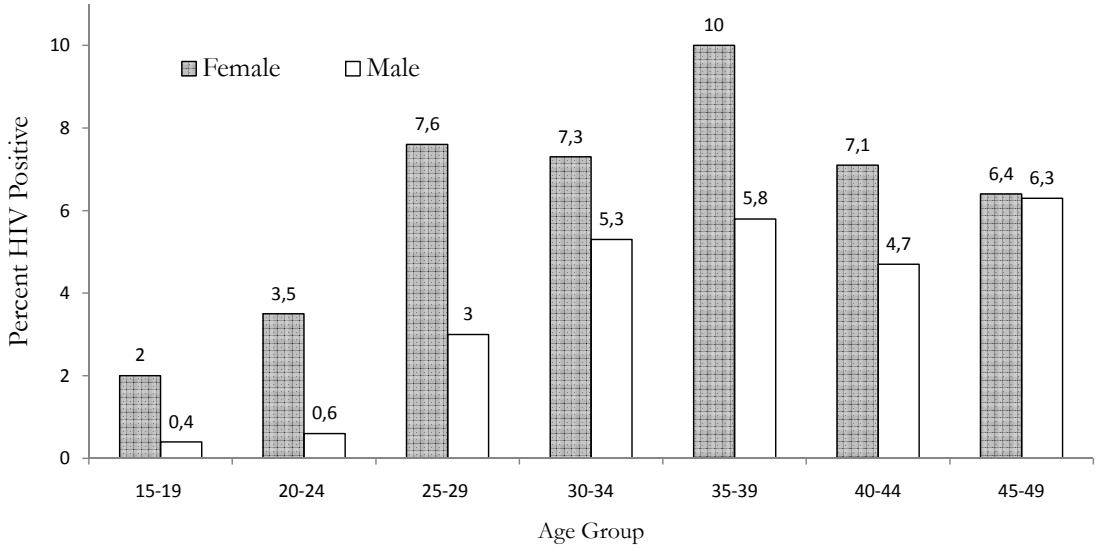


Figure 2. 2011 HIV Prevalence in Cameroon, by Gender and Age Group



Source: Cameroon DHS 2011 http://www.measuredhs.com/pubs/pdf/PR16/PR16.pdf

Table 1: Summary Statistics and Balance Check

	Control Group		Treatment Groups						
			Basic (TB)		Outside Consultant (TC)		Outside Consultant + Relative Risk Message (TCR)		
Panel A. School Level Characteristics	Control Group	Std. Dev.	Mean	*P-val TB = C*	Mean	*P-val TC = C*	Mean	*P-val TCR = C*	Number of Observations
Share of girl	0.50	0.11	0.51	*0.49*	0.49	*0.39*	0.50	*0.98*	318
Share successful at junior high school exit exam	0.40	0.16	0.40	*0.87*	0.42	*0.41*	0.42	*0.49*	258
Absenteism among girls during school sampling visit	0.16	0.15	0.13	*0.23*	0.15	*0.67*	0.14	*0.61*	314
Total # of students in the school	1144	1198	994	*0.39*	1087	*0.76*	1016	*0.48*	318
Students-teacher ratio	23.15	9.25	24.85	*0.40*	25.59	*0.19*	24.08	*0.63*	311
Private School	0.35	0.48	0.30	*0.50*	0.28	*0.33*	0.34	*0.91*	318
Vocational School	0.10	0.30	0.14	*0.47*	0.09	*0.81*	0.08	*0.59*	318
In Yaounde (urban), Central Region	0.31	0.47	0.30	*0.86*	0.29	*0.77*	0.32	*0.96*	318
In Southern Region (rural)	0.11	0.32	0.10	*0.80*	0.13	*0.79*	0.11	*0.98*	318
In Western Region (rural)	0.58	0.50	0.60	*0.75*	0.58	*0.93*	0.57	*0.95*	318
Number of Schools	80		80		79		79		318
Panel B. Girl level characteristics									
Age	15.05	1.71	15.06	*0.90*	14.98	*0.66*	14.97	*0.58*	3 140
Ever participated in school health club	0.21	0.41	0.19	*0.54*	0.22	*0.88*	0.15	*0.1**	1 488
Married	0.02	0.15	0.01	*0.36*	0.02	*0.53*	0.01	*0.26*	1 471
Of Muslim faith	0.06	0.23	0.03	*0.43*	0.08	*0.51*	0.04	*0.62*	1 489
Has a relative or friend who has HIV or died of AIDS	0.21	0.41	0.17	*0.18*	0.15	*0.04***	0.20	*0.70*	1 485
Ever pregnant	0.03	0.18	0.04	*0.96*	0.02	*0.51*	0.04	*0.81*	1 479
Mentions abstinence or faithfulness among top two HIV prevention methods	0.42	0.49	0.45	*0.49*	0.49	*0.13*	0.53	*0.02***	1 492
Mentions condoms among top two HIV prevention methods	0.57	0.50	0.52	*0.25*	0.56	*0.73*	0.54	*0.44*	1 492
Knows that condoms are highly effective at preventing HIV if used correctly	0.38	0.49	0.39	*0.90*	0.42	*0.35*	0.39	*0.96*	1 479
Knows that mosquitoes cannot transmit HIV	0.35	0.48	0.33	*0.67*	0.45	*0.07**	0.36	*0.91*	1 483
HIV knowledge index (7 questions)	-0.10	1.53	-0.03	*0.57*	0.07	*0.17*	0.06	*0.18*	1 453
Index of perceived risks associated with unprotected sex	-0.05	1.11	0.01	*0.59*	0.09	*0.24*	-0.05	*0.96*	1 455
Knows that men above 25 have a higher chance of having HIV than men 15-24	0.51	0.50	0.47	*0.28*	0.49	*0.59*	0.42	*0.01***	1 476
Ever had sex	0.22	0.41	0.23	*0.81*	0.18	*0.42*	0.26	*0.45*	1 488
Currently has at least one sexual partner	0.18	0.38	0.19	*0.67*	0.14	*0.43*	0.20	*0.53*	1 483
Number of sexual partners in past 12 months	0.41	1.69	0.24	*0.17*	0.19	*0.06**	0.38	*0.85*	1 374
Ever used a condom	0.18	0.39	0.19	*0.92*	0.15	*0.50*	0.21	*0.56*	1 489
Panel C. Attrition for Girls and Friends									
Girls - Could not be found for endline survey	0.16	0.37	0.12	*0.05**	0.14	*0.29*	0.14	*0.34*	3 312
Girls - Could not be found and no relative could provide information on childbearing and schooling status	0.10	0.30	0.07	*0.11*	0.08	*0.47*	0.09	*0.62*	3 312
Friends - Could not be found for endline survey	0.16	0.37			0.14	*0.55*	0.14	*0.50*	1 277
Friends - Could not be found and no relative could provide information on childbearing and schooling status	0.10	0.30			0.11	*0.80*	0.10	*0.90*	1 277

Notes: Panel A presents data collected during census of high schools in three study areas. Panel B presents data collected during baseline survey administered in a random half of the schools sampled for the study. Only the age variable is available for all schools because it was collected during the follow-up survey.

