

ORIGINAL RESEARCH ARTICLE

Multi-level Correlates of Safer Conception Methods Awareness and Attitudes among Ugandan HIV Clients with Fertility Intentions

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Abstract

Many people living with HIV desire childbearing, but low cost safer conception methods (SCM) such as timed unprotected intercourse (TUI) and manual self-insemination (MSI) are rarely used. We examined awareness and attitudes towards SCM, and the correlates of these constructs among 400 HIV clients with fertility intentions in Uganda. Measures included awareness, self-efficacy, and motivation regarding SCM, as well as demographics, health management, partner and provider characteristics. Just over half knew that MSI (53%) and TUI (51%) reduced transmission risk during conception, and 15% knew of sperm washing and pre-exposure prophylaxis. In separate regression models for SCM awareness, motivation, and self-efficacy, nearly all independent correlates were related to the partner, including perceived willingness to use SCM, knowledge of respondent's HIV status, HIV-seropositivity, marriage and equality in decision making within the relationship. These findings suggest the importance of partners in promoting SCM use and partner inclusion in safer conception counselling. (*Afr J Reprod Health 2016; 20[1]: 40-51*).

Keywords: timed unprotected intercourse; manual self-insemination; self-efficacy.

Résumé

De nombreuses personnes vivant avec le VIH désirent procréer, mais en servant des méthodes de conception plus sûres (MCS), mais les méthodes peu coûteuses, tels que les rapports sexuels non protégés chronométré (RSNPC) et le manuel d'auto-insémination (MAI) sont rarement utilisés. Nous avons examiné la sensibilisation et les attitudes envers la MCS et les corrélats de ces constructions au sein des 400 clientes du VIH qui avaient l'intention d'être fécondes en Ouganda. Les mesures comprenaient la sensibilisation, l'auto-efficacité, et la motivation concernant la MCS, ainsi que la démographie, la gestion de la santé, le partenaire et les caractéristiques des prestataires. Un peu plus de la moitié savaient que le MAI (53%) et les RSNPC (51%) diminuent le risque de transmission lors de la conception, et 15% connaissaient la de lavage du sperme et la prophylaxie de la pré-exposition. Dans les différents modèles de la régression pour la sensibilisation à la MCS la motivation et l'auto-efficacité, presque tous les corrélats indépendants étaient liés au partenaire, y compris la volonté perçue à utiliser la MCS, la connaissance de la situation de la cliente par rapport au VIH, la séropositivité du VIH, le mariage et l'égalité dans la prise de décision au sein de la relation. Ces résultats suggèrent l'importance des partenaires dans la promotion de l'utilisation de la MCS et l'inclusion du partenaire dans le conseil de la conception plus sûre. (*Afr J Reprod Health 2016; 20[1]: 40-51*).

Mots-clés: rapports sexuels non protégés chronométré; manuel de l'auto-insémination; auto-efficacité.

Introduction

HIV antiretroviral therapy (ART) has dramatically reduced mortality and morbidity in Sub-Saharan Africa¹, and lowered rates of both vertical (infant) and horizontal (partner) HIV transmission²⁻⁴.

Greatly improved access to ART⁵, and knowledge of the efficacy of treatment to reduce transmission likely contributes to the high proportion (20–50%) of persons living with HIV (PLWHIV) who desire to have children in Uganda⁶⁻⁸ and the larger region⁹⁻¹². In fact, 20–40% of HIV-positive women

become pregnant post-HIV diagnosis^{13,14} and nearly 100,000 Ugandan women living with HIV become pregnant annually¹⁵.

Conception among PLWHIV involves risks of HIV transmission to uninfected partners, as well as the fetus, and recent data suggests over 50% of HIV-affected couples in Uganda are serodiscordant¹⁶. There are considerable resources and support for patients once they become pregnant, including use of ART for prevention of mother-to-child-transmission (PMTCT)¹⁷, but the pre-conception stage is starkly different. Counselling and contraceptives are readily available for preventing pregnancy, but services aimed at promoting safer conception are rarely available despite a majority (57%) of pregnancies among PLWHIV being planned¹⁸.

