The Relationship History Calendar:

Improving Sexual Behavior Data among Youth in Developing Country Settings

Nancy Luke
Department of Sociology
Population Studies and Training Center
Brown University
Box 1916
Providence, RI 02912
nluke@brown.edu

Shelley Clark
Department of Sociology
McGill University
1130 Pine Ave., West, Room # 102
Montreal, QC H3A 1A3
shelley.clark@mcgill.ca

Eliya Zulu
African Population and Health Research Center
Shelter Afrique Center, 2nd Floor
Longonot Road, Upper Hill
Nairobi, Kenya
ezulu@aphrc.org

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Abstract

Adolescence and early adulthood is a period of rapid change for young people worldwide. Sociologists are particularly interested in how reproductive and sexual outcomes are shaped by these early life course transitions and contexts. Complex survey design and instrumentation have yielded elaborate, high-quality data on adolescents in the U.S. Implementation of these methods is not always feasible or successful in developing countries, and therefore new approaches are needed. We develop a new survey method, the Relationship History Calendar (RHC), which collects detailed, 10-year retrospective data on the sexual histories and other life course events of youth. We assess the quality of sexual behavior data gathered with the RHC through a field experiment conducted in urban Kenya. We find that reporting on sexual behaviors is improved with the RHC in comparison to a standard questionnaire, and that respondents enjoy and are more comfortable with the RHC.

Introduction

The transition to adulthood is a period marked by rapid changes in schooling, employment, family formation, and sexuality for adolescents and young people worldwide. Transitions during these formative years have significant impact on individuals' development and well-being throughout the life course. Sociologists have been particularly interested in how reproductive and sexual outcomes, including premarital sexual activity, unintended pregnancy, and sexually transmitted infections (STIs), are shaped by these early processes and the contexts in which they take place. In order to understand these complex transitions and their relationship to reproductive and sexual health, equally complex data collection methods are required. Researchers in the U.S. have gathered elaborate data on the early life course in the National Longitudinal Study of Adolescent Health (Add Health), for example, which includes repeated waves of interviews with a large population-based sample, collection of information on multiple sexual partnerships for each respondent, and utilization of computer-assisted interviewing techniques to ensure accurate reporting on sensitive issues, particularly sexual behavior. Analyses of these data have greatly contributed to our understanding of adolescents' transitions into sexual activity and multi-level influences on sexual behavior and outcomes in the U.S. (e.g., O'Sullivan et al. 2007, Upchurch et al. 2004, Harris et al. 2002).

A similar approach to collecting comprehensive data on young people's transitions in developing countries has not been undertaken, although it is arguably even more pressing. In sub-Saharan Africa, youth experience some of the highest rates of HIV infection and early pregnancy in the world, and many mature in contexts where poverty, school dropout, and multi-partnering are common. Implementation of complex survey designs and instrumentation is not always feasible or successful in these resource-poor settings, however. Longitudinal surveys are extremely costly and difficult to conduct, due to frequent migration that makes tracking of young people over time problematic (Cleland et al. 2004). The use of computer-assisted technology has produced mixed results (e.g., Mensch et al. 2003, Jaya et al. 2007), and gathering sensitive information continues to be a major challenge. Furthermore, reproductive health surveys in developing countries routinely fail to collect data on respondents' multiple concurrent or sequential partnerships, the multi-dimensional aspects of these relationships, and the changing nature of sexual behaviors within them. Such shortcomings in commonly used large-scale surveys may be a partial explanation for why researchers have been unable to fully explain patterns of sexual behavior and their linkages to the HIV epidemic in sub-Saharan Africa. Consequently, new data collection approaches are needed that can improve both the scope and quality of data on sexual relationships and behavior among young people in developing countries.

The life history calendar is an alternative method to longitudinal studies to collect information on the contextual and dynamic aspects of the life course. Life history calendars are generally placed

within a standard survey instrument and, through face-to-face interviewing, respondents report detailed retrospective information for reference periods of several months or years before the survey (Freedman et al. 1988, Belli 1998, Schwarz and Oyserman 2001). In addition to the wide range of time-varying information that can be recorded in calendars, they have been shown to produce accurate data on birth, contraceptive use, migration, schooling, employment, and illness histories from diverse populations around the world (e.g., Leridon 1990, Axinn et al. 1999, Fussell and Massey 2004, White et al. 2005, Belli et al. 2001, Goldman et al. 1998, Freedman et al. 1988, Steele and Diamond 1999, Curtis and Blanc 1997). Furthermore, the structure and interviewing techniques associated with life history calendars help to minimize social desirability bias, which is particularly important for gathering data on sensitive sexual and reproductive behaviors.

In this paper, we describe a newly developed life history calendar—the Relationship History Calendar (RHC)—which focuses on the romantic and sexual relationship histories of young people. We designed the RHC to produce detailed, time-varying data on sexual relationships and behavior, while overcoming some of the challenges of survey research in developing-country settings. We evaluate the quality of reporting on sexual behaviors with the RHC compared to a standard survey questionnaire through a field experiment conducted with young women and men in urban Kisumu, Kenya. We chose Kisumu as an example of a low-income urban setting where young people face considerable sexual and reproductive health risks. Kisumu has one of the highest HIV prevalence rates in the country, estimated at 25 percent for women and 18 percent for men in 2003 (Bailey et al. 2007). Young people are among the most severely affected. According to a 1997 study, HIV prevalence peaks at ages 20 to 24 for women in Kisumu, reaching nearly 40 percent, while 27 percent of females ages 15-19 are infected; rates for males in the same age groups are 13 percent and 5 percent, respectively (Glynn et al. 2001). Over 80 percent of males and females ages 15-24 are sexually active, however, rates of condom and modern contraceptive use are relatively low. Condom use was 41 percent among females ages 15-19 at last nonmarital sex, and 26 percent for males (Voeten et al. 2004). Only 14 percent among young females ages 15-24 are currently using modern contraceptives (Hargreaves et al. 2002). These poor reproductive and sexual health outcomes are a consequence of the relationships into which young people enter and their sexual behaviors within them. Thus, gathering detailed, accurate data on the period of transition into adulthood is crucial to identifying which relationship contexts and processes lead to healthier sexual and reproductive health outcomes and those which set a course for a pattern of risky sexual behavior.

Reporting on Sexual Behaviors in Previous Studies

Researchers have been concerned with the accuracy of information collected on sexual behavior by structured, face-to-face interviews for some time (Cleland et al. 2004). The main type of measurement error associated with data on sensitive behaviors is social desirability bias, which occurs when the respondent gives an incorrect response in order to conceal information from the interviewer that is considered socially less acceptable, such as multiple partnerships or visiting a commercial sex worker (Catania et al. 1990, Gribble et al. 1999, Gregson et al. 2002). Recent methodological advances have sought to minimize social desirability bias by removing the interviewer from the survey process and allowing respondents to record their answers privately

(Cleland et al. 2004, Schwarz and Oyserman 2001). Such confidential response methods include recording responses via self-administered surveys, ballot boxes, envelopes, response cards, or computer (Gregson et al. 2002, Lindstrom 2008, Hewitt et al. 2004). Some of these interview modes utilize an interviewer to read the questions aloud to respondents, while in others, the questions are read by the respondent or are heard over audio headphones.