Table 2. Self-Reported Sexual Behavior

A. Sexual Activity and Condom Use

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Has had sexual intercourse in the last 12 months				Did not use a condom at first sexual intercourse				If ever had sex: Last intercourse was unprotected			
	All	Yaounde	South	West	All	Yaounde	South	West	All	Yaounde	South	West
Any Treatment (T)	-0.004	-0.006	-0.068	0	-0.025*	0.003	-0.126**	-0.018	-0.054	0.084	-0.213	-0.045
	(0.021)	(0.037)	(0.082)	(0.026)	(0.014)	(0.018)	(0.054)	(0.018)	(0.049)	(0.090)	(0.139)	(0.061)
Consultant (C)	0.015	0.021	0.006	0.023	0.005	0.019	0.036	-0.019	0.080*	0.138*	0.164	0.036
	(0.021)	(0.038)	(0.080)	(0.027)	(0.013)	(0.020)	(0.043)	(0.017)	(0.044)	(0.076)	(0.142)	(0.055)
Relative Risk Message (R)	-0.015	-0.044	0.025	0.01	0.024*	0.005	0.065	0.031*	-0.013	-0.321***	0.065	0.001
	(0.021)	(0.034)	(0.060)	(0.030)	(0.012)	(0.019)	(0.051)	(0.016)	(0.042)	(0.089)	(0.137)	(0.051)
Observations	2,860	866	319	1,675	2,851	863	319	1,669	793	160	149	484
R-squared	0.251	0.256	0.357	0.218	0.09	0.161	0.186	0.073	0.196	0.429	0.173	0.162
Mean of Dep. Var. (Control)	0.274	0.198	0.432	0.285	0.091	0.051	0.189	0.095	0.266	0.186	0.5	0.231
p-value (T+C=0)	0.594	0.669	0.309	0.435	0.155	0.29	0.083	0.039	0.567	0.003	0.747	0.855
p-value (T+C+R=0)	0.874	0.408	0.558	0.269	0.728	0.102	0.701	0.762	0.798	0.307	0.913	0.881

Notes: Data Source: Endline survey. OLS regressions. Standard errors in parentheses. ***,**,* indicates significance at 1, 5 and 10% level respectively.
Any treatment is a dummy for TB, TC and TCR, C*onsultant* a dummy for TC and TCR and *Relative Risk Message* a dummy for TCR.

Table 2. Self-Reported Sexual Behavior

B. Partner Selection

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Had at least one sponsor in past 12 month				Age of oldest partner in past 12 months (if any)				Number of sponsors in past 12 months			
	All	Yaounde	South	West	All	Yaounde	South	West	All	Yaounde	South	West
Any Treatment (T)	0.018	-0.011	-0.008	0.029	0.153	0.802	-0.283	0.111	0.019	-0.022	0.06	0.022
	(0.020)	(0.034)	(0.082)	(0.024)	(0.264)	(0.986)	(0.541)	(0.295)	(0.026)	(0.042)	(0.148)	(0.028)
Consultant (C)	0.015	0.033	-0.069	0.03	0.099	-0.173	0.905*	-0.199	0.022	0.031	-0.045	0.023
	(0.020)	(0.036)	(0.081)	(0.025)	(0.273)	(0.783)	(0.514)	(0.299)	(0.028)	(0.042)	(0.160)	(0.031)
Relative Risk Message (R)	-0.027	-0.058*	0.042	-0.008	0.203	1.278	-0.511	0.132	-0.031	-0.05	-0.054	0.003
	(0.020)	(0.032)	(0.053)	(0.027)	(0.295)	(1.232)	(0.425)	(0.311)	(0.027)	(0.037)	(0.113)	(0.036)
Observations	2,966	872	338	1,756	790	161	149	480	2,835	859	315	1,661
R-squared	0.276	0.269	0.361	0.265	0.407	0.387	0.599	0.424	0.215	0.242	0.29	0.185
Mean of Dep. Var. (Control)	0.253	0.19	0.416	0.256	21.031	21.605	21.5	20.692	0.26	0.208	0.452	0.252
p-value (T+C=0)	0.112	0.521	0.183	0.038	0.323	0.508	0.311	0.744	0.127	0.836	0.895	0.185
p-value (T+C+R=0)	0.771	0.237	0.544	0.066	0.164	0.209	0.846	0.894	0.709	0.252	0.676	0.15

	(13)	(14)	(15)	(16)
	If received money from sponsor(s): smallest amount received by a sponsor			
	All	Yaounde	South	West
Any Treatment (T)	17.868	90.329	14.544	9.768
	(11.928)	(79.342)	(28.651)	(8.123)
Consultant (C)	0.037	20.343	-19.533	-1.421
	(9.751)	(38.689)	(22.093)	(8.510)
Relative Risk Message (R)	5.795	18.055	14.086	-7.444
	(11.127)	(57.834)	(19.621)	(9.078)
Observations	634	124	135	375
R-squared	0.246	0.316	0.258	0.286
Mean of Dep. Var. (Control)	52.468	84.7	75.893	32.916
p-value (T+C=0)	0.115	0.067	0.883	0.347
p-value (T+C+R=0)	0.077	0.07	0.708	0.907

Notes: Data Source: Endline survey. OLS regressions. Standard errors in parentheses. ***,**,* indicates significance at 1, 5 and 10% level respectively.
Any treatment is a dummy for TB, TC and TCR, *Consultant* a dummy for TC and TCR and *Relative Risk Message* a dummy for TCR.