Use of ART and achieving complete viral suppression can reduce the risk of horizontal transmission in serodiscordant couples by as much as 96%¹⁹. However, the absence of routine viral load testing in much of sub-Saharan Africa (including Uganda), inadequate adherence to achieve viral suppression in a sizable minority of clients on ART²⁰, and the fact that many HIV clients are not on ART⁵, highlight the need for low cost, effective safer conception methods (SCM) to compliment ART in reducing the risk of HIV transmission during attempts to conceive. Together with effective ART use, SCM stands to play an important role as part of a combination of safer conception specific and non-specific approaches to reducing horizontal transmission^{21,22}. Low cost behavioral SCM include timed unprotected intercourse (during woman's peak fertility days only), and manual self-insemination with partner's sperm (when male is HIV-negative), each of which has been demonstrated to reduce risk of HIV transmission^{23,24}. More costly SCM such as sperm washing plus insemination or in vitro fertilization²⁵ are not yet realistic options for most serodiscordant couples in sub-Saharan Africa. Aside from ART, other methods for reducing horizontal transmission that are not specific to the context of conception include male circumcision, which can lower the transmission risk for

uninfected men by 50%²⁶, and pre-exposure antiretroviral prophylaxis (PrEP) for the uninfected partner²⁷ though it is not widely available in Uganda.

While SCM such as timed unprotected intercourse and manual self-insemination cost little, successful use of these methods requires that clients have adequate knowledge, self-efficacy and motivation for applying these strategies with their partner. Factors that influence the use of SCM may include individual (e.g., knowledge and attitudes towards specific SCM), relationship (e.g., HIV disclosure to partner, communication and decision making dynamics), and provider (e.g., provider-client communication about childbearing desires, provider attitudes towards childbearing among HIV clients) level factors^{28,29}. Published studies have mostly focused on the prevalence and correlates of fertility desires; we are unaware of any quantitative study that has evaluated the knowledge, attitudes and practices of PLWHIV in sub-Saharan Africa regarding specific SCM.

To fill this gap, we conducted a study of SCM in a sample of 400 Ugandan HIV clients in committed heterosexual relationships who have intentions to have a child. We found that 12% had used timed unprotected intercourse while trying to conceive, but none had used manual self-insemination or sperm washing³⁰. Among the correlates of use of timed unprotected intercourse were awareness of and self-efficacy regarding the use of SCM, revealing the importance of knowledge and attitudes for the use of these methods.

In this paper we report analyses that examined the awareness of and attitudes towards SCM, and the correlates of these constructs from among demographic, relationship, and health management characteristics, as well as multidimensional aspects of stigma towards childbearing by HIV-affected couples.

Methods

Study Setting

The study was conducted at The AIDS Support Organization (TASO) HIV care and treatment sites

in Kampala and Jinja, Uganda. TASO is a non-governmental organization founded in 1987 to provide care and support for Ugandans who were either living with or affected by HIV/AIDS. The Kampala site is located next to the Mulago National Referral Hospital and has over 6700 active clients. The Jinja site is located within the Jinja Regional Referral Hospital campus and provides HIV care to over 8000 clients. In addition to ART and counselling services, TASO has well established family planning and contraception services at its clinics, but has not integrated the routine delivery of safer conception services.

Participants

Clients at the two study clinics were eligible for the study if they were (1) 18 years or older, (2) married or in a committed heterosexual relationship, and (3) reported an intention to conceive a child with their partner within the next 24 months. Only one member of a couple was allowed to participate to ensure the participants were independent of each other. Partner HIV status was not a part of the eligibility criteria; even though safer conception methods are particularly relevant for couples in which one partner's HIV status is negative or unknown, safer conception methods are also relevant to HIV seroconcordant couples for the purpose of limiting risks of superinfection and transmission of resistant virus. The cohort was recruited between May and October of 2013. Recruitment took place primarily during the triage phase of clients registering their attendance at clinic visits. A brief screening was conducted with adult clients by the triage personnel. Those who were likely eligible and expressed interest were referred to the research coordinator for a more thorough screening and consent procedures.

After providing written informed consent, participants were administered the baseline survey. Follow-up surveys were scheduled at 6-month intervals for 24 months, or until the participant (or their partner) became pregnant in which case their participation ended after a post-delivery survey was completed. Since the study is still ongoing, we

analysed only the baseline data for this paper.

Participants received 15,000 Ush (\$6 USD) for completing each survey. The study protocol was reviewed and approved by Institutional Review Boards at Makerere University School of Biomedical Sciences and the RAND Corporation, as well as the Uganda National Council for Science and Technology.

