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Mobile phone questionnaires for sexual risk data collection among young women in Soweto, South Africa.

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Abstract

Background: Recall and social desirability bias undermine self-report of paper-and-pencil questionnaires. Mobile phone questionnaires may overcome these challenges. We assessed and compared sexual risk behavior reporting via in-clinic paper-and-pencil and mobile phone questionnaires.

Methods: HVTN 915 was a prospective cohort study of 50 adult women in Soweto, who completed daily mobile phone, and eight interviewer-administered in-clinic questionnaires over 12 weeks to assess sexual risk.

Results: Daily mobile phone response rates were 82% (n=3486/4500); 45% (n=1565/3486) reported vaginal sex (median sex acts 2 (IQR:1–3)) within 24 hours and 40% (n=618/1565) consistent condom. Vaginal sex reporting was significantly higher via mobile phone across all visits (p<0.0001). There was no significant difference in condom use reporting by mobile phone and in-clinic paper-based questionnaires across all visits (p=0.5134).

Conclusions: The results show high adherence and reporting of sex on the mobile phone questionnaire. We demonstrate feasibility in collecting mobile phone sexual risk data.

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Conflict of Interest:

All authors have declared that they have no conflict of interest.

Ethical approval: This study involved human participants. All procedures performed in in this study were in accordance with the ethical standards of the HVTN, the University of the Witwatersrand and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed consent: Informed consent was obtained from all individual participants included in the study.

Keywords

Daily diaries; mobile health (mhealth); mobile phone; momentary ecological assessments; Africa

Introduction

In South Africa, HIV incidence remains high among women aged 15–24 years (1, 2) with infection rates twice as high as male counterparts (2). Furthermore, in 2012 black African females aged 20–34 years had the highest HIV incidence rate, estimated at 4.5%, in the country (2). The efforts to assess HIV acquisition risk (1, 3–8), have rarely focused on young South African women, especially as there is no standardized risk assessment methodology in this population.

HIV prevention research relies extensively on retrospective self-reported measures of sexual risk to ascertain risk for HIV exposure for recruitment and enrolment purposes. Many behavioral clinical trial studies utilize paper-and-pencil based questionnaires, completed in the research environment, through interviewer administration or having the participant complete the questionnaire on their own (9–11). Women are often asked to report the number of male and female sex partners, condom use, transactional sex, history of sexually transmitted infection (STI) diagnosis, and history of alcohol and other substance use (12–14). Recall periods vary from 30 days (3) to lifetime behaviors (4). Traditionally the daily diary method is regarded as the gold standard in reporting sexual and behavioral risk information (15), and has been compared with other self-reported methods incorporating retrospective recall periods (16). However, research evaluating the accuracy of these assessments is rarely conducted and often show inconclusive results (17). For example, while face-to-face interviewer-administered paper-and-pencil questionnaires are the most commonly used methods to assess sexual behaviors in South African HIV vaccine clinical trials, there are limited comparisons to determine the reliability and validity of these methods (18).

Self-reported data by these methods may be inaccurate due to recall bias because of memory difficulties when having to report for a specific duration (e.g., forgetting and telescoping or distorting the recency of salient events) (19–21) and social desirability bias which is the tendency to present oneself favorably to avoid negative evaluations, portray a positive view of oneself, or to obtain approval by responding in culturally and socially acceptable ways (20–22). Problems with recall, even among those who make every effort to report their past behaviors accurately, can lead to inaccuracies in the reported incidence and frequency of specific behaviors (18, 23–27). Generally, longer recall intervals result in underreporting or inaccurate recall of sexual practices and number of partners (28, 29), which in turn may lead to errors in the prevalence estimates of high- or low-risk behaviors (24). To overcome these challenges, sexual risk assessment methodology may be optimized by addressing these biases with: (i) daily diary or momentary ecological assessments, that is, completion of measures close to real time (30); (ii) shorter recall periods; (iii) increased convenience for the participant; (iv) detachment from the clinical environment; and (v) more privacy to avoid

participant feelings of judgment. Innovative use of technology may offer researchers combinations of these advantages.