Table 3. Life Outcomes

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Ever pregnant[a]				Ever pregnant, Married				Ever pregnant, Never married			
	All	Yaounde	South	West	All	Yaounde	South	West	All	Yaounde	South	West
Any Treatment (T)	-0.011	-0.002	-0.104**	0.005	0.004	0	0.03	0.003	-0.014	-0.002	-0.129**	0.003
	(0.011)	(0.017)	(0.043)	(0.013)	(0.006)	(0.004)	(0.019)	(0.009)	(0.011)	(0.017)	(0.053)	(0.011)
Consultant (C)	-0.004	0.026	0.053	-0.028**	-0.010*	-0.006**	-0.017	-0.012	0.005	0.032**	0.068*	-0.018*
	(0.010)	(0.016)	(0.033)	(0.013)	(0.006)	(0.003)	(0.019)	(0.009)	(0.009)	(0.016)	(0.037)	(0.009)
Relative Risk Message (R)	0.001	-0.013	-0.003	0.012	0.003	0.001	0.001	0.004	-0.001	-0.014	-0.004	0.009
	(0.010)	(0.016)	(0.051)	(0.012)	(0.005)	(0.003)	(0.017)	(0.008)	(0.009)	(0.016)	(0.047)	(0.009)
Observations	3,017	882	344	1,791	3,010	881	342	1,787	3,010	881	342	1,787
R-squared	0.343	0.31	0.411	0.296	0.182	0.415	0.273	0.196	0.268	0.274	0.299	0.219
Mean of Dep. Var. (Control)	0.094	0.05	0.329	0.073	0.02	0.005	0.037	0.025	0.07	0.045	0.284	0.044
p-value (T+C=0)	0.128	0.126	0.288	0.046	0.193	0.105	0.436	0.252	0.369	0.051	0.235	0.14
p-value (T+C+R=0)	0.217	0.489	0.336	0.412	0.506	0.308	0.359	0.596	0.371	0.312	0.28	0.641

	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)
	Had an unplanned first pregnancy				Dropped out of school			
	All	Yaounde	South	West	All	Yaounde	South	West
Any Treatment (T)	-0.011	-0.007	-0.075	0.011	-0.017*	-0.017	-0.012	-0.01
	(0.011)	(0.014)	(0.045)	(0.011)	(0.009)	(0.014)	(0.032)	(0.012)
Consultant (C)	0.012	0.026**	0.066	-0.018*	-0.004	0.025*	-0.029	-0.018
	(0.010)	(0.013)	(0.049)	(0.010)	(0.008)	(0.014)	(0.030)	(0.011)
Relative Risk Message (TCR)	-0.009	-0.012	-0.05	0.01	0.009	-0.011	0.023	0.014
	(0.010)	(0.014)	(0.067)	(0.009)	(0.009)	(0.013)	(0.027)	(0.012)
Observations	2,835	862	315	1,658	3,027	881	343	1,803
R-squared	0.227	0.24	0.341	0.1	0.357	0.383	0.285	0.405
Mean of Dep. Var. (Control)	0.054	0.042	0.247	0.025	0.079	0.036	0.183	0.081
p-value (T+C=0)	0.922	0.159	0.829	0.423	0.025	0.571	0.266	0.022
p-value (T+C+R=0)	0.464	0.604	0.366	0.81	0.204	0.842	0.605	0.327

Notes: Data Source: Endline survey. OLS regressions. Standard errors in parentheses. ***,**,* indicates significance at 1, 5 and 10% level respectively.
Any treatment is a dummy for TB, TC and TCR, *Consultant* a dummy for TC and TCR and *Relative Risk Message* a dummy for TCR.
[a] Corrected for inconsistencies between baseline and endline

Table 4. Exposure to HIV Prevention Education at School

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	When asked about sources of information about HIV/AIDS, mentions school				Participated in at least one HIV prevention education session in last 12 months				If Any: Number of HIV prevention education sessions in last 12 months			
	All	Yaounde	South	West	All	Yaounde	South	West	All	Yaounde	South	West
Any Treatment (T)	0.018	-0.05	0.117**	0.034*	0.179***	-0.039	0.175*	0.311***	1.370***	0.121	1.255***	1.608***
	(0.016)	(0.033)	(0.046)	(0.019)	(0.041)	(0.063)	(0.091)	(0.054)	(0.312)	(0.314)	(0.422)	(0.409)
Consultant (C)	-0.002	0.024	-0.019	-0.02	0.151***	0.231***	0.129	0.095*	-1.390***	-0.425	-1.330***	-1.430***
	(0.015)	(0.038)	(0.032)	(0.017)	(0.037)	(0.058)	(0.081)	(0.048)	(0.261)	(0.308)	(0.460)	(0.336)
Relative Risk Message (R)	-0.011	0.01	0.004	-0.014	0.005	0.062	-0.138**	0.029	-0.018	0.101	0.373	-0.007
	(0.016)	(0.037)	(0.035)	(0.018)	(0.036)	(0.062)	(0.066)	(0.050)	(0.137)	(0.204)	(0.232)	(0.181)
Observations	2,840	862	315	1,663	2,840	862	315	1,663	1,456	302	178	976
R-squared	0.055	0.064	0.126	0.063	0.203	0.186	0.127	0.228	0.26	0.4	0.312	0.316
Mean of Dep. Var. (Control)	0.903	0.898	0.836	0.918	0.322	0.278	0.438	0.324	1.677	2.085	1.594	1.508
p-value (T+C=0)	0.322	0.474	0.026	0.495	0	0.003	0	0	0.93	0.348	0.795	0.58
p-value (T+C+R=0)	0.745	0.641	0.029	0.976	0	0	0.053	0	0.857	0.426	0.21	0.535