Measures

All measures were translated (using standard forward and back translation methods) into and administered in Luganda, the most common native language in the study setting. Trained and experienced interviewers used computer-assisted personal interview software to administer the survey. Each measure related to safer conception methods, as well as measures of internalized and community stigma related to childbearing among PLWHIV, were developed by the study team and are described elsewhere in more detail³¹, including the wording of all items within each scale and psychometric characteristics (internal reliability, factor structure, and convergent and divergent validity); we have noted the internal reliability (Cronbach's alpha) of these newly developed measures in the descriptions below.

SCM awareness

We developed a 15-item scale to measure awareness of the availability of safer conception methods in general, specific safer conception methods (timed unprotected intercourse, manual self-insemination, sperm washing), and strategies to reduce transmission risk that are not specific to conception (e.g., circumcision, PrEP, treating any sexually transmitted infection [STI], waiting for higher CD4, starting ART early). Respondents were asked to indicate whether each statement was 'True' or 'False,' or whether they 'Did not know.' A sum of the number of correct responses was tabulated. Note that this measure was administered prior to other SCM-related measures to limit their responses being influenced by exposure to the other measures, some of which included descriptions of SCM.

SCM self-efficacy

We adapted a self-efficacy measure developed by Johnson et al.³² to create 3 items to assess the respondent's level of confidence in being able to identify the most fertile days of the woman's cycle and to limit condomless sex to only 2-3 specific days per month (both of which are involved with timed unprotected intercourse and manual self-insemination), and to postpone attempts to conceive until any active sexually transmitted diseases had been treated. Respondents rated their level of confidence on a scale of 1 'Can't do at all' to 10 'Certain I can do'. Mean item score was computed and higher scores represented greater self-efficacy; Cronbach's $\alpha = 0.50$. In addition to this scale, we asked an individual item related to manual self-insemination ("My partner will ejaculate into a container or a condom during sex and then inject the semen into my vagina if necessary to reduce the risk of transmission to my partner") if the participant was female and their partner's HIV status was negative or unknown.

SCM motivation

We adapted items from the Brief Motivation Scale³³ to create 3 items to assess level of commitment and readiness to engage in safer conception counselling with a provider (e.g., "I'm confident a health care provider can be helpful to me and my partner in trying to have a child safely") and to "temporarily delay pregnancy if it will help to have a child more safely". Respondents rated their level of agreement with each statement on a scale of 1 'Strongly Agree' to 10 'Strongly Disagree'. Mean item score was computed and higher scores represented greater motivation; Cronbach's $\alpha = 0.88$.

Demographics

These included age, sex, education level (whether or not any secondary education had been completed), occupation, and monthly income.

Reproductive health history and current fertility intention

Participants reported their number of living children and pregnancy history (including miscarriages or abortions), including with the partner with whom they are currently trying to conceive, as well as time frame of when they intend to conceive (0-6, 7-12, 13-24 months).

Health management characteristics

Date of HIV diagnosis was self-reported, and CD4 count and ART status were abstracted from the participant's clinic chart. To assess adherence to ART, respondents were asked to indicate how many doses they missed in the last 7 days; for analysis, a binary variable was created to represent whether any doses had been missed. Respondents also reported whether or not they had missed any clinic appointments in the past 6 months. Respondent's indicated whether they had discussed their childbearing desires with their HIV care providers.

Relationship and partner characteristics

These included marital status, whether respondent or partner had other spouses/partners (monogamous or polygamous relationship), HIV status of partner, and partner's knowledge of respondent's HIV status. Respondents were also asked to rate their *perception of partner's willingness to use SCM*: we developed 3 items to assess the respondent's perception of their partner's willingness to use safer conception methods (e.g., "Your partner would cooperate with advice to only have condomless sex during 2-3 peak fertility days per month"). Respondents were asked to rate their confidence from 1 'No confidence' to 5 'High confidence'; mean item score was computed and Cronbach's $\alpha = 0.85$. **Control of decision making in the relationship** was measured with the 15-item relationship control subscale of the Sexual Relationship Power

Scale³⁴; respondents were asked to rate their level of agreement with statements from 1 ‘Strongly Agree’ to 4 ‘Strongly Disagree,’ a mean item score was calculated, and higher scores represent greater self-efficacy in decision making.