There is a growing body of literature supporting positive experiences and attitudes towards accessing sexual health information through technology (31–34). Globally, there is an increasing trend for internet and mobile-phone based HIV prevention programs (32, 35–40). The use of technology-based HIV programs, via the internet and mobile phone short message system (SMS), have been shown to be feasible in HIV prevention, especially among at-risk populations, overcoming some of the individual and intervention-level barriers, such as discomfort with topics (32, 37, 41, 42). Moreover, content can be easily tailored and updated to reflect current trends and changes in health information (32).

In South Africa, mobile phone ownership is high. An estimated 95% of South African households own mobile phones (43). About 87% of mobile-phone users in South Africa choose a pre-paid, “pay-as-you-go” mobile telephone service option (44) to purchase airtime when they need it and can afford it, allowing for individual control over, and informal sharing of, mobile phones. The use of mobile phones for healthcare interventions creates an open channel of communication between service providers and target populations (45). In sub-Saharan Africa, mobile phone interventions have been used to increase medication adherence for chronic conditions and improve clinic attendance among young people and adults (46), for disease prevention messaging (47), and to facilitate data collection (48). However, few mobile phone applications tested within developing countries have been evaluated for efficacy and feasibility (47).

HIV Vaccine Trials Network (HVTN) 915 was an observational study that evaluated the use of once daily self-administered vaginal swabs over 90 days for the detection of HIV-1 virions among women in South Africa (49, 50). One of the secondary objectives of the study was to pilot the use of a mobile phone messaging application outside of the clinic setting to collect the type of sexual activity data which would be useful within preventive HIV vaccine trials. In this paper we describe the mobile phone responses and in-clinic paper-and-pencil based responses to sexual risk questionnaires, and correlate the difference in reporting sexual and behavioral risk data collected via two different methods: traditional in-clinic paper-based and more novel mobile-phone based questionnaires.

Methods

HVTN 915 was a prospective cohort study of 50 young women in Soweto, South Africa. For each participant, data were collected on sexual frequency and condom use using a mobile phone application and a site-administrated questionnaire during a planned series of clinic visits.

Study setting

The study was conducted at the Perinatal HIV Research Unit (PHRU) in Soweto, South Africa. Soweto, with a population of about one million people, is located south west of Johannesburg in the Gauteng Province of South Africa. The estimated HIV prevalence across all ages 0–60+ years in Gauteng is 12.4% (2); with prevalence rates doubled among

young women aged 14–24 years compared to their male counterparts (2, 51). Specifically, the HIV prevalence was 4% among a sample of 7689 young women compared to 2% among 3833 young men aged 14–24 years living in Soweto (51). A study conducted among young people in Soweto showed high access (91%) and ownership of mobile phones (78%) (52) with a high proportion (87%) accessing social networking via their mobile phones (53). The ability to access and use social networking applications implies access to the internet.

Sample

We utilized convenience sampling to recruit eligible volunteers who were consenting, healthy, heterosexual HIV-uninfected women 18 to 25 years, who reported at least 3 sexual acts per week and were able to demonstrate successful use of a mobile phone. Women were approached through active community recruitment in Soweto, including local taverns, “shebeens” (usually a small house located in townships as an alternative to pubs and bars, selling alcoholic liquor mostly illegally) (54) and brothels, and then invited to come to the site to receive more information about the study. Participants provided written voluntary informed consent.

Study procedures

Screening procedures included a laboratory based HIV test, the collection of demographic information, assessment of mobile phone use and questionnaire completion ability as well as assessment of the volunteer’s sexual activity during HIV risk reduction counseling and through an interviewer-administered behavioral risk assessment questionnaire. At enrolment (week 0), all participants were issued with a Samsung Galaxy Star S5280 smart phone pre-programmed with the sexual behavior data collection questionnaire for daily completion and submission outside the clinic. Participants were shown a demonstration video on how to use the daily mobile phone questionnaire. Thereafter, study staff explained the instruction brochure and answered any questions. In order to determine whether participants were comfortable with the functionality of the mobile phone and questionnaire, participants had to successfully demonstrate use of the mobile phone to a study staff member, and complete a test questionnaire record on their own. For this assessment participants had to access the mobile phone by entering the phone access password on their own and showing the study staff member how they would complete the questionnaire – entering the questionnaire application, starting a new questionnaire form, entering the encrypted questionnaire password, completing each question and submitting the fully completed questionnaire. The participant passed the functionality assessment if she could complete the process independently. Study nurses administered a behavioral risk assessment during eight scheduled clinic visits at weeks 0, 1, 2, 3, 4, 6, 8, and 12. The mobile phone and in-clinic risk assessments differed in mode of administration, frequency of administration, nature of questions, and recall period (i.e. 24 hours versus 7 days). Previous research among South African women showed that a 7 day recall period was considered optimal for correlating daily diaries in the reporting of sexual behaviors in longitudinal studies (55).