Numerous studies of confidential response methods have been carried out in developing countries and have shown significant increases in reporting of socially undesirable sexual activities for men and women compared to face-to-face interviews. The results of these studies by response mode and sex of the respondent are not always consistent, however (for Kenya, see Mensch et al. 2003, Hewett et al. 2004; Malawi, see Mensch et al. 2008; Zimbabwe, see Gregson et al. 2004, 2002; India, see Jaya et al. 2008, Potdar and Koenig 2005; Vietnam, see Le et al. 2006). In particular, audio computer-assisted self-interviewing (ACASI) has not performed consistently better than face-to-face interviews or other confidential response methods. For example, some studies have found that reporting on sexual behavior is most improved and levels of comfort are highest with ACASI for higher-educated groups, perhaps due to differential ability to use the computer or trust its confidentiality (Mensch et al. 2003, van de Wijgert et al. 2000, Potdar and Koenig 2005, NIMH 2007).

There continues to be debate about the quality of data and feasibility of using various confidential response methods, particularly computer-assisted methods, in developing country settings. Besides social desirability bias, researchers are concerned about additional sources of bias, such as recall error and respondents misunderstanding or skipping survey questions (Catania 1990, McLaws et al. 1990, Gregson et al. 2004, Wight and West 1999, NIMH 2007). These biases may not be substantially decreased by all types of confidential reporting methods. For example, self-administered methods that eliminate the interviewer offer respondents little opportunity to probe or clarify the meaning of questions (Jaya et al. 2008). In addition, some confidential response methods do not permit detailed, complex questioning and skip patterns. Finally, computer-assisted technology may not be feasible in all contexts. Computers may be expensive for many local research and intervention projects, and they require technological infrastructure that may be difficult to guarantee, especially in rural areas (Gregson et al. 2004). Thus, there is a continued need to design and evaluate low-technology methods that collect detailed, high-quality data on sexual behavior (Gregson et al. 2004).

The Relationship History Calendar (RHC)

Life history calendars were developed as a means to collect detailed information on the life course by emphasizing context and change over time (Elder 1994, Elder et al. 2003). In this section, we describe the design of the Relationship History Calendar (RHC), the scope of the information recorded, and how its structure and execution may help reduce social desirability bias and improve respondent comprehension and recall.

The RHC is designed to gather retrospective information on romantic and sexual relationships of youth and other important life course domains for 10 years before the survey. We chose a reference period of 10 years to be able to gather full relationship histories for most of the young

people in our sample (those aged 18-24, see sampling details below). This contrasts with most existing surveys on sexual behavior in sub-Saharan Africa, such as the Demographic and Health Surveys (DHS), which typically gather information on a snapshot of an individual's sexual history, such as current or recent partnerships[1] (Luke 2003). Unlike Add Health, the few longitudinal studies on young people that exist in sub-Saharan Africa, including the Cape Area Panel Study (CAPS)[2] and the Malawi Diffusion and Ideational Change Project (MDICP),[3] do not collect information on all relationships between survey waves, and thus sexual trajectories cannot be fully tracked.[4] Furthermore, most existing surveys gather information only on respondents' relationships that involve sexual intercourse and ignore relationships that are non-sexual (which we term "romantic"). These relationships may be particularly prevalent among young people (Giordano 2003), and analysis of their dynamics may useful provide information on how and why they remain abstinent.

The RHC is a fold-out grid with units of time in months noted across the top of the grid, and life domains, including residence, schooling, work, fertility, and romantic and sexual relationships, are represented as time lines that extend across the 10-year reference period. The RHC records information in monthly intervals, as opposed to years, as many relationships among young people survive for less than one year, and we wished to assess the possibility of eliciting month-level changes in relationship dimensions and behaviors. The full RHC extends from January 1998 to June/July 2007 (the date of our field trial). A truncated version of the RHC is shown in **Figure 1.**[5]

The top portion of the RHC records information on life course domains that are particularly significant for the transition to adulthood, including residence (by district location and rural/urban setting), schooling, and employment and income histories. For females, their pregnancy, miscarriage, abortion, and births histories are recorded as well. The bottom portion of the RHC records detailed information on each romantic and sexual relationship. Here, our particular interest is to collect couple-level measures, as the relationship is an important context in which sexual decisions are negotiated and enacted and this level of analysis tends to be ignored by many researchers (Giordano 2003).

Within each relationship, the RHC records constant partner characteristics, including ethnicity and highest level of completed schooling, and partner characteristics that vary over time within a relationship, such as year in school, economic status, and residence. The RHC also records relationship dimensions (and how they change over time) that have been found to influence sexual behaviors among youth in previous studies, including the relationship type, its duration, and emotional attachment (Giordano et al. 2005, Giordano 2003). With respect to emotional aspects, we include the respondents' reasons to enter, maintain, and end the relationship. The RHC also includes questions about relationship dimensions that are little studied but likely to influence sexual behavior, such as aspirations for marriage, a respondent's knowledge of his or

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[1]The DHS records information about up to 3 sexual partners in the last year as well as the first sexual relationship in a respondent's lifetime.

[2] http://www.caps.uct.ac.za/. Accessed March 15, 2008.

[3] http://www.malawi.pop.upenn.edu/. Assessed March 19, 2008.

[4] CAPS Waves 1 and 2 collected information on first and last sexual partners; Wave 3 included limited information on up to 10 sexual relationships in a respondent's lifetime.

[5] See Freedman et al. 1998 and Axinn et al. 1999 for other examples of life history calendars.

her partners' other sexual partners, and money and gifts given and received within a relationship (Luke 2003, 2005). Finally, the RHC records the major sexual and reproductive behaviors that concern most researchers. Within each relationship, information on coital frequency, condom use, and contraceptive use is recorded by month as well as the fertility history of each male respondent's female partners.

The RHC includes space to report up to 8 separate relationships; for respondents with more than 8 relationships in the last 10 years, additional pages of the RHC are available. The 10-year monthly time period and space for 8 relationships makes the RHC quite large (approximately 3 feet wide by 5 feel long).[6] The RHC is folded to a smaller size; only the upper portion is exposed initially and folded sections containing two relationships are revealed one at a time.

The cells of the RHC grid are filled in by an interviewer in pencil with information provided by the respondent. Each question (or row) on the RHC is accompanied by a set of response codes. A numerical code is filled in the cell corresponding to the month an event occurred or a state began, and a line is drawn to indicate the number of months in which that state continued. For information on life course domains in the top portion of the RHC, each cell is filled in from January 1998 until the interview month in 2007. For each relationship in the bottom portion of the RHC, cells are filled in for each question only for the months in which the relationship was active.

The RHC interview procedure is designed to be flexible and conversational in nature, with interviewers and respondents working collaboratively to fill in the cells of the grid. The order and nature of questions are left up to the trained interviewer, with life course domains and calendar months helping to structure the questions (Freedman et al. 1988, Axinn et al. 1999, Belli et al. 2001). In particular, interviewers are encouraged to discuss respondents' romantic and sexual relationship histories in the sequence and detail with which respondents feel most comfortable.