Stigma of childbearing among PLWHIV

We developed a 2-item scale to measure the respondent’s *internalized childbearing stigma*: respondents were asked to indicate their level of agreement with the following statements, “I feel ashamed for wanting to have a child” and “I feel selfish for wanting to have a child”. Response options ranged from 1 ‘Disagree Strongly’ to 5 ‘Agree Strongly;’ mean item score was computed, higher scores represent greater internalized childbearing stigma, and Cronbach’s $\alpha = .72$. We developed a single item to measure the respondent’s *perceived provider childbearing stigma*: respondents were asked to rate their level of agreement with the statement, “Most HIV providers think that HIV-positive clients should not have children”. Response options ranged from 1 ‘Disagree Strongly’ to 5 ‘Agree Strongly;’ mean item score was computed and higher scores represent greater provider stigma.

Data Analysis

Bivariate statistics (2-tailed independent t-tests, Pearson correlations) were used to examine correlates of SCM awareness, self-efficacy and motivation. Linear regression analyses were used to further examine the correlates of these constructs, with each being the dependent variable in separate models. In each of the models, basic demographics (age, sex, any secondary education) were included as independent variables in addition to variables found to be correlated with the dependent variable in bivariate analysis at the $p < .05$ level of significance.

Results

Sample Characteristics

A sample of 400 participants was enrolled (207 at Kampala, 193 at Jinja). With the exception of five who refused, those who were screened and were

eligible decided to participate. The characteristics of the sample are listed in Table 1, including demographics, HIV health characteristics, reproductive health history and partner/relationship characteristics. Three-quarters of the sample were female, 60% were on ART, nearly two-thirds ($n=244$; 62%) reported that the HIV status of this partner was either negative or unknown, and 79% indicated that this partner was aware that the respondent was HIV-positive.

Table 1: Characteristics of the Sample (N=400)

Variable	Mean/Frequency (SD or %)
Demographics	
Female	299 (74.8%)
Mean age (years)	33.8 (7.5)
Secondary education and above	179/379 (47.2%)
Operates a small business/sells things	194/399 (48.6%)
Average monthly income \$40-\$220 USD	292/391 (74.7%)
Health Characteristics	
Mean years since HIV diagnosis	5.5 (4.7)
Mean CD4 count	435.4 (277.3)
On HIV antiretroviral therapy	242/399 (60.7%)
Missed any clinic appointments in past 6 months	78 (19.6%)
Discussed childbearing desires with HIV provider	176 (44%)
Reproductive health history	
Have had children	354 (88.5%)
Mean number of children (among parents)	3.2 (2.3)
Have had a child with current partner	195 (48.8%)
Had pregnancy since knowing HIV status	110/284 (38.7%)
Relationship/Partner Characteristics	
Marital status:	
Married	175 (43.8%)
In committed relationship	225 (56.2%)
In a polygamous relationship	121 (30.3%)
HIV status of partner with whom trying to conceive	
HIV positive	156 (39%)
HIV negative	122 (30.5%)
Unknown HIV status	122 (30.5%)
Partner knows respondent’s HIV status	317 (79.3%)
SCM knowledge and attitudes	
SCM awareness (mean (SD); range)	9.35 (2.43) [2 – 15]
SCM self-efficacy (mean (SD); range)	8.63 (1.42) [4 – 10]
SCM motivation (mean (SD); range)	9.06 (1.58) [1 – 10]

Table 2 Awareness of Safer Conception Methods (correct responses are underlined)

Item	True	False	Don't know
1 It is possible for an HIV+ woman to have an HIV-negative baby.	<u>98%</u>	0	2%
2 HIV antiretrovirals can reduce the risk of passing HIV to a baby.	<u>87%</u>	4%	9%
3 There are ways to make conception with an HIV+ partner safer.	<u>57%</u>	9%	34%
4 There are ways to make conception with an HIV-negative partner safer.	<u>56%</u>	8%	36%
5 All options to make conception safer are very expensive.	32%	<u>24%</u>	44%
6 Waiting until my CD4 is higher will reduce the risk of health complications to the mother during pregnancy.	<u>66%</u>	<u>24%</u>	10%
7 Having a sexually transmitted infection will increase the risk of passing HIV to an uninfected partner during unprotected or "live" sex.	<u>96%</u>	2%	2%
8 There are times during a woman's cycle when she is most fertile (likely to become pregnant).	<u>95%</u>	2%	3%
9 Health care providers can offer advice to help make childbearing safer for you, your partner, and your child.	<u>95%</u>	1%	4%
10 If an HIV+ person has an undetectable amount of HIV virus, it means that person is no longer able to infect someone else.	19%	<u>67%</u>	15%
11 For some couples, having the man ejaculate into a condom or container and then manually inject the semen into the woman's vagina is a way to reduce risk of HIV transmission if the man is HIV negative.	<u>53%</u>	23%	24%
12 Only having unprotected sex during the few days each month when the woman is most fertile will help to limit the risk of HIV transmission to an uninfected partner.	<u>51%</u>	43%	7%
13 There is technology available that can cleanse a man's sperm or semen of the HIV virus.	<u>15%</u>	24%	61%
14 Starting to take HIV medications early (as soon as diagnosed) helps reduce the risk of transmitting HIV to a sexual partner.	<u>63%</u>	27%	9%
15 HIV medications can be taken by an HIV-negative (or unknown status) partner that will reduce their risk of getting infected by their HIV+ partner.	<u>15%</u>	63%	22%