The mobile phone questionnaire was created using the SurveyCTO (56) application. Study mobile phones had two levels of password protection, known to the participant and staff

providing technical support, to ensure privacy and unauthorized access. The passwords were (i) for access to switch on the study mobile phone and (ii) an encrypted password to access the SurveyCTO application for survey completion and submission. At enrolment, mobile phones were preloaded with the necessary data bundles, that is, a set quantity of mobile data for a fixed cost via mobile service providers (57). Additional data bundles to transmit the daily questionnaires were subsequently sent to the study mobile phone. We purposefully set up the application to allow participants to send multiple submissions so that they had the option to review their data before finalizing submissions. In cleaning and finalizing the dataset for analysis, participants with multiple daily submissions had to be contacted throughout the study to verify the valid questionnaire. Upon completion of each mobile phone questionnaire, participants received airtime on their personal mobile phones to the value of ~USD0.50 (ZAR 5). Reimbursement for scheduled clinic visits was ~USD15 (ZAR 150) per clinic visit.

Mobile phone sexual behavior questionnaire

The protocol team specifically developed the mobile phone questions to support the main study objective of detecting exposure to HIV. Therefore, the questions assessed unprotected sexual exposure over 24 hours. Mobile phone questions were developed based on previous experience in assessing HIV risk in HIV vaccine clinical trials in South Africa (9), and in assessing sexual exposure in as close to real time as possible (30).

Figure 1 displays the three questions about sexual behavior assessed (i) vaginal sex between 7am on the day of questionnaire completion and 7am the preceding day (24-hour period); (ii) if yes, how many acts (“rounds”) of vaginal sex occurred; and (iii) whether a condom was used with every vaginal sex act. These questions were asked to determine unprotected sex acts. The questions were displayed one at a time so that each question could be completed before proceeding to the next.

In-clinic behavioral risk assessment questionnaire

The questions addressed general sexual behavior and the last sex act in the past 7 days at the enrolment (week 0) visit and at subsequent visits. Sexual behavior questions related to type, number and age of sexual partners; frequency of vaginal, oral and/or anal sex; sex related condom use; and transactional sex. Sexual partner types were defined as main partner (a male sexual partner to whom the participant was married, living with as married or “closest to her in her heart”, even if she did not live with him), casual partner (a male sexual partner who was not the main or regular partner) or new partner (a male partner who she had sex with for the first time during the recall period). Questions related to last sex act were about: type of partner, number of sex acts, type of sex act (vaginal, anal or oral), and whether or not a condom was used.

Ethical considerations

The study was approved by the University of the Witwatersrand Human Research Ethics Committee and the Fred Hutchinson Institutional Review Board. The relevance of the study design, procedures and mobile phone questionnaire were ratified by the PHRU Soweto

Prevention Community Advisory Board (CAB), which had also piloted the draft mobile phone questionnaire for 7 days and provided feedback in terms of its use, implementation and language. The Prevention CAB is comprised of representatives of key sectors of the local community, for example non-governmental organizations (NGOs), the healthcare sector, the traditional healer sector, the police service, and religious leaders. The Prevention CAB serves as a link between the PHRU and the community of Soweto. They provide input on ongoing HIV prevention studies and filter their feedback and experience to the wider communities.