Both the structure of the questions and the interview procedure of the RHC method may reduce the risk of social desirability bias. The structure of the questioning minimizes the potential embarrassment of sensitive questions by embedding them within the broader history of the respondent's life domains. The RHC inquires of sexual behaviors within the more innocuous context of romantic and sexual relationships as well as in conjunction with life domains of schooling, work, and residence. In addition, the conversational, collaborative nature of the RHC produces a more trusting, less judgmental environment. Interviewers develop greater rapport with respondents than in standard surveys, which makes the interview a pleasing experience (Freedman et al. 1988). Overall, the RHC draws on the methods of qualitative interviewing, and in doing so produces closer interviewer-respondent interaction and respondent motivation (Wight and West 1999, Plummer et al. 2004, Freedman et al. 1988). As opposed to other new methods (such as ACASI) that aim to decrease social desirability bias by removing the interviewer from the interview experience, our approach is to generate greater trust and rapport between respondent and interviewer by encouraging more, rather than less, interaction.

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[6] A life history calendar used in Nepal also appears to have been quite large (see Axinn and Pearce (2006) p. 143).

The structure of the RHC and its interview procedure also facilitate respondent recall in several ways. First, life history calendars (including the RHC) parallel the hierarchical structure of autobiographical memory to aid in the reconstruction of the occurrence, timing, and sequencing of life events (Schwarz and Sudman 1994, Belli 1998, Schwarz and Oyserman 2001). The RHC encourages searches of memory through multiple entry points into the hierarchy and through connections across different domains or life periods. For example, filling out RHC information for the period of "years at school" could jog the respondent's specific memory about the first romantic or sexual partner (top-down recall across domains), and thinking about the first partner may prompt memories about a later partner (across time within domain). Second, the RHC produces a matrix of visual cues to help respondents anchor events into their personal memory network (Bradburn et al. 1987, Conway 1990, Schwarz and Oyserman 2001). Cues include column headings by calendar years/months, respondent age, and personal and public "landmarks." Landmarks are important events, such as graduating from school, the death of a parent, or the 2002 national election in the Kenyan context (Axinn et al. 1999). Cues also help to ensure the accuracy of dating and offset faulty inferences, such as forward telescoping (Belli 1998). Third, the interview procedure aids recall and respondent comprehension. The flexible nature of the interview permits cross-checking of answers in one domain with events in other domains to resolve inconsistencies in event dating (Belli et al. 2001) as well as clarification of questions and their meaning. In standard survey questionnaires, questions are scripted and ordered, and interviewers can rarely return to check or correct a respondent's previous answers or offer clarification.

Study Design
Survey Instruments

Our study used an experimental design in which 1290 young people ages 18-24 in Kisumu town were randomly assigned to receive face-to-face survey instruments that contained either (1) the Relationship History Calendar or (2) a standard Sexual Partnership Questionnaire (SPQ). The SPQ was developed specifically for the study and includes the limited set of questions regarding sexual behavior covered by the DHS as well as additional questions, which allows us to make further comparisons between the sexual behavior information collected by the two methods. While the RHC records information on respondents' sexual and romantic histories and relationships over the last 10 years, the SPQ only records information on up to five of the respondents' sexual partnerships in the last year.[7] In contrast to the conversational nature of the RHC interview, the questions on the SPQ are scripted and ordered; interviewers must ask the exact question as written on the survey and in the order that they appear.

The RHC and SPQ survey instruments both begin with an identical introductory section, which consists of scripted questions regarding background demographic characteristics of respondents, such as age, marital status, and economic status of the household, and a current household roster. Subsequently, either the RHC or the SPQ is administered to respondents. The RHC instrument also includes several follow-up questions, where interviewers probe to ensure complete reporting of all the respondents' sexual and romantic partners in the last year and the last 10 years. In the

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[7] Less than one percent of SPQ respondents reported more than five sexual partners in the last year, and thus we collected full relationship histories for almost all respondents for the last year from both RHC and SPQ respondents.

follow-up, RHC respondents are also asked several scripted questions about their first sexual partnership if it was not covered in the last 10 years and to report their total number of sexual partnerships in their lifetime. Scripted questions about the first sexual partner and total number of lifetime partners are also included in the SPQ.

Finally, we wished to compare the interview experience across instrument types, and therefore a short exit interview was conducted with each respondent (identical for the RHC and SPQ). The exit interview elicits information about the respondent's experience with the sexual relationship history section of the instrument in particular and with the interview in general. Because respondents may feel pressure to offer positive reviews of their experience, we also elicited information on the interviewers' assessments of each respondent's experiences, which may be more objective. The parallel questions for interviewers were filled out in private after they had left the respondent. In addition, interviewers were also asked to assess the level of rapport that was achieved with the respondent.

Data Collection

The RHC was pre-tested in several peri-urban areas outside of Kisumu town in February 2007, and the field experiment was conducted in Kisumu in June and July 2007. The Central Bureau of Statistics (Kenyan Government)'s enumeration areas were used as primary sampling units within Kisumu town. Of these, 45 were randomly chosen for the survey, and every other household in each enumeration area was selected. In each household, one current resident of eligible age was interviewed regardless of sex; in those households with more than one eligible respondent, one was randomly chosen regardless of sex. Each respondent was compensated Kenyan shillings 250 ($US3) for the interview regardless of instrument type.[8] The survey team was particularly concerned with maintaining a high response rate and visited respondents at least three times in order to locate them. The overall response rate for the RHC was 98.8 percent and 99.5 percent for the SPQ. Among males, the response rate for the RHC was 98.7 percent and 100 percent for the SPQ (statistically significant difference at the 0.05 level); the figures for females are 98.9 percent and 99.1 percent, respectively (no significant difference).

A team of 10 interviewers—five women and five men—were hired, with all but one in the age range of respondents, 18-24. In order to minimize interviewer effects, we trained interviewers to administer both the RHC and the SPQ. Because of the different nature of each instrument, the research team developed a detailed questionnaire manual for both the RHC and SPQ. Each included instructions on how to code specific responses, and these were identical when the questions overlapped between the two instruments. In addition, because the RHC does not include scripted questions and the line of questioning is left up to the interviewer, the manual gave several examples of how to ask each question and probe for accurate responses and changes in the aspects over time. The survey instruments were translated into Luo, the major language in

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[8] In our past survey experiences, we have not compensated respondents. We chose to compensate respondents in this project because (1) we were concerned that the time and effort required to fill out the RHC in particular would be burdensome to respondents and (2) another aspect of the overall project aimed to locate respondents' recent sexual partners in Kisumu and interview them to construct a matched partner sample (see Clark, Kabiru, and Zulu 2008). Compensation was part of this project component as well.

the region, and interviewers were trained to administer the instruments in Luo and Kiswahili, the national language. Training took place for 8 days, which included practice interviews using both the RHC and SPQ instruments.