	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)
	Total time in HIV education sessions in past 12 months (in min)				An outside consultant held session(s)				A member of the school staff held session(s)			
	All	Yaounde	South	West	All	Yaounde	South	West	All	Yaounde	South	West
Any Treatment (T)	59.984***	-2.332	33.61	96.964***	0.014	-0.045	0.074	0.044	0.218***	-0.051	0.184	0.371***
	(9.753)	(10.667)	(24.218)	(13.336)	(0.035)	(0.059)	(0.074)	(0.048)	(0.039)	(0.042)	(0.115)	(0.054)
Consultant (C)	-7.48	11.981	6.554	-22.646	0.363***	0.241***	0.341***	0.425***	-0.149***	0.003	-0.101	-0.246***
	(9.980)	(11.618)	(22.457)	(14.361)	(0.032)	(0.055)	(0.074)	(0.041)	(0.038)	(0.042)	(0.099)	(0.053)
Relative Risk Message (TCR)	9.352	29.250**	-7.534	12.79	0.005	0.038	-0.158**	0.028	-0.032	0.091*	-0.148*	-0.045
	(9.077)	(14.713)	(16.525)	(13.201)	(0.035)	(0.056)	(0.073)	(0.049)	(0.034)	(0.048)	(0.083)	(0.048)
Observations	2,718	847	306	1,565	2,840	862	315	1,663	2,840	862	315	1,663
R-squared	0.17	0.105	0.098	0.225	0.259	0.209	0.196	0.319	0.155	0.11	0.11	0.217
Mean of Dep. Var. (Control)	43.353	42.292	60.694	40.728	0.229	0.218	0.301	0.223	0.185	0.167	0.301	0.173
p-value (T+C=0)	0	0.471	0.056	0	0	0	0	0	0.041	0.293	0.311	0.01
p-value (T+C+R=0)	0	0.005	0.102	0	0	0	0.003	0	0.285	0.397	0.442	0.108

Notes: Data Source: Endline survey. OLS regressions. Standard errors in parentheses. ***,**,* indicates significance at 1, 5 and 10% level respectively.
Any treatment is a dummy for TB, TC and TCR, *Consultant* a dummy for TC and TCR and *Relative Risk Message* a dummy for TCR.

Table 5. Content of HIV Education at School

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Remember hearing about condoms during session(s)				Remember hearing about abstinence during session(s)				Remember hearing about faithfulness during session(s)			
	All	Yaounde	South	West	All	Yaounde	South	West	All	Yaounde	South	West
Any Treatment (T)	0.161***	-0.03	0.119	0.284***	0.186***	-0.038	0.196**	0.318***	0.192***	-0.047	0.204**	0.331***
	(0.040)	(0.064)	(0.093)	(0.053)	(0.041)	(0.064)	(0.095)	(0.053)	(0.040)	(0.064)	(0.091)	(0.052)
Consultant (C)	0.161***	0.217***	0.146*	0.118**	0.146***	0.226***	0.118	0.091*	0.128***	0.205***	0.102	0.071
	(0.036)	(0.059)	(0.086)	(0.048)	(0.037)	(0.057)	(0.087)	(0.048)	(0.036)	(0.057)	(0.081)	(0.049)
Relative Risk Message (R)	0	0.072	-0.128*	0.009	0.011	0.056	-0.140*	0.043	0.018	0.074	-0.125*	0.043
	(0.035)	(0.062)	(0.067)	(0.048)	(0.035)	(0.062)	(0.071)	(0.048)	(0.035)	(0.060)	(0.066)	(0.049)
	0	0	0	0	0	0	0	0	0	0	0	0
Observations	2,840	862	315	1,663	2,840	862	315	1,663	2,840	862	315	1,663
R-squared	0.191	0.183	0.104	0.211	0.198	0.186	0.125	0.226	0.198	0.179	0.115	0.229
Mean of Dep. Var. (Control)	0.3	0.255	0.425	0.302	0.303	0.278	0.411	0.297	0.303	0.278	0.397	0.3
p-value (T+C=0)	0	0.004	0	0	0	0.003	0	0	0	0.011	0	0
p-value (T+C+R=0)	0	0	0.08	0	0	0	0.045	0	0	0.001	0.029	0

	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)
	Remember hearing about sponsors during session(s)				Remember hearing about modes of HIV transmission during session(s)				Session involved a video screening			
	All	Yaounde	South	West	All	Yaounde	South	West	All	Yaounde	South	West
Any Treatment (T)	0.042	-0.023	0.04	0.091***	0.183***	-0.049	0.193*	0.318***	-0.006	-0.062	-0.089	0.036
	(0.026)	(0.050)	(0.081)	(0.034)	(0.039)	(0.060)	(0.096)	(0.051)	(0.025)	(0.052)	(0.072)	(0.027)
Consultant (C)	0.091***	0.062	0.142**	0.086**	0.122***	0.209***	0.109	0.064	0.466***	0.338***	0.474***	0.531***
	(0.026)	(0.044)	(0.067)	(0.038)	(0.036)	(0.054)	(0.079)	(0.049)	(0.031)	(0.049)	(0.095)	(0.043)
Relative Risk Message (TCR)	0.243***	0.207***	0.092	0.299***	0.007	0.062	-0.150**	0.031	0.045	-0.008	0.02	0.094*
	(0.033)	(0.054)	(0.058)	(0.046)	(0.034)	(0.061)	(0.061)	(0.048)	(0.040)	(0.060)	(0.106)	(0.054)
	0	0	0	0	0	0	0	0	0	0	0	0
Observations	2,840	862	315	1,663	2,840	862	315	1,663	2,834	862	315	1,657
R-squared	0.179	0.163	0.141	0.235	0.18	0.182	0.124	0.203	0.345	0.22	0.352	0.446
Mean of Dep. Var. (Control)	0.137	0.185	0.192	0.101	0.278	0.264	0.384	0.267	0.065	0.13	0.082	0.027
p-value (T+C=0)	0	0.421	0.003	0	0	0.014	0	0	0	0	0.001	0
p-value (T+C+R=0)	0	0	0	0	0	0.001	0.088	0	0	0	0	0

Notes: Data Source: Endline survey. OLS regressions. Standard errors in parentheses. ***,**,* indicates significance at 1, 5 and 10% level respectively.
Any treatment is a dummy for TB, TC and TCR, *Consultant* a dummy for TC and TCR and *Relative Risk Message* a dummy for TCR.