SCM awareness, self-efficacy and motivation

Table 1 lists the mean, standard deviations and range of scores on the scales of SCM awareness, self-efficacy and motivation. Table 2 lists the level of awareness measured by each item in the awareness of SCM scale; the scale's mean was 9.3 (SD = 2.4), with a range of 2 to 15. Awareness of the specific SCM was generally poor, with just over half the participants knowing that manual self-insemination (53%) and timed unprotected intercourse (51%) were methods to reduce transmission risk during conception, and only 15% knowing about each of the methods of sperm washing and PrEP for this purpose. Awareness of each of these four specific SCM was not associated with the respondent's gender, age, ART

status, HIV status of their partner, and whether or not they had discussed their childbearing desires with their HIV care provider, with the following exceptions: awareness of manual self-insemination was lower among those who were on ART compared to those not on ART (65.1% vs. 76.9%; Chi Square = 4.93, $p = .026$), and awareness of timed unprotected intercourse (60.6% vs. 49.3%; Chi Square = 4.75, $p = .029$) and PrEP (25.4% vs. 14.2%; Chi Square = 6.16, $p = .013$) were greater among those who had discussed childbearing desires with their HIV providers compared to those who had not. When the specific procedures involved with each SCM were described to the respondents, confidence in being able to use these methods was generally good. Confidence ratings (on scale of 1 'low' to 10 'high') were high for

Table 3 Bivariate Correlation Coefficients between Awareness and Attitudes Towards Safer Conception Methods (SCM)

	Awareness	Self-efficacy	Motivation
Demographics			
Age	-0.04	0.16**	0.09*
Female sex	-0.02	-0.15**	-0.04
Has any secondary education	0.01	0.002	0.08
Health			
CD4 cell count	-0.01	0.03	0.08*
Currently on ART	-0.04	0.14**	0.06
Time since HIV diagnosis (years)	0.05	0.16**	0.04
Missed ART doses in past 7 days	-0.11	-0.06	-0.17**
Missed any clinic appointments in past 6 months	0.10*	-0.14**	-0.06
Has discussed childbearing desires with HIV care provider	0.183***	0.07	-0.010
Relationship/Partner			
Decision making power	-0.001	0.35***	0.16**
Married	-0.08	0.33***	0.14**
In a polygamous relationship	-0.16**	-0.05	-0.02
Number of children	-0.03	0.14**	0.07
Partner is HIV+	0.09*	0.18***	-0.01
Partner knows respondent is HIV+	0.11**	0.19***	0.18**
Perceived partner willingness to use SCM	0.16**	0.37***	0.21***
Childbearing Stigma			
Internalized stigma towards childbearing	-0.02	-0.11**	-0.05
Perceived provider Stigma of childbearing	-0.03	-0.20***	-0.11**
SCM awareness and attitudes			
SCM awareness	---	0.11**	-0.09*
SCM self-efficacy	0.11**	---	0.24***
SCM motivation	-0.09*	0.24***	---

* $p < 0.10$; ** $p < 0.05$; *** $p < 0.001$

Table 4. Multiple Regression Analysis of Correlates of Awareness and Attitudes Regarding Safer Conception Methods (SCM)

	Awareness Beta (SE)	Self-efficacy Beta (SE)	Motivation Beta (SE)
Demographics			
Age	-0.01 (0.02)	-0.002 (0.01)	0.01 (0.02)
Female sex	0.09 (0.33)	0.48 (0.20)**	0.37 (0.29)
Has any secondary education	-0.01 (0.24)	-0.03 (0.13)	0.08 (0.21)
Health			
Currently on ART		0.26 (0.14)*	
Time since HIV diagnosis (years)		0.02 (0.02)	
Missed ART doses in past 7 days			-0.85 (0.31)**
Missed any clinic appointments in past 6 months		-0.01 (0.17)	
Has discussed childbearing desires with HIV care provider	0.83 (0.25)**		
Relationship/Partner			
Decision making power		0.71 (0.18)***	0.01 (0.31)