Interviewers covered each EA in teams of 2 to 4, each with at least one male and one female interviewer. Randomization of the survey instruments occurred at interviewer level; interviewers gave the RHC or SPQ to alternative respondents that they interviewed. Although we initially aimed for interviewers and respondents to be matched by sex, this was difficult in the field. Our particular concern was that females would not feel comfortable discussing their sexual and relationship histories with male interviewers. Thus, the research team proceeded as follows: If a female interviewer was not available, female respondents were asked if they felt comfortable talking to a male interviewer, and if so, to proceed with a male interviewer. If not, an appointment was made for a female interviewer to return at a later time. In the end, 18.3 percent of female respondents were interviewed by males, and 23.0 percent of male respondents were interviewed by females.

The research team also audio recorded 26 RHC interviews in order to study interview dynamics. Digital tape recorders were given to four interviewers, and the recordings were simultaneously translated and transcribed in the field. The data were entered and analyzed in NVivo. In contrast to qualitative studies that code for substantive meanings and topics, we coded for interviewer-respondent dynamics, such as probing and development of rapport.

Methods of Evaluation

To assess reduction in social desirability bias, we begin with the assumption that the direction of misreporting varies by gender for specific sexual behaviors. Behaviors that are deemed socially undesirable or stigmatized will be under-reported, while those that garner social approval or prestige will be over-reported. In most contexts in sub-Saharan Africa, this implies that most sexual behaviors will be under-reported for young women, while sexual behaviors tend to be over-reported for young men, unless they carry some stigma, such as visiting a commercial sex worker. Similar assumptions about the direction of systematic reporting biases have been used to evaluate the quality of other confidential response methods in sub-Saharan Africa (see Gregson et al. 2002, Mensch et al. 2003).

We compare the level of reporting for various sexual behaviors reported in the RHC to the SPQ using *t*- and chi-square tests to detect significant differences across instrument type by sex. For females, we expect that the RHC will elicit significantly *higher* levels of reporting than the SPQ with respect to the percentage who have debuted sexually; the mean number of lifetime sexual partners and sexual partners in the last year; and the percentage who report having one or more lifetime or sexual partners in their lifetimes or in the last year. We also expect that females will report a *lower* mean age at first sex on the RHC than the SPQ (thus improving the reporting of young ages at first sex). For males, we expect the RHC to elicit *lower* levels of reporting than the SPQ on all these measures, except for the mean age at first sex, which should be *higher* on the RHC.

To shed light on the mechanisms by which social desirability bias is reduced, we examine answers to the exit interview questions regarding respondents' subjective assessments of their interview experience. We compare their comfort level discussing their sexual histories and their enjoyment of the interview by instrument type. We include interviewers' perceptions of the respondents' experience on these aspects as well. We are also interested in how sex of the interviewer affects reporting, and therefore we examine how respondents' comfort level varies by instrument type and interviewer sex. Finally, to gain further information about interview dynamics with the RHC, we present examples from the transcriptions of the audio recorded RHC interviews to showcase the RHC's rapport-building techniques.

Results

Reporting of Sexual Behavior

We begin by presenting descriptive statistics of the characteristics of our sample by sex of respondent and instrument type in **Table 1**. Overall, we see there are few significant differences between the RHC and SPQ samples, which verifies that randomization by instrument type was achieved. Male RHC respondents are significantly younger than SPQ respondents, and male and female RHC respondents are wealthier in terms of house and cell phone ownership, respectively, than SPQ respondents. We also note that the sample sizes differ for females, and that more SPQs were administered than RHCs, although this did not appear to affect the randomization procedure.

Key sexual behavior measures by sex of the respondent and instrument type are shown in **Table 2**. The results reveal interesting differences in levels of sexual activity for males and females. A similarly large proportion of both samples have initiated sexual activity by the time of the interview, and males experience sexual debut approximately one-half year earlier than females. With respect to sexual partners, young males have had approximately twice as many lifetime partners as females and approximately 0.5 more partners in the last year on average. The majority of youth have had more than one sexual partner in their lifetimes, while sizeable proportions of both sexes have had more than one sexual partner in the last year, one-quarter of males and as much as 13 percent of females (reporting in the RHC).

With respect to the comparisons of reporting on sexual behaviors by instrument type, in three of the six associations for males, the RHC figures are statistically significantly different from the SPQ and in the expected directions. Males report a significantly lower level of ever having sex, fewer lifetime sexual partners, and a lower level of multiple lifetime partnerships on the RHC. The figures for recent (in the last year) sexual partners and multiple recent partnerships are in the expected direction, however, the associations are not significant, and the reported mean age at first sex does not differ across instruments. For females, three of the six associations are also significantly different and in the expected directions. Females report a lower mean age at first sex (a marginally significant difference), more sexual partners in the last year, and a higher level of multiple partnerships in the last year on the RHC compared to the SPQ. Reporting on the other measures is not significantly different across instruments.

As a robustness test, we conducted OLS and logistic regression analyses of the sexual behaviors shown in Table 2 with instrument type serving as the main independent variable, controlling for background characteristics found to differ significantly by instrument type as well as a variable denoting the sex of the interviewer.[9] Overall, the results were significantly different by instrument type on the same measures as in the bivariate results with the exception that the mean age at first sex became statistically significant at the 0.01 level for females, and males reported no significant difference in ever having sex on the RHC and SPQ. It is also important to note that there were no significant differences by sex of the interviewer in any of the regressions.

These results support the view that the RHC decreases social desirability bias and improves reporting on sensitive sexual behaviors for both males and females. These results are not consistent across all measures, however. Nevertheless, the RHC does not appear to produce less accurate reports than the SPQ. We also recognize the possibility that under-reporting on multiple measures of sexual behavior may be due to the complex structure of the RHC rather than or in addition to expectations about social desirability bias. RHC respondents may wish to conceal some of their partners because they fear being asked further detailed questions about these relationships, particularly for young males who must report details of four or five lifetime partners on average.

To further examine the issue of under-reporting, we present cross-tabulations and accompanying histograms of the number of recent and lifetime sexual partners for males and females by instrument type in **Table 3** and **Figures 2 and 3**. All comparisons show significant differences across instrument type by sex with the exception of the number of lifetime partners for females. For males, we see that a higher percentage report no partners in last year on the RHC (30 percent) than on the SPQ (18 percent), while a smaller proportion report only one partner on the RHC (43 percent) than on the SPQ (55 percent). At the same time, the percentages reporting higher-order partner numbers are approximately equal. One plausible explanation for these differences is that young males over-report having one sexual partner on the SPQ in order not to appear sexually inactive, while they feel more comfortable disclosing their inactivity on the RHC. It is also easier to fabricate a partnership on the SPQ, as there are fewer details to report. Furthermore, concern over under-reporting on the RHC due to extensive questioning on relationship details does not appear to affect the number of higher-order recent partnerships reported.