Table 6. Attitude towards HIV Education at School

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	It was possible to speak up during HIV education session(s)				Spoke up during HIV education session(s)				If any: Found the HIV education session(s) very interesting			
	All	Yaounde	South	West	All	Yaounde	South	West	All	Yaounde	South	West
Any Treatment (T)	0.189***	-0.045	0.181*	0.330***	0.165***	0.01	0.220**	0.231***	0.082*	0.015	0.072	0.08
	(0.040)	(0.062)	(0.090)	(0.053)	(0.026)	(0.036)	(0.085)	(0.035)	(0.046)	(0.121)	(0.118)	(0.058)
Consultant (C)	0.136***	0.222***	0.112	0.078	0.029	0.090**	0.083	-0.012	0.024	-0.11	0.156**	0.031
	(0.037)	(0.055)	(0.073)	(0.050)	(0.028)	(0.036)	(0.089)	(0.037)	(0.035)	(0.098)	(0.076)	(0.045)
Relative Risk Message (R)	0.007	0.058	-0.156**	0.039	-0.012	0.03	-0.262***	0.026	0.016	0.179**	-0.041	-0.007
	(0.037)	(0.061)	(0.067)	(0.053)	(0.027)	(0.043)	(0.056)	(0.037)	(0.032)	(0.069)	(0.068)	(0.043)
Observations	2,839	862	315	1,662	2,840	862	315	1,663	1,509	309	184	1,016
R-squared	0.194	0.179	0.132	0.226	0.121	0.145	0.166	0.125	0.09	0.194	0.145	0.096
Mean of Dep. Var. (Control)	0.302	0.278	0.425	0.292	0.108	0.088	0.137	0.114	0.439	0.483	0.281	0.458
p-value (T+C=0)	0	0.004	0	0	0	0.006	0	0	0.017	0.244	0.047	0.069
p-value (T+C+R=0)	0	0.001	0.116	0	0	0.004	0.409	0	0.003	0.285	0.076	0.068

Notes: Data Source: Endline survey. OLS regressions. Standard errors in parentheses. ***,**,* indicates significance at 1, 5 and 10% level respectively.
Any treatment is a dummy for TB, TC and TCR, *Consultant* a dummy for TC and TCR and *Relative Risk Message* a dummy for TCR.

Table 7. HIV Prevention Knowledge

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Knows that condoms are highly effective when used correctly				Mentions condom use as a way to prevent HIV infection				Mentions faithfulness as a way to prevent HIV infection			
	All	Yaounde	South	West	All	Yaounde	South	West	All	Yaounde	South	West
Any Treatment (T)	0.071***	0.131**	0.046	0.064**	0.011	0.039	0	-0.007	0.048	0.098	0.109	0.038
	(0.027)	(0.060)	(0.072)	(0.031)	(0.021)	(0.033)	(0.060)	(0.031)	(0.030)	(0.065)	(0.095)	(0.034)
Consultant (C)	-0.013	-0.129*	0.021	0.022	-0.054**	-0.078**	-0.088	-0.037	-0.070**	-0.131**	-0.200**	-0.038
	(0.028)	(0.065)	(0.050)	(0.034)	(0.022)	(0.033)	(0.067)	(0.032)	(0.029)	(0.064)	(0.084)	(0.037)
Relative Risk Message (R)	0.026	0.091	-0.026	0.005	0.056***	0.112***	0.074	0.026	0.048*	-0.02	0.006	0.078**
	(0.028)	(0.058)	(0.066)	(0.037)	(0.019)	(0.031)	(0.056)	(0.027)	(0.028)	(0.052)	(0.071)	(0.038)
Observations	2,776	855	315	1,606	2,840	862	315	1,663	2,840	862	315	1,663
R-squared	0.061	0.101	0.109	0.061	0.075	0.083	0.087	0.087	0.083	0.08	0.149	0.11
Mean of Dep. Var. (Control)	0.301	0.29	0.397	0.289	0.805	0.815	0.877	0.787	0.397	0.426	0.466	0.369
p-value (T+C=0)	0.036	0.974	0.363	0.01	0.033	0.246	0.182	0.113	0.43	0.556	0.223	0.996
p-value (T+C+R=0)	0.003	0.086	0.628	0.01	0.513	0.017	0.804	0.48	0.353	0.321	0.327	0.035

	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)
	Mentions abstinence as a way to prevent HIV infection				Mentions partner selection as a way to prevent HIV infection				Knows that men 25-29 are riskier partners than men 15-19			
	All	Yaounde	South	West	All	Yaounde	South	West	All	Yaounde	South	West
Any Treatment (T)	0.070**	0.109**	0.119*	0.056	-0.007	-0.004	-0.016	-0.008	0.014	0.039	-0.01	0.021
	(0.033)	(0.054)	(0.067)	(0.048)	(0.005)	(0.006)	(0.011)	(0.007)	(0.031)	(0.049)	(0.109)	(0.045)
Consultant (C)	-0.05	-0.088*	-0.02	-0.041	0.001	0.009	0	-0.003	-0.002	-0.072	-0.054	0.013
	(0.032)	(0.051)	(0.056)	(0.048)	(0.004)	(0.006)	(0.005)	(0.005)	(0.030)	(0.050)	(0.104)	(0.044)
Relative Risk Message (TCR)	0.015	0.006	-0.037	0.01	0.004	-0.003	0.003	0.008	0.066**	0.104*	0.083	0.048
	(0.031)	(0.050)	(0.046)	(0.045)	(0.005)	(0.009)	(0.004)	(0.006)	(0.030)	(0.060)	(0.084)	(0.039)
Observations	2,840	862	315	1,663	2,834	862	315	1,657	2,839	862	315	1,662
R-squared	0.101	0.128	0.118	0.093	0.047	0.075	0.034	0.049	0.058	0.079	0.056	0.072
Mean of Dep. Var. (Control)	0.504	0.542	0.329	0.515	0.013	0.009	0.014	0.015	0.405	0.44	0.397	0.389
p-value (T+C=0)	0.535	0.679	0.109	0.752	0.262	0.489	0.175	0.107	0.695	0.495	0.443	0.426
p-value (T+C+R=0)	0.286	0.626	0.367	0.594	0.712	0.827	0.169	0.667	0.011	0.254	0.837	0.04

Notes: Data Source: Endline survey. OLS regressions. Standard errors in parentheses. ***,**,* indicates significance at 1, 5 and 10% level respectively.
Any treatment is a dummy for TB, TC and TCR, *Consultant* a dummy for TC and TCR and *Relative Risk Message* a dummy for TCR.