Married		0.83 (0.15)***	0.23 (0.24)
In a polygamous relationship	-0.63 (0.29)**		
Number of children		0.03 (0.03)	
Partner is HIV+		0.38 (0.15)**	
Partner knows respondent is HIV+	0.22 (0.34)	-0.28 (0.20)	0.59 (0.30)*
Perceived partner willingness to use SCM	0.15 (0.14)	0.23 (0.08)**	0.25 (0.13)**
Childbearing Stigma			
Internalized stigma towards childbearing		-0.06 (0.10)	
Perceived provider Stigma of childbearing		-0.09 (0.05)*	-0.04 (0.08)
SCM awareness and attitudes			
SCM awareness		0.08 (0.03)**	-0.10 (0.04)**
SCM self-efficacy	0.11 (0.09)		0.14 (0.09)
SCM motivation		0.12 (0.04)**	

* $p < 0.10$; ** $p < 0.05$; *** $p < 0.001$

being able to limit condomless sex to just the few days when the woman was most fertile (mean = 8.3), with men being more confident than women (8.8 vs. 8.1; $p = .002$). Women who had HIV-positive partners reported a higher level of confidence in being able to limit condomless sex to the few days in which they were most fertile compared to women who had HIV-negative or unknown status partners (8.5 vs. 7.8; $p = .008$). Women who had an HIV-negative or unknown status partner were considerably less confident (mean = 5.1; scale of 1–10) in their partner's ability to use manual self-insemination; nonetheless, 50% reported a confidence level of at least 6. Respondents on ART reported greater confidence in being able to use timed unprotected intercourse (8.5 vs. 7.9; $t = 2.50$, $p = .013$), but less confidence in using manual self-insemination (4.7 vs. 5.7; $t = 2.86$, $p = .005$) compared to those not on ART, and age was positively correlated with confidence in using timed unprotected intercourse ($r = 0.16$, $p = .001$). We did not assess self-efficacy related to sperm washing and PrEP since these methods are largely inaccessible to the study population currently.

Correlates of SCM awareness, self-efficacy and motivation

Bivariate Analysis: Table 3 lists the bivariate correlates of the measures of SCM awareness, self-efficacy, and motivation. Awareness of SCM

was positively correlated with self-efficacy to use SCM, and self-efficacy and motivation to use SCM were positively correlated, but awareness and motivation were only marginally associated. Among demographics, older age and being male was associated with greater SCM self-efficacy. Among health characteristics, greater SCM self-efficacy was associated with greater time since HIV diagnosis, being on ART, and not missing clinic appointments, while lower SCM motivation was associated with missing ART doses and greater SCM awareness was associated with and communication with provider about childbearing desires. Greater internalized stigma related to childbearing was associated with lower SCM self-efficacy, and greater perceived provider stigma of childbearing was associated with both lower SCM self-efficacy and motivation.

Several relationship and partner characteristics were associated with these SCM constructs (See Table 3). Participants who were married had greater self-efficacy and motivation to use SCM, compared to unmarried participants in committed relationships. Those in polygamous relationships had lower SCM awareness compared to those in monogamous relationships, and more equality in decision making within one's relationship was associated with greater self-efficacy and motivation to use SCM. Greater perceived partner willingness to use SCM and partner knowledge of the respondent's HIV-positive status were both positively associated

with SCM awareness, self-efficacy, and motivation; and having an HIV-positive partner and having more children were associated with greater SCM self-efficacy.

Multiple Regression Analysis

Results of multiple regression analyses are listed in Table 4. Greater SCM awareness and motivation were each independently associated with greater self-efficacy to use SCM, and greater awareness was also associated with greater SCM motivation. The only demographic that was independently associated with any of the SCM constructs was gender, with female gender now being associated with higher SCM self-efficacy, unlike in the bivariate analysis where the relationship was in the opposite direction. Among health characteristics, having discussed childbearing desires with one's HIV provider was independently associated with greater awareness of SCM, while missing ART doses was associated with lower motivation to use SCM. Among relationship characteristics, being married was associated with greater self-efficacy to use SCM, being in a polygamous relationship was associated with lower SCM awareness, and more equality in decision making within one's relationship was associated with greater SCM self-efficacy. Having an HIV-positive partner was associated with greater SCM self-efficacy, while greater perceived partner willingness to use SCM was associated with greater self-efficacy and motivation to use SCM. None of the childbearing stigma measures was independently associated with any of the SCM constructs.