A slightly different pattern emerges with respect to lifetime sexual partners for males. Again, they are more likely to report no partners on the RHC (11 percent) than on the SPQ (7 percent). Males report higher percentages of only one or two lifetime partners on the RHC and lower levels of higher-order numbers of partners (3+ partners) compared to the SPQ. Thus, young males appear willing and able to report details of higher-order recent sexual partners on the RHC but not lifetime sexual partners, which are much greater in number. The lower reporting of lifetime partners on the RHC is likely due to the difficulty of recalling larger numbers of sexual relationships more than one year ago or the unwillingness to spend the time to do so.

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[9] Controls included respondent age, house ownership (males), cell phone ownership (females), and sex of the interviewer.

The table and histograms for the number of recent and lifetime sexual partners for females show similar percentages reporting sexual inactivity on the RHC and SPQ. There are higher percentages of higher-order numbers of recent partners (2 or 3+ partners) elicited in the RHC. Among lifetime partner reports, the RHC elicits higher reports of one and two partners, and lower reports of three lifetime partners, and the percentages reporting 4+ partners are approximately equal. These findings support the view that the RHC does not deter reporting of multiple lifetime sexual partners among young females and increases it significantly for recent partners.

Exit Interview Findings

We discussed the mechanisms by which we believe the RHC would decrease social desirability bias, namely because the conversational nature of the RHC interview fosters greater rapport between the respondent and interviewer and therefore the RHC becomes a more comfortable and enjoyable experience than a standard survey interview. We examine these claims in **Table 4**, which presents perceptions of the respondents' interview experience by instrument type. There is no difference between the RHC and SPQ with regard to respondents' comfort level discussing their relationship histories and sexual behavior. Interviewers are significantly more likely to believe that respondents are very comfortable discussing these issues with the RHC than the SPQ, however. According to both respondents and interviewers, respondents enjoy the interview experience with the RHC significantly more than with the SPQ. In terms of the level of rapport built between the respondent and interviewers, the interviewers believe that the RHC interview was approximately twice as likely to produce significant rapport than the SPQ interview. It is interesting to note that interviewers felt that in nine percent of RHC interviews, very little or no rapport was built, which may reflect the difficulty interacting with some respondents regardless of the survey method. Furthermore, we find that interviewers judge each of these measures of the respondents' interview experience to be less positive than respondents judge them, suggesting that respondents may overstate their contentment.

Since the RHC records a large amount of detail on relationships over a long reference period, the researchers were concerned that the RHC interview would be extremely lengthy and thereby fatigue and perhaps aggravate respondents. The RHC instrument took an average of approximately 90 minutes to complete and the SPQ took an average of 60 minutes.[10] The results in Table 4 show that respondents believe that the duration of the RHC interview is significantly less acceptable than the SPQ interview, and on this measure, interviewers reported similar levels of respondent acceptance. Nevertheless, few report that the time taken for the RHC interview is totally unacceptable. This information, combined with the low refusal rate and high level of enjoyment of the RHC interview, leads us to conclude that most respondents were not over-burdened with the RHC interview.

Although we find that sex of the interviewer had no significant effect on the reporting of sexual behaviors among males and females, we further examine the possibility that female respondents were uncomfortable discussing their sexual and romantic relationship histories with male interviewers. Respondents' comfort level disaggregated by sex of the interviewer and instrument

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[10] This information is based on information for the first 1000 interviews completed.

type is shown in **Table 5**. The top panel presents respondent reports and the bottom panel shows interviewer reports. Among both male and female respondents, there are no significant differences in comfort level with the RHC or the SPQ by sex of the interviewer. Interviewers also report no significant differences by instrument type and sex of the interviewer, with the exception of male SPQ respondents. Here, female interviewers report much higher levels of comfort among male respondents than male interviewers do. Overall, it does not appear that young female respondents in Kisumu were uncomfortable discussing their sexual histories with male interviewers, including the detailed reports gathered with the RHC.

RHC Interview Transcripts

The results of our study suggest that the RHC interview decreases social desirability bias because respondents are more comfortable, the interview is more enjoyable, and more rapport is created between interviewer and respondent than in the SPQ interview. To examine further the means by which social desirability bias is decreased, we describe results of content analysis of the transcripts of the audio recorded RHC interviews.[11]

The RHC interview builds on qualitative interviewing techniques, where the interviewer becomes an active listener and strives to not only gather information but understand the respondent's experience (Hesse-Biber and Leavy 2006, Charmaz 2006). Interviewers were encouraged to engage respondents in relaxed and meaningful conversation, which often resulted in much more detail being discussed in the interview than was ultimately filled out on the RHC.[12] Following is an excerpt of an RHC interview with a female respondent and female interviewer. In order to complete the RHC, the interviewer only needs to elicit information on the date the respondent's relationship ended and why it ended. ("I" indicates the interviewer's voice and "R" the respondent's.)

> I: *And why did you break up?*
> R: *His ex-girlfriend didn't accept the fact that they broke up and she kept interfering. There was a day his ex found me in his house then they started fighting.*
> I: *Was the chick older?*
> R: *Yes. She was way older.*
> I: *So now, why couldn't he just kick her out?*
> R: *The girl was tough. Now the girl started telling me, "I told you to leave me alone with my life." I was so scared. I ran away.*
> I: *OK. That was terror?*
> R: *Yes.*
> I: *So, after that fight, that's when you called it quits?*
> R: *No. But after the fight, I started getting scared, you know, I've fought with a rival. I just pulled off slowly and left him.*

---

[11] We did not audio record SPQ interviews to compare to the RHC interviews, as we assumed the SPQ interview would proceed in a standard scripted question/response format. We did confirm, however, that the standard survey format was maintained in the introductory survey section of the RHC interviews (which was identical across both instrument types) compared to the conversational character of the romantic and sexual relationship history section.
[12] This may be another reason why RHC interviews took longer to complete than SPQ interviews.

> I: So, that was your main reason?
> R: Yes.
> I: So which month was that?
> R: It was late that year.
> I: Late like October, November?
> R: We started in May and it didn't last that long. We broke up in September.

Another example concerns the data collected on economic transfers, or money and gifts exchanged between romantic and sexual partners. This section of the RHC interview produced a great deal of dialogue between the interviewers and respondents. Although the RHC is limited to recording information on the value of the items exchanged, the interviewers generally probed into the specific monetary or gift items given and received by the respondent and the circumstances of the exchange to gather these details. Since many of the conversations about money and gifts are quite long and detailed, we provide a short excerpt here from an interview with a female respondent and a female interviewer.

> I: He bought you shoes worth how much?
> R: 15.
> I: 1500?
> R: Mm [yes].
> I: That is one pair?
> R: Mm [yes]. Camel shoes.
> I: Oooh. Camel shoes?
> R: Mm [yes].
> I: Which ones are those?
> R: You don't know camel shoes?
> I: [Laughs.] What do they look like?
> R: They have suede at the top.
> I: Mm.
> R: And the bottom is rubber sole. You don't know them?
> I: I don't know them.
> R: These are shoes that ladies have worn. And if you haven't worn camel, you are
>   not a lady.
> I: [Laughs.] Then, I am not a lady.
> R: No, I mean, I say, those days people would put on camel. If you don't put on
>   camel, you just feel that I am not a lady.
> I: Mm.
> R: You had to put them on.