Statistical analysis

All statistical analyses were conducted using SAS/STAT software in SAS Enterprise Guide 7.1 (SAS Institute Inc., Cary, NC, USA). Descriptive data including counts and percentages for categorical questionnaire responses and medians and interquartile ranges (IQR) for numeric responses are shown in Tables 1, 2 and 3. Demographics, responses from the in-clinic baseline behavioral questionnaire and responses from week 1 in-clinic behavioral questionnaire are presented in Tables 1 and 2. Mobile phone questionnaire data from weeks 1–12 with the corresponding in-clinic questionnaire data are shown in Table 3 and Figure 2. All comparisons were made from week 1.

Frequencies for consistent and inconsistent condom use were determined for each questionnaire assessment at each clinic visit. With the data reported by in-clinic questionnaires, consistent condom use was defined as always using a condom. Otherwise condom use was classified as inconsistent. On the mobile phone application, consistent condom use was defined as always using a condom in the 7 days prior to each clinic visit. At each visit, frequencies of consistent and inconsistent condom use in this study cohort as reported by mobile phone and in-clinic visit were compared using McNemar's test for matched pairs. Condom use between the two assessments was compared longitudinally using a weighted generalised estimating equation (GEE) to adjust for missing data. Weights were derived from the fraction of days with responses weekly and by inverse probability weights drawn from the proportion attending follow-up visits.

The frequencies of sex acts were evaluated for both the mobile phone application and in-clinic visits. In the mobile phone questionnaire (see Figure 1), the frequency of vaginal sex was reported on a daily basis and summed (over the 7 days prior to the in-clinic visit) to match the equivalent clinic visit. Although, the items across the two methods both measured frequency of sex over 7 days, the questions were asked differently. For the in-clinic questionnaire the following question was used: (i) *In the last 7 days, how many times have you had vaginal sex with your [main/casual/new] partner?* For each visit, we compared vaginal sex frequency differences between the two assessments non-parametrically using the sign test for paired samples. Sex frequencies were compared over time by inverse probability weighted GEE to account for missing data as well as to determine the rate of decline in each assessment.

Results

Baseline characteristics

Of 116 volunteers screened for the HVTN 915 study, 66 were ineligible, for reasons that included reporting infrequent sex (n=19), HIV infection (n=8), pregnancy (n=7), report of suicide attempt n=6), difficulties drawing blood (N=6) or other reasons (n=20), for example drug problems, did not fit age criterion, refusal to use contraception or not residing in Soweto. We enrolled 50 black female participants with a median age of 22 years (IQR:21–24), between September 2014 and April 2015. Four participants were withdrawn during the study, for reasons pertaining insufficient time for study participation, loss-to-follow-up, and pregnancy.

Sexual risk behavior characteristics (via in-clinic questionnaire) at week 1

Table 1 shows the in-clinic sexual risk behavior results by partner type. At week 1, 100% (n=49) and 98% (n=48) reported having a main and casual partner, with partner median ages at 27 (IQR:24–29) and 26 (IQR:23–29) years respectively. Eleven percent (4/37) reported consistently using a condom during vaginal sex with the main partner in the past 7 days and 20% (5/25) reported transactional sex with a casual partner. As indicated in Table 2, 22% (11/49) reported sex with a casual partner; 4% (2/49) engaged in anal sex and 8% (4/49) in oral sex the last time they had sex; 45% (22/49) used alcohol and of these 64% (14/22) drank 6 or more drinks per week. Thirty-nine percent (19/49) of participants reported using non-injectable drugs.

Daily mobile phone questionnaire response rates

Of 4500 questionnaires planned for delivery among the 50 participants over the 90 day period, 4219 questionnaires were actually delivered for submission by participants. Questionnaires were not delivered because of termination from the study, a faulty mobile phone and a lost/stolen/confiscated phone. The response rate for the delivered questionnaires was 82% (n=3486). Reasons for unanswered questionnaires included factors related to the mobile phone network provider (participant disabled the mobile phone data connection), to the participant (forgetting or being busy) and to the mobile phone application (one participant reset the study phone, thereby deleting SurveyCTO).

Sexual behavior reported via mobile phone over 12 weeks

Although all women were sexually active, overall, mobile phone questionnaire responses showed that 45% of women reported vaginal sex within a 24 hour period. A median of 2 (IQR:1–3) reported sex acts within a 24 hour period was reported over the entire study duration. Consistent condom use was 40% among those who reported vaginal sex.