Table 8. Diffusion to family members

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Talked to parents about condoms				Talked to parents about faithfulness				Talked to parents about sponsors			
	All	Yaounde	South	West	All	Yaounde	South	West	All	Yaounde	South	West
Any Treatment (T)	0.015	0.042	-0.101	0.032	-0.024	0.039	-0.069	-0.04	0.027	0.008	-0.087*	0.055*
	(0.023)	(0.043)	(0.071)	(0.029)	(0.028)	(0.044)	(0.078)	(0.039)	(0.022)	(0.037)	(0.049)	(0.031)
Consultant (C)	-0.01	-0.086**	0.09	0.006	0.022	-0.091**	0.022	0.075**	-0.019	-0.016	-0.031	-0.014
	(0.021)	(0.040)	(0.056)	(0.028)	(0.025)	(0.045)	(0.082)	(0.033)	(0.022)	(0.037)	(0.041)	(0.031)
Relative Risk Message (R)	0.036*	0.104***	-0.011	0.004	0	0.081*	0.045	-0.045	0.041*	0.041	0.047	0.032
	(0.021)	(0.034)	(0.061)	(0.028)	(0.024)	(0.041)	(0.079)	(0.031)	(0.024)	(0.038)	(0.045)	(0.033)
Observations	2,840	862	315	1,663	2,838	861	315	1,662	2,839	862	315	1,662
R-squared	0.049	0.095	0.114	0.058	0.059	0.07	0.098	0.064	0.049	0.077	0.136	0.059
Mean of Dep. Var. (Control)	0.227	0.245	0.274	0.208	0.45	0.37	0.479	0.488	0.181	0.222	0.205	0.154
p-value (T+C=0)	0.797	0.206	0.876	0.169	0.936	0.152	0.597	0.348	0.735	0.849	0.008	0.206
p-value (T+C+R=0)	0.078	0.129	0.776	0.157	0.93	0.488	0.973	0.781	0.043	0.396	0.187	0.032

	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)
	Talked to sisters about condoms				Talked to sisters about faithfulness				Talked to sisters about sponsors			
	All	Yaounde	South	West	All	Yaounde	South	West	All	Yaounde	South	West
Any Treatment (T)	0.015	0.036	-0.151**	0.037	0.001	0.021	-0.128**	0.025	0.006	-0.022	-0.061	0.033
	(0.027)	(0.049)	(0.057)	(0.036)	(0.025)	(0.050)	(0.052)	(0.034)	(0.024)	(0.042)	(0.049)	(0.036)
Consultant (C)	0.048*	0.075	0.107	0.02	0.032	0.027	0.028	0.022	0.028	0.043	0.048	0.015
	(0.026)	(0.047)	(0.064)	(0.036)	(0.025)	(0.054)	(0.064)	(0.031)	(0.028)	(0.045)	(0.060)	(0.039)
Relative Risk Message (TCR)	-0.013	-0.014	-0.056	0.002	0.021	0.042	-0.014	0.024	0.037	0.038	-0.056	0.046
	(0.026)	(0.044)	(0.053)	(0.036)	(0.026)	(0.054)	(0.064)	(0.033)	(0.029)	(0.052)	(0.071)	(0.040)
Observations	2,840	862	315	1,663	2,838	861	315	1,662	2,839	862	315	1,662
R-squared	0.069	0.087	0.12	0.085	0.074	0.102	0.107	0.076	0.052	0.07	0.075	0.07
Mean of Dep. Var. (Control)	0.459	0.407	0.562	0.468	0.554	0.486	0.63	0.577	0.329	0.333	0.397	0.315
p-value (T+C=0)	0.021	0.011	0.393	0.129	0.217	0.369	0.052	0.169	0.206	0.643	0.824	0.203
p-value (T+C+R=0)	0.07	0.038	0.086	0.11	0.044	0.081	0.066	0.054	0.007	0.211	0.211	0.014

Notes: Data Source: Endline survey. OLS regressions. Standard errors in parentheses. ***,**,* indicates significance at 1, 5 and 10% level respectively.
Any treatment is a dummy for TB, TC and TCR, *Consultant* a dummy for TC and TCR and *Relative Risk Message* a dummy for TCR.

Table 9. Diffusion to girl friends

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Talked to girl friends about faithfulness				Talked to girl friends about condoms				Talked to girl friends about sponsors			
	All	Yaounde	South	West	All	Yaounde	South	West	All	Yaounde	South	West
Any Treatment (T)	0.01	-0.003	0.108	0.013	0	0.052	0.028	-0.027	-0.015	0.013	-0.084	-0.009
	(0.024)	(0.039)	(0.075)	(0.034)	(0.019)	(0.036)	(0.076)	(0.025)	(0.031)	(0.059)	(0.073)	(0.041)
Consultant (C)	0.014	0.037	-0.032	-0.002	-0.001	-0.036	-0.058	0.02	0.005	-0.086	0.182***	0.036
	(0.023)	(0.041)	(0.061)	(0.032)	(0.021)	(0.039)	(0.061)	(0.027)	(0.031)	(0.052)	(0.055)	(0.045)
Relative Risk Message (R)	0.017	-0.026	-0.019	0.044	0.03	0.017	0.01	0.039	0.094***	0.082	-0.036	0.122***
	(0.023)	(0.038)	(0.057)	(0.032)	(0.021)	(0.041)	(0.049)	(0.026)	(0.032)	(0.056)	(0.056)	(0.044)
	0	0	0	0	0	0	0	0	0	0	0	0
Observations	2,838	862	315	1,661	2,837	861	315	1,661	2,838	862	315	1,661
R-squared	0.069	0.071	0.121	0.096	0.058	0.067	0.102	0.079	0.069	0.065	0.118	0.102
Mean of Dep. Var. (Control)	0.74	0.778	0.644	0.738	0.766	0.764	0.767	0.767	0.539	0.616	0.548	0.496
p-value (T+C=0)	0.328	0.433	0.321	0.744	0.962	0.676	0.616	0.791	0.774	0.208	0.173	0.539
p-value (T+C+R=0)	0.089	0.845	0.453	0.105	0.14	0.37	0.786	0.199	0.007	0.889	0.399	0

Notes: Data Source: Endline survey. OLS regressions. Standard errors in parentheses. ***,**,* indicates significance at 1, 5 and 10% level respectively.
Any treatment is a dummy for TB, TC and TCR, *Consultant* a dummy for TC and TCR and *Relative Risk Message* a dummy for TCR.