In both of these examples, as well as many others, the interviewer maintains an interested stance, probes for further information, and the respondents are eager to share the details of their stories, all of which appear to contribute to gathering accurate information. We also found that most of the RHC interviews we recorded were infused with laughter on the part of both interviewers and respondents.

The RHC transcripts also reveal ways in which interviewers probed to check for accurate dating of events and internal consistency. In the course of the RHC interviews, schooling histories were often used as landmarks to date events and recall changes in relationship dimensions. School exams, holidays, and graduations were particularly salient events in our young respondents' lives, and as these events occurred in particular months, they helped date other events and states by month. As another example, interviewers cross-checked female respondents pregnancy status in the fertility row in the top portion of RHC with information on sexual relationships in the bottom part of the RHC to ensure that the relationship in which conception occurred was recorded and dated precisely. Finally, the RHC transcripts show multiple instances of interviewers clarifying questions to be sure respondents understood their meaning according to the research team's definition as discussed in the RHC interview manual.

Conclusion

This paper describes the Relationship History Calendar (RHC), a new method aimed at improving the scope and quality of data collected on life course transitions, particularly sexual relationships and behaviors, among youth. To assess the accuracy of reporting, we conducted a field experiment by randomly assigning 1290 adolescents in urban Kisumu, Kenya, to be interviewed with the RHC or a standard sexual partner questionnaire (SPQ). Results of our study show that the RHC improves reporting on multiple measures of sexual behaviors among both young males and females.

We further investigated why the RHC decreased social desirability bias and produced accurate results. We found that respondents enjoy the RHC interview a great deal more than the SPQ, and they appear to display a greater level of comfort discussing their relationship histories and sexual behaviors. Interviewers reported that levels of rapport between themselves and respondents were significantly higher with the RHC interviews as well. Compared to ACASI, with has produced negative reactions to or unfamiliarity with the computer in some settings, we encountered little negative response to the RHC instrument itself beyond initial surprise with its size. The RHC has additional benefits of enhancing respondent recall and allowing interviewers to check for internal consistency and respondent comprehension. Our study also demonstrates that the low-technology RHC can be implemented with little difficulty in resource-poor settings, such as urban Kenya.

There are also several limitations to the RHC. First, our findings reveal that higher-order lifetime relationships are not consistently reported among males, although higher-order recent (in the last year) partnerships appear to be. An alternative way of dealing with this issue would be to record partial relationship histories (such as 3- or 5-year histories) on the RHC, which would minimize respondent recall burden and the time needed to record relationship histories with large numbers of partners. Such partial histories could be collected from respondents and pieced together over time in a longitudinal survey format. Second, the RHC requires skilled interviewers and intensive training to ensure that all interviews elicit and record detailed information accurately and systematically. While we found no significant differences in responses to sexual behavior questions and respondent comfort levels by sex of the interviewer,

further analysis of interviewer bias should be assessed. Third, the RHC takes more time to administer to respondents than a standard survey, which adds to survey costs. The research team also devoted more time to check RHC questionnaires in the field and carry out data entry with the RHC than the SPQ. Our results suggest that respondents are not over-burdened by the length of the RHC, however, and a tradeoff is that a great deal more information—particularly on time-varying life history domains by month—is collected on the RCH than on a standard questionnaire. Overall, the RHC is likely to be comparatively less expensive to implement than computer technology such as ACASI, and it appears to produce similar, if not better, reporting on sexual behavior. A direct comparison of ACASI and the RHC would be an interesting topic of further study.

In addition to recording accurate information on sexual relationships and behaviors, the new RHC provides researchers with highly contextualized, time-varying data on transitions to adulthood. Full sexual and relationship histories can be recorded for most respondents as well as details of relationship contexts and change in relationship dimensions and other life course domains over time. These rich data can be analyzed with multi-level and event history techniques to understand how relationship histories and partnership dynamics affect the sexual risk behaviors and reproductive health of young women and men worldwide.

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Figure 1. Relationship History Calendar

RESPONDENT ID ☐☐ ☐☐ ☐☐ ☐ Male ☐ Female

		1998	1999	2000
	YEAR			
1 Birthdate	MONTH	J F M A M Jn Jl A S O N D	J F M A M Jn Jl A S O N D	J F M A M Jn Jl A S O N D
M _____	Respondent Age			
Y _____	Landmarks	Embassy bombings ✚		
	2 Location			
	3 Urban/Rural			
	4 Person Responsible			
	5 Year in School			
	6 Occupation			
	7 Earned Income			
	8 Pregnancy (female R)			
	9 HIV Testing			

		1998	1999	2000
10 Partner initials	Relationship 1	J F M A M Jn Jl A S O N D	J F M A M Jn Jl A S O N D	J F M A M Jn Jl A S O N D
_____				
11 P age at rel. start	16 Duration			
_____	17 P Residence			
12 P Birthdate	18 P Year in School			
M _____	19 P Economic Status			
Y _____	20 Type of Relationship			
	21 Main Reason			
13 P yrs. of school	22 Secondary Reason			
at rel. start	24 Marital Aspirations			
_____	25 Frequency of Sex			
	26 Contraception			
14 P ethnicity	27 Condom Use			
_____	28 P Pregnancy (male R)			
15 Knew P before	29 Amount Given by R			
_____	30 Amt. Received by R			
	31 P Marital Status			
23 Reason for end	32 P # Other Wives			
_____	33 P # Other NM Partners			
	34 Knowledge of NMPs			

Table 1. Background characteristics by instrument type

	Males			Females		
	RHC	SPQ		RHC	SPQ	
Demographic characteristics						
Age	20.7	21.1	*	20.6	20.4	
Marital status						
Never married	88.0	83.4		67.2	60.8	
Married	10.7	14.4		29.3	36.2	
Divorced/separated/widowed	1.3	2.2		3.5	3.0	
Number of children	0.2	0.3		0.7	0.7	
Ethnicity						
Luo	76.3	77.4		70.7	73.8	
Luhya	10.4	10.0		19.7	14.4	
Other	13.3	12.5		9.7	11.9	
Religion						
Roman Catholic	23.3	29.8		25.6	22.5	
Mainstream Protestant	28.7	25.7		22.2	25.3	
SDA	14.8	11.3		15.9	14.2	
Pentecostal	14.5	13.8		21.8	20.6	
Indigenous African Church	8.8	11.3		8.3	11.1	
Other	9.8	8.2		6.2	6.4	
Born in rural area (vs. urban)	25.2	32.1		41.4	48.1	
Paternal orphan by age 18	37.5	33.8		39.2	33.3	
Maternal orphan by age 18	22.0	19.6		21.9	16.2	
Education						
Highest level of schooling completed						
Standard 8 or less	25.9	29.5		33.9	39.0	
Form 1-3	21.1	15.1		14.5	13.3	
Form 4	33.4	37.6		27.7	27.1	
Form 5 or above	12.0	12.9		14.9	14.4	
Vocational training	7.6	5.0		9.0	6.4	
Currently attending school	28.5	21.9		19.8	19.4	
Economic status						
Owns house (vs. renting or squatting)	22.4	15.4	*	23.9	18.8	
Roof material						
Corrugated iron/mabat	86.1	87.7		83.7	86.9	
Asbestos sheets	8.2	9.8		9.0	5.0	
Other	5.7	2.5		7.3	8.1	
Flush toilet (vs. pit latrine or other)	28.4	29.3		35.9	31.3	
House has electricity	53.0	48.1		59.7	56.0	
House has a TV	55.5	52.2		58.6	54.9	
Personally own cell phone	44.8	46.5		47.6	29.6	***
Days in last month reduced meals b/c of shortages of food or money						
Never	53.3	55.4		67.7	63.4	
1-3 days	29.3	27.4		18.1	24.4	
4-7 days	11.4	12.3		8.7	9.4	
More than 7 days	6.0	5.0		5.6	2.8	
N	317	320		290	362	