Reporting of vaginal sex and condom use via mobile phone and in-clinic questionnaires

Table 3 presents the reporting of vaginal sex frequency by mobile phone matched to that reported in the in-clinic visit from weeks 1–12. Across all visits up to week 6, reported median frequency of vaginal sex was significantly higher¹ when data were collected via the mobile phone questionnaire compared to the in-clinic questionnaire (Table 3 and Figure 2).

Overall, reported sex frequency on the mobile phone application was significantly higher (Table 3) than in-clinic (estimate 0.64; $p<0.0001$). Mobile phone response rates were above 90% between weeks 1–8, but decreased to 80% at week 12. Reporting of sex frequencies on the mobile phone declined significantly by 0.0418 ($p=0.0002$) per visit during follow-up whereas there was a lower decline of 0.0074 ($p=0.4691$) for the in-clinic paper-and-pencil questionnaires. There was no significant difference (estimate 0.084, $p=0.64$) in the reporting of condom use over the last 7 days across all visits.

Discussion

This is the first study conducted within the HVTN in South Africa to correlate the reporting of sexual risk data using two methods of delivery, that is, a mobile phone and in-clinic paper-and-pencil questionnaire amongst healthy heterosexual young women aged 18–25 years. The high adherence to completing daily mobile phone questionnaires over the 12 week period shows acceptability and feasibility of delivering sexual risk questionnaires via mobile phone among young heterosexual women in South Africa. Participants reported more-frequent sexual activity via the mobile phone versus the in-clinic questionnaire, which may imply that answering questionnaires via the mobile phone on their own may have provided women with a sense of privacy and anonymity minimizing social desirability bias. Another possible explanation for the difference in sexual activity reporting may be due to recall bias. Participants may have been more likely to recall and report sexual activity for the mobile phone questionnaire as it was closer to the event than during the in-clinic questionnaire. It is likely that the mobile phone questionnaire presents a more reliable method of data collection given reduced social desirability and recall bias.

This is the sex frequency as indicated at the start of the sentence. At each follow-up visit, the reported sex frequencies dropped by 0.0418

The nature of questions about the last vaginal or anal sex act was similar between the in-clinic and the mobile phone sexual behavior questionnaires but there were some key differences. Of note, the former was a much broader questionnaire that collected data on multiple other determinants of risk behavior (examples are types of partners, anal sex, vaginal hygiene practices, and drug use), whereas the latter focused exclusively on vaginal sex. The different assessments allowed for different complexities of data collection.

The response rates with the mobile phone questionnaire showed a significant decline in responses at week 12 with optimal average response rates occurring between weeks 1–8, which may indicate that participants experienced response fatigue between weeks 8 and 12 (58), the novelty of using the mobile phone questionnaire had worn off, or the gap between face-to-face in-clinic visits was too long (that is, four weeks). Response bias may have occurred because participants became too familiar with the questionnaire. Our results are similar to that found by Curran et al. (2013) (59), where reporting via the mobile phone decreased in the later weeks of the study. Baseman et al. (2013) (60) also reported response fatigue when participants have to provide frequent and repetitive information. In a daily SMS pilot study conducted by Anhoj and Moldrup (2004) to collect data among asthma patients, there was no response fatigue over two months (61). Participants suggested one

simple SMS question per day in combination with a Web page for user customization and data display (61) to address response fatigue. Some researchers implemented weekly reporting of events using web-based applications (62). However, their results do not show whether weekly reporting contributed towards high response rates.