Table 10. Information spillovers on girl friends

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Talked to girl friends about faithfulness	Talked to girl friends about condoms	Talked to girl friends about sponsors	Knows that condoms are highly effective when used correctly	Mentions condom use as a way to prevent HIV infection	Mentions faithfulness as a way to prevent HIV infection	Mentions abstinence as a way to prevent HIV infection	Mentions partner selection as a way to prevent HIV infection	Knows that men 25-29 are riskier partners than men 15-19
Panel A. Girls									
Consultant (C)	0.026	0	-0.011	0.053**	-0.041**	-0.013	0.018	-0.006	0.004
	(0.024)	(0.021)	(0.031)	(0.026)	(0.019)	(0.027)	(0.030)	(0.005)	(0.028)
Relative Risk Message (R)	0.02	0.033	0.093***	0.034	0.054***	0.046*	0.02	0.004	0.076***
	(0.022)	(0.021)	(0.030)	(0.026)	(0.018)	(0.025)	(0.030)	(0.005)	(0.027)
Observations	2,103	2,104	2,103	2,055	2,105	2,105	2,105	2,103	2,105
R-squared	0.059	0.042	0.056	0.067	0.068	0.073	0.096	0.048	0.072
Mean of Dep. Var. (Control)	0.74	0.766	0.539	0.301	0.805	0.397	0.504	0.013	0.405
p-value (C+R=0)	0.056	0.11	0.008	0.001	0.518	0.211	0.223	0.706	0.006
Panel B. Friends									
Consultant (C)	0.076**	0.083**	0.057	0.066*	-0.027	0.014	0.077**	-0.009**	0.004
	(0.034)	(0.033)	(0.048)	(0.038)	(0.030)	(0.038)	(0.034)	(0.004)	(0.041)
Relative Risk Message (R)	-0.004	-0.047	-0.066	-0.064	0.026	-0.058	-0.057	0.005	0.026
	(0.041)	(0.041)	(0.055)	(0.050)	(0.041)	(0.051)	(0.047)	(0.005)	(0.052)
Observations	1,077	1,077	1,076	1,055	1,076	1,076	1,076	1,075	1,076
R-squared	0.123	0.069	0.113	0.097	0.1	0.133	0.184	0.124	0.114
Mean of Dep. Var. (Control)	0.74	0.766	0.539	0.301	0.805	0.397	0.504	0.013	0.405
p-value (C+R=0)	0.025	0.31	0.836	0.962	0.986	0.289	0.614	0.41	0.489

Notes: Data Source: Endline survey. OLS regressions. Standard errors in parentheses. ***,**,* indicates significance at 1, 5 and 10% level respectively. C*onsultant* IS a dummy for TC and TCR and *Relative Risk Message* a dummy for TCR.

Table 11. Behavioral spillovers on girl friends

	(1)	(2)	(3)	(4)	(5)
	Ever pregnant	Ever pregnant, Married	Ever pregnant, Never married	Had an unplanned first pregnancy	Dropped out of school
Panel A. Girls					
Consultant (C)	-0.018*	-0.009*	-0.008	0.002	-0.022**
	(0.011)	(0.005)	(0.010)	(0.010)	(0.009)
Relative Risk Message (R)	0.006	0.004	0.003	-0.005	0.01
	(0.012)	(0.005)	(0.011)	(0.011)	(0.008)
Observations	2,239	2,233	2,233	2,101	2,246
R-squared	0.178	0.101	0.147	0.156	0.341
Mean of Dep. Var. (Control)	0.094	0.02	0.07	0.054	0.079
p-value (C+R=0)	0.348	0.325	0.669	0.778	0.163
Panel B. Friends					
Consultant (C)	-0.009	0.004	-0.008	-0.005	-0.018*
	(0.014)	(0.008)	(0.011)	(0.009)	(0.011)
Relative Risk Message (R)	-0.030*	0	-0.038**	-0.030**	-0.003
	(0.017)	(0.011)	(0.017)	(0.011)	(0.014)
Observations	1,143	1,138	1,138	1,073	1,147
R-squared	0.236	0.172	0.181	0.179	0.448
Mean of Dep. Var. (Control)	0.094	0.02	0.07	0.054	0.079
p-value (C+R=0)	0.007	0.683	0.004	0.001	0.052

Notes: Data Source: Endline survey. OLS regressions. Standard errors in parentheses. ***,**,* indicates significance at 1, 5 and 10% level respectively. *Consultant* IS a dummy for TC and TCR and *Relative Risk Message* a dummy for TCR.

Appendix Figure 1: Map of Cameroon


CAMEROON
0 km 50 100 150 km
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National Capital (1, 120,000 In 99)
over 1,300,000
over 100,000
over 20,000
other main city
other city
Chief town of prefecture
CHAD
Ndjamena
Maiduguri
Kousséri
Maroua
EXTREME-NORD
Mokolo
Mora
Kolofata
Mts Mandara
Chari
Logone
Bongor
Yagoua
Kaélé
Guider
Figuil
Kumo
Garoua
Pala
Benue
Mts Alantika
Lagdo
Lac de Lagdo
NORD
Poli
Tcholliré
Moundou
Ngaoundéré
Massif de l'Adamaoua
Tignère
Meiganga
ADAMAOUA
Banyo
Tibati
Djohong
Mbéré
Bélél
Mbang
Mbéwé
Mangorm
Mbitao
Ndok
Touboro
Koum
Sorombéo
Bandjoukri
Sassa Mbersi
Mbé
Djoumbol
Mandourou
Béka
Lagone Occ.
Lagone Orient.
Bouar
C. AFRICAN R
Carnot
Berbérati
Bétaré Oya
Ndokayo
Garoua Boulai
Mabélé
Goyoum
Deng Deng
Oulé
Kélfé
Batouri
Ngoura
Bertoua
Nanga-Ekobo
Belabo
Batouri
Abong Mbang
EST
Yokadouma
Landjwé
Ngato
Gribé
Messok
Lomié
Zoulabot
Samalomo
Bengbis
Endom
Akonolinga
Messaménna
Mbama
Mfou
YAOUNDÉ
Obala
Zoa
Nguélémendouka
Dimako
Doumé
Bimba
Djampiel
Kanyol
Mbang
Ndélélé
Ntui
Mbandjok
Minta
Mbet
Diang
Sanaga
Monatélé
Ngambé
Sao
Bafia
Nguila
Ngoro
Mankim
Batoua
Matsari
CENTRE
Yassem
Ndiam
Bangangté
Bafang
Baham
Bandjoum
Massangam
Foumban
Bafoussam
OUEST
Kong
Yoko
Kumbo
NORD-OUEST
Nwa
Sankolong
Nyamboya
Bankim
Sangbé
Mbakaou
Lac de Mbakaou
Mayo Darlé
Tchabal Mbabo
Mts Mambila
Banyo
Ngaoundal
Mboula
Djérem
Mbéré
Mbam
Mbakou
Mbéré
Mbéré
Mbéré