***p<.001;**p<.01;*p<.05

Table 2. Key sexual behavior measures by sex of respondent and instrument type

	Males			Females		
	RHC	SPQ		RHC	SPQ	
Ever had sex (%)[a]	88.7	93.4	*	84.8	85.2	
Mean age at first sex[b]	15.6	15.6		16.0	16.4	+
Mean number of lifetime sexual partners[b]	3.8	4.9	**	1.8	1.9	
More than one sexual partner in lifetime (%)[a]	68.3	77.7	**	51.6	54.0	
Mean number of sexual partners in last year[b]	1.2	1.3		0.9	0.8	*
More than one sexual partner in last year (%)[a]	25.6	26.6		13.3	4.7	***

***p<.001;**p<.01;*p<.05; +p<.10

[a]chi-square test

[b]two-tailed t-test

Table 3. Number of sexual partners in the last year and in lifetime by sex of respondent and instrument type

| | Males | | | | | | Females | | | | |
| | Last year | | | Lifetime | | | Last year[a] | | | Lifetime | |
	RHC	SPQ		RHC	SPQ		RHC	SPQ		RHC	SPQ
0	30.0	18.4	**	11.0	6.6	**	24.8	25.7	***	14.8	14.6
1	43.2	55.0		19.9	15.6		60.3	69.1		32.4	30.9
2	15.5	17.2		20.8	12.8		11.0	4.4		25.9	21.8
3	5.4	5.6		15.1	16.6		3.8	0.8		14.1	21.3
4	1.9	1.9		6.3	10.6		--	--		4.8	5.0
5+	4.1	1.9		26.8	37.8		--	--		7.9	6.4

***p<.001;**p<.01;*p<.05; +p<.10; chi-square tests

[a]Highest category is 3+

Figure 2. Number of sexual partners in the last year (top panel) and number of lifetime
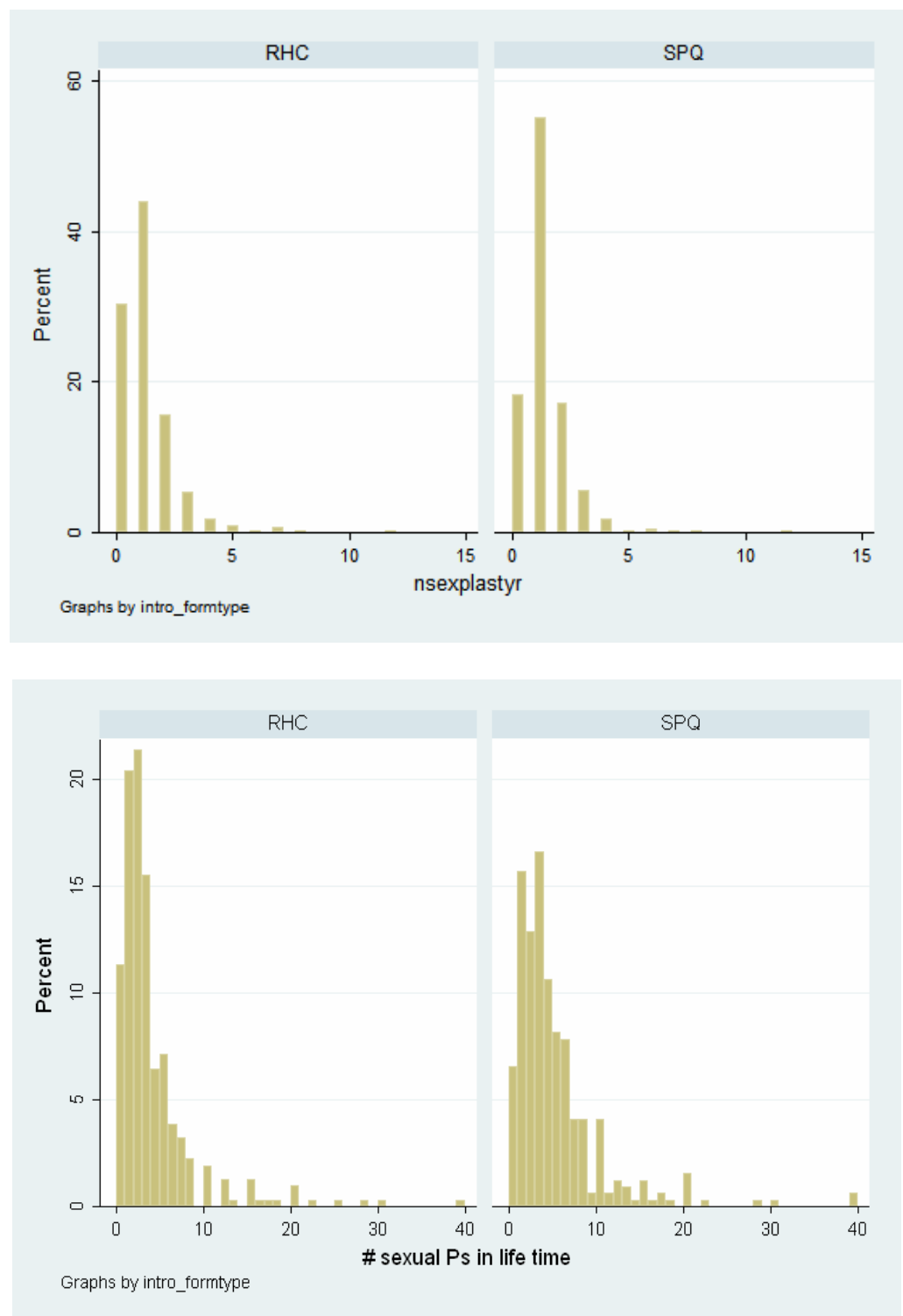sexual partners (bottom panel) by instrument type for males