Participation in HIV vaccine trials usually takes place over 2–3 years with multiple scheduled in-clinic visits (12). Therefore, daily reporting of sexual risk information via mobile phone will likely be impractical. However, investigators would have to weigh up whether the response bias via the in-clinic questionnaire would be worse than the mobile phone application and subject to significant bias. An alternative to daily reporting over a long period may be sexual event based reporting, where participants respond to mobile phone questionnaires following sexual activity (63–65). Future research is required to ascertain if sexual event based reporting may alleviate response fatigue over a long period of time. An alternative may be a hybrid solution, to allow a short period of daily reporting, allowing participants to become familiar with the questions and application, followed by sexual event-based reporting. Despite limited comparisons, the gold standard for self-reported sexual risk behavior data collection is the completion of daily diaries (15). Our study leveraged the daily diary method through a mobile phone application. A study conducted among American MSM; drug and alcohol use was reported more frequently using text messaging ecological momentary assessments compared with Audio Computer-Assisted Self Interview (66). Research related to chronic diseases, such as, inflammatory rheumatic disorders, has shown comparable data between daily mobile phone and daily diary methods (67). Our study showed feasibility in collecting sexual risk data through a daily self-reported mobile phone questionnaire and has the potential to be integrated as a self-collection tool into HIV vaccine clinical trials.

Implications for future research

HIV vaccine trials conducted in South Africa include women and men. Future research is recommended to extend the work to adult men in South Africa. In addition, there is a need to address potential response fatigue among study participants, particularly when participants have to complete the same type of questionnaire over a longer period of time. Therefore, future research could focus on different participant-operated self-collection tools. In terms of collecting data on sexual activity, event-based reporting may be more favorable than daily reporting.

Challenges and Limitations

The mobile phone component of our study draws on the daily diary method, the gold standard for self-reported sexual risk assessments, which itself has not been objectively validated (16). In the absence of a biological marker, we are unable to validate the mobile phone questionnaire. There were a few implementation challenges: One study phone was reported as stolen, one confiscated at school and another faulty during the study period and had to be replaced for these three participants to continue questionnaire submissions. The data bundles (57) uploaded manually on each study phone had a one month expiry date and therefore data bundle upload dates had to be tracked by study staff. In the future, an

automated system for data bundle uploads is recommended. Alternatively, the cost of the questionnaire submission could be included in the application costs to avoid the use of data bundles. Participants were able to submit more than one mobile phone questionnaire record a day, which complicated data management, including manual verification of the correct questionnaire record and manually issuing the airtime incentives in these instances. An alternative may be to use a different application for the mobile phone questionnaires. Participants had to familiarize themselves with a new type of smartphone. Even though many owned or were familiar with a smart phone, they experienced technical difficulties in becoming familiar with the study phone, resulting in delayed questionnaire submissions to the data server. An improved participant training program may mitigate these technical problems.

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Compliance with Ethical Standards:

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The figure displays three sequential screenshots of a mobile application interface for a sexual behavior questionnaire. Each screenshot shows a status bar at the top with signal strength, battery level, and time (18:18, 18:19, and 18:20 respectively). Below the status bar is a navigation bar with a 'Collect > HV...' button and icons for a document and a back arrow. The main content area features a pink rounded rectangle containing a question. Below the question are two pink rounded buttons labeled 'Yes' and 'No'. The first screenshot asks: 'Did you have vaginal sex from 7am this morning going back to 7am yesterday morning?'. The second screenshot asks: 'How many acts of vaginal sex did you have from 7am this morning going back to 7am yesterday morning?'. The third screenshot asks: 'Did you use a condom EVERY time you had vaginal sex from 7am this morning going back to 7am yesterday morning?'. A blue horizontal line is visible below the second question.

Figure 1.
Mobile phone sexual behavior questionnaire

Figure 2.

Sex frequency of participants over 12 weeks shown by mobile phone and in-clinic questionnaire

Average weekly mobile phone sex frequency is the mean of the sex frequency reported each week during follow-up

Table I.

Sexual behavior of female participants by partner type as reported in the in-clinic questionnaire at week 1