Table A1: Summary Statistics by Study Areas

	Means by Study Areas		
	Yaounde (Urban)	South (Rural)	West (Rural)
Panel A. School Level Characteristics			
Share of girl	0.52	0.46	0.50
Share successful at junior high school exit exam	0.48	0.51	0.36
Absenteism among girls during baseline school visit	0.19	0.24	0.10
Total number of students in the school	1317.20	870.19	962.74
Student to teacher ratio	21.93	34.13	23.84
Private School	0.73	0.03	0.16
Vocational School	0.06	0.08	0.12
School has a computer room	0.78	0.00	0.35
Number of schools	97	36	185
Panel B. Girl level characteristics			
Age	15.24	15.57	15.60
Ever participated in school health club	0.17	0.11	0.22
Married	0.00	0.02	0.02
Of Muslim faith	0.03	0.00	0.07
Has a relative or friend who has HIV or died of AIDS	0.19	0.28	0.17
Ever pregnant	0.02	0.16	0.02
Mentions abstinence or faithfulness among top two HIV prevention methods	0.46	0.53	0.47
Mentions condoms among top two HIV prevention methods	0.61	0.62	0.51
Knows that condoms are highly effective at preventing HIV if used correctly		0.45	0.38
Knows that mosquitoes cannot transmit HIV	0.50	0.41	0.30
Index of perceived risks associated with unprotected sex	0.14	0.28	-0.12
Index of perceived risks associated with unprotected sex	0.34	0.37	-0.24
Knows that men above 25 have a higher chance of having HIV than men 15-24	0.47	0.36	0.49
Ever had sex	0.15	0.58	0.19
Currently has at least one sexual partner	0.12	0.47	0.16
Number of sexual partners in past 12 months	0.12	0.77	0.33
Ever used a condom	0.11	0.50	0.16
Panel C. Attrition			
Could not be found for endline survey	0.14	0.16	0.14
Could not be found and no relative could provide information on childbearing and schooling status	0.13	0.08	0.07
Number of observations	1288	487	2534

Appendix: Caveats

Sexual Behaviour Data Quality

In our study, all measures of sexual behaviour rely on self-reports. This can obviously lead to under- or over-reporting of these behaviours.

The first concern with self-reported sexual behaviour is the measurement of the quantity of these behaviours. Self-reported data is notoriously subject to social desirability, meaning that respondents could answer based on what they thought the enumerators wanted to hear. Evidence on misreport of sexual behaviour is for instance the fact that surveys generally do not report equal aggregate amounts of sex by men and by women (Gersovitz et al. 1998). It is not clear whether women under-report or men over-report but it is clear that men and women are subject to social desirability when asked about their sexual activity. Do teenagers misreport as much as adults? Gersovitz et al. (1998) find that married people misreport more that unmarried people, which suggests that our sample should be less prone to reporting bias than usual samples including people aged 15-65. We also tried to reduce social desirability issues as much as possible: we insisted a lot on this during the training of the interviewers, and banished some stigmatized term like "sponsor" from the questionnaire (we used the more neutral expression "partners providing assistance"). However, in our data we can observe some inconsistencies between baseline and endline measures in terms of pregnancy: 26% of the girls that declared having experienced a pregnancy at baseline declared the reverse at endline. So we definitively do not claim that self-reported data are a good way to capture quantities of sexual behavior-related outcomes.

However, our focus in this study is not on the quantity of self-reported behaviour, but on comparability of groups. Provided that social desirability does not vary across groups, we should be able to correctly estimate the effect of the interventions. May social desirability be influenced by treatments, i.e. that the respondents in the treatment groups might be more likely to suspect enumerators wanted to hear reports of "safer" sex? It is possible

that students in the outside consultant groups associated the endline survey interviewers to the consultant who provided the intervention. We can believe that this did not happen since we were cautious at presenting the survey as a general survey on teenage sexuality and questions on formal HIV education in school were put in the last section of the questionnaire so that they do not recall the intervention when responding about their sexual behaviour. Since the survey took place one year after the intervention, we regard as unlikely that the interventions were immediately salient before asking about formal HIV education at the end of the questionnaire.

Finally, our results give two reasons to believe that reporting bias is not driving the main findings in this study. First, the self-reported data in this study are highly consistent with the more objective (childbearing and schooling) data, indicating that, if any, biases are pretty constant over groups. Second, the overall effects of the interventions on sexual behaviour described in section 4 are hardly socially desirable. In that regard, the lack of effects of the relative risk message on reported sponsored relationships is quite striking. Even more striking, the negative impacts of outside consultant interventions in Yaoundé and in the South. From this perspective, the negative findings are highly reliable.

Attrition

As shown in Table 1 (panel C), the likelihood that girls in the study sample has responded to the endline questionnaire is balanced across the control, TC and TCR groups (about 84%), but this is not the case for the TB group where a significantly higher fraction of students (+3.9pp) responded in person to the questionnaire. However, the responses by tier-person filled the gap: we ended with less than 10% of girls with no information at all, and this proportion is balanced across all groups suggesting no differential selection into the endline survey for the set of outcomes that were measured in the tier-person survey: fertility and schooling.

The differential attrition might be related to the fact that the basic treatment significantly

reduced dropouts. Indeed, the marginal cost of interviewing girls at school is much lower than the marginal cost of interviewing girls at home. Since the survey teams had the same amount of time to spend in each school and its neighbourhood, the fewer girls enrolled in school, the fewer girls the survey teams could interview. Unfortunately, we cannot provide evidence on that since data on the place of the interview was not collected. This selection issue should be kept in mind while analyzing the treatment effects on self-reported behavioral outcomes. The marginal girl who would not have kept enrolled in the absence of the TB intervention is likely to exhibit riskier sexual behavior than the girls who would have kept enrolled anyway. So if any selection bias on TB average treatment effect, it is likely to be downward.

For friends, there is no differential selection into the endline survey for any set of outcomes across the TC, TCR and control groups (Table 1, panel C).