Figure 3. Number of sexual partners in the last year (top panel) and number of lifetime sexual partners (bottom panel) by instrument type for females
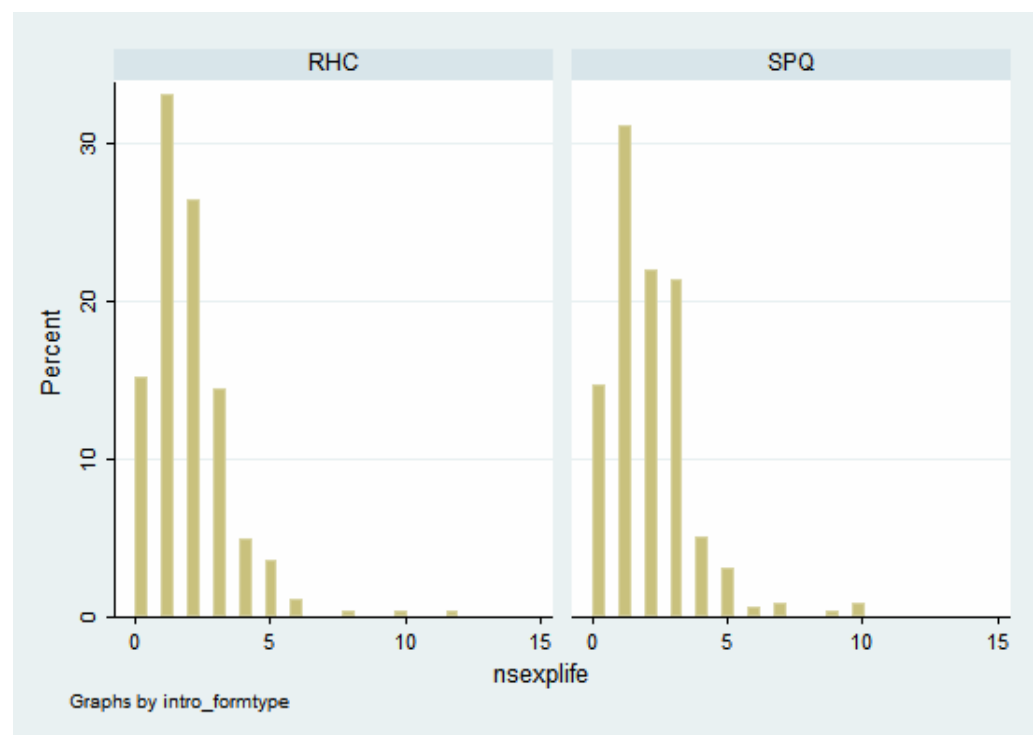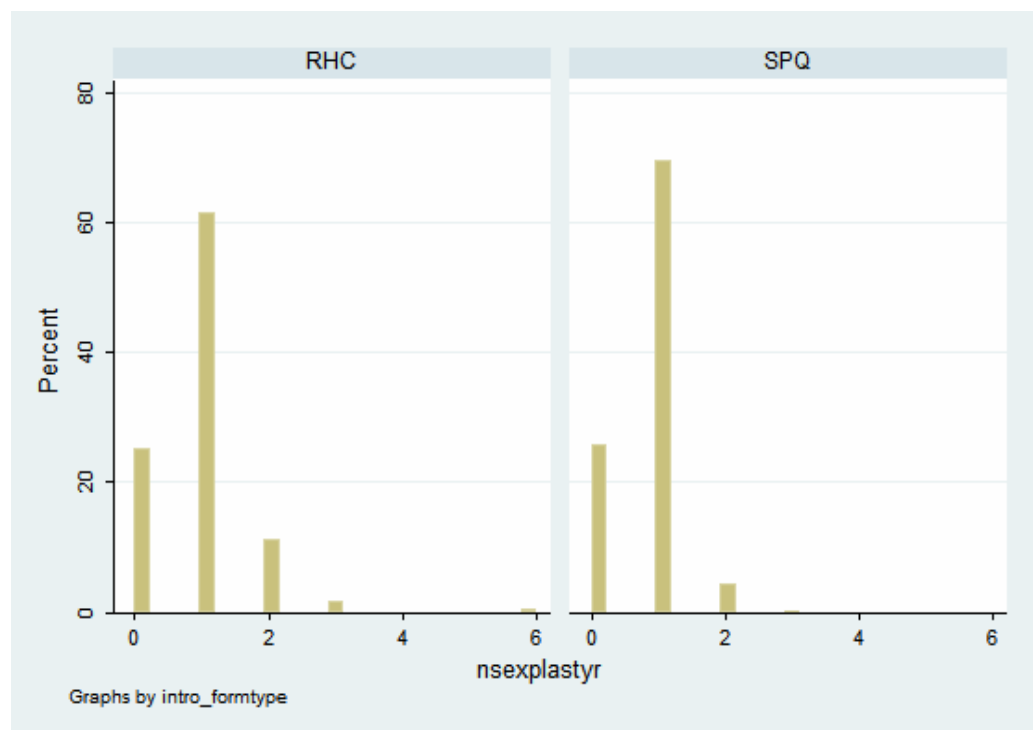
Table 4. Perceptions of interview experience by respondents and interviewers by instrument type

	Respondent report			Interviewer report		
	RHC	SPQ		RHC	SPQ	
Comfort level discussing sexual behaviors						
Very comfortable	80.3	80.2		69.8	62.0	*
Somewhat comfortable	18.6	18.2		28.2	34.6	
Not comfortable at all	1.2	1.6		2.0	3.4	
Enjoyment of the interview						
Very enjoyable	84.7	69.5	***	66.1	34.6	***
Somewhat enjoyable	15.1	28.1		32.6	61.4	
Not enjoyable at all	0.2	2.5		1.3	4.0	
Rapport built between interviewer and respondent						
Significant	--	--		59.1	33.1	***
Moderate	--	--		31.8	47.7	
None/little	--	--		9.1	19.2	
Acceptability of the length of interview time						
Very acceptable	65.6	84.1	***	69.3	80.1	***
Somewhat acceptable	30.7	15.3		27.2	18.9	
Not acceptable at all	3.7	0.6		3.5	1.0	

***p<.001;**p<.01;*p<.05;+p<.1;chi-square tests

Table 5. Respondents' comfort level reported by respondents and interviewers by instrument type and sex of the interviewer

	Respondent report							
Respondent's sex	Male				Female			
Instrument type	RHC		SPQ		RHC		SPQ	
Interviewer's sex	Female	Male	Female	Male	Female	Male	Female	Male
Comfort level discussing behaviors (%)								
Very comfortable	79.0	83.0	85.3	81.5	78.0	80.0	78.9	76.9
Somewhat comfortable	19.7	15.3	13.2	16.5	21.2	20.0	19.7	23.1
Not comfortable at all	1.3	1.7	1.5	2.0	0.9	0.0	1.4	0.0
N	76	235	68	248	227	50	289	65
chi-square p-value	0.65		0.76		0.78		0.54	

	Interviewer report							
Respondent's sex	Male				Female			
Instrument type	RHC		SPQ		RHC		SPQ	
Interviewer's sex	Female	Male	Female	Male	Female	Male	Female	Male
Comfort level discussing behaviors (%)								
Very comfortable	68.8	70.3	73.5	55.8	70.0	68.0	66.2	54.6
Somewhat comfortable	31.2	27.5	26.5	39.4	27.3	30.0	31.0	43.9
Not comfortable at all	0.0	2.1	0.0	4.8	2.6	2.0	2.8	1.5
N	77	236	68	249	227	50	290	66
chi-square p-value	0.38		0.01		0.91		0.13	