Variable	<u>Main partner</u>		<u>Casual partner</u>		<u>New partner</u>	
	<u>n</u>	<u>n(%) or median (IQR)</u>	<u>n</u>	<u>n(%) or median (IQR)</u>	<u>n</u>	<u>n(%) or median (IQR)</u>
Partners age (years)	49	27 (IQR: 24–29)	48	26 (IQR: 23–29)		N/A
In the last 7 days, how many partners have you had vaginal or anal sex with?	48	1 (IQR: 1–1)	43	1 (IQR: 0–1)	2	1 (IQR: 1–1)
In the last 7 days, how many times have you had vaginal sex with your partner?	39	2 (2–4)	25	1 (1–2)	2	1 (1–1)
In the last 7 days, how often was a condom used during vaginal sex with your partner?						
Never	37	27 (73%)	25	10 (40%)	2	0 (0%)
Sometimes		6 (16%)		6 (24%)		0 (0%)
Always		4 (11%)		9 (36%)		2 (100%)
In the last 7 days, did your partner give you money, gifts, drugs, goods, shelter or services to have vaginal or anal sex with him?						
Yes	38	1 (3%)	25	5 (20%)	2	2 (100%)
No		37 (97%)		20 (80%)		0 (0%)
In the last 7 days, did your partner also have sex with other women and/or men?						
Yes	38	1 (3%)	25	5 (20%)	2	0 (0%)
No		2 (5%)		0 (0%)		0 (0%)
Don't know		35 (92%)		20 (80%)		2 (100%)

^a "N" refers to the number of respondents who responded to each of the items above

Table II.

Risk behavior of female participants as reported in the in-clinic questionnaire at week 1

Variable	n	n (%)
The last time you had sex, whom did you have sex with?	49	
Main partner		37 (76%)
Casual partner		11 (22%)
New partner		1 (2%)
How many sex acts did you have?	49	
1 sex act		3 (6%)
2–3 sex acts		41 (84%)
More than 3 sex acts		5 (10%)
What type of sex act(s) did you engage in the last time you had sex? (Vaginal)	49	49 (100%)
What type of sex act(s) did you engage in the last time you had sex? (Anal)	2	2/49 (4%)
What type of sex act(s) did you engage in the last time you had sex? (Oral)	4	4/49 (8%)
Was a condom used the last time you had sex?	49	
Yes		11 (24%)
No		38 (76%)
In the last 7 days, how often did you drink alcohol?		
Never	27	27/49 (55%)
On the days that you drank alcohol, how many drinks did you usually have?	22	
1 drink		1/22 (4%)
2–3 drinks		3/22 (14%)
4–5 drinks		4/22 (18%)
6 or more drinks		14/22 (64%)
During the last 7 days, did you inject any non-prescription drugs under your skin or in a vein or muscle to get high?	49	
Yes		0 (0%)
No		49 (100%)
During the last 7 days, did you take any non-injected drugs?	49	
Yes		19 (39%)
No		30 (61%)

Table III.
Sex frequency reported in the last seven days by mobile phone and during in-clinic visits

	Mobile Phone			In-Clinic			p-value (statistic)*
	Response (%)	Mean (SD)	Median (IQR)	Response (%)	Mean (SD)	Median (IQR)	
Week 1	49/50 (98)	7.3 (4.5)	7 (5,10)	49/50 (98)	3.6 (3.1)	3 (2,5)	<0.0001 (15)
Week 2	49/50 (98)	7.2 (4.9)	7 (3,11)	50/50 (100)	3.2 (2.1)	3 (2,4)	<0.0001 (17)
Week 3	47/49 (96)	5.5 (4.7)	4 (2,9)	47/49 (96)	2.9 (2.2)	3 (1,4)	0.0001 (11.5)
Week 4	47/49 (96)	5.6 (4.4)	5 (2,9)	49/49 (100)	2.7 (2.0)	2 (1,4)	<0.0001 (13.5)
Week 6	47/48 (98)	5.9 (4.9)	5 (2,9)	47/48 (98)	3.4 (2.7)	3 (2,5)	<0.0195 (8)
Week 8	44/47 (94)	6.0 (5.1)	4 (2,10)	47/47 (100)	3.4 (2.4)	4 (1,5)	0.1755 (4.5)
Week 12	37/46 (80)	4.2 (4.0)	3 (0,7)	46/46 (100)	2.8 (2.2)	3 (1,4)	0.3449 (3)
Repeated Measures							<0.0001

^bThe p-value (sign rank test statistic) compares the difference per visit between mobile phone and in-clinic sex frequency responses non-parametrically using the sign rank test; *Total for mobile phone and in-clinic responses at each visit excludes terminations where they occurred*