Discussion

This study of HIV clients in Uganda with fertility intentions revealed poor awareness of specific safer conception methods (SCM), with only half being aware of timed unprotected intercourse and manual self-insemination as methods to reduce transmission during conception, and much fewer knowing about sperm washing and PrEP. Yet, participants expressed relatively high confidence in being able to implement the specific procedures

involved with these methods when described to them, especially timed unprotected intercourse, and particularly among male respondents. Levels of motivation to use SCM were generally good. Our data reveal that multi-level factors (individual, partner and provider), but especially relationship or partner related variables, are associated with SCM awareness and attitudes, and may be key to developing effective interventions to promote use of SCM and safe, healthy pregnancies among PLWHIV.

Greater awareness of SCM was associated with respondents having communicated with their providers about their desire to have children. This communication between provider and client is likely a key antecedent to providers offering the client safer conception education and counselling. Receipt of safer conception counselling is instrumental to a client gaining knowledge of SCM. Providers need to initiate discussions with their clients about childbearing and SCM options, but clients also need to inform their providers of their childbearing desires and need for safer conception counselling. In bivariate analysis, greater awareness of SCM was also associated with having greater confidence in being able to use SCM, which may also be fostered by receipt of counselling instructions. Unfortunately, counselling to address barriers to the use of SCM and instruct clients and couples on the use of these methods is not currently being implemented in sub-Saharan Africa (or any other part of the world) as part of standard care; in fact, providers and HIV clients do not typically discuss the childbearing desires of clients^{13,35-37}. Even when a client does discuss fertility intentions with a provider, it is not clear the extent to which available options for safer conception methods are included in such discussions.

SCM self-efficacy was associated with several partner-related variables. Limiting condomless sex to just the two or three days of the woman's ovulation cycle when she is most fertile, or having the man collect and prepare his semen for insertion into the woman's vagina, are methods that require the cooperation of both members of a couple, making the willingness of one's partner to

use SCM critical. Perception of partner's willingness to use SCM was significantly correlated with SCM self-efficacy, as were partner knowledge of the respondent's HIV status, the partner along being HIV-positive, and greater equality in decision making power within the relationship. Partner or relationship characteristics were also associated with motivation to use SCM. Being married and having disclosed HIV status to one's partner were both associated with having greater SCM motivation, which may reflect the influence of relationship commitment and communication on the desire and willingness to use unconventional methods to limit risk of transmission and protect one's partner. These findings highlight the importance of both members of a couple being involved in safer conception counselling to ensure that both the man and woman are informed and motivated to accurately employ the appropriate safer conception method.

A limitation of the study is the sample being comprised solely of PLWHIV who are receiving HIV care. The study results are only applicable to PLWHIV who are in HIV care and have intentions to conceive with their partner. PLWHIV who are not in HIV care, and those not interested in having a child, may be less likely to be familiar with safer conception methods and how to use them. Also, when appraising the levels of awareness, self-efficacy and motivation to use SCM in this population, it is important to acknowledge that there is no formal or organized education about SCM for PLWHIV in Uganda or most of sub-Saharan Africa. The knowledge and attitudes expressed in the study are based on very little exposure to SCM, perhaps with the exception of timed unprotected intercourse—a method that is similar to that used in family planning to prevent conception, although the window for abstaining from sex to prevent conception is larger than the 2-3 day window used to promote safer conception. Although the survey questions related to specific SCM consisted of concrete descriptions of the procedures involved with the method, rather than a descriptive term (e.g., manual self-insemination), so that the respondent could understand the nature of the method without having prior knowledge, it

is possible that our data related to self-efficacy and motivation are influenced by this relatively limited level of understanding of the methods. With the reproductive health rights of PLWHIV becoming increasingly recognized by clinical providers, availability of safer conception education and counselling should increase in the coming years. Our longitudinal data will enable us to examine whether knowledge, attitudes and practices regarding SCM change over time in this setting.

Our prior research found that awareness and attitudes related to SCM are key determinants of the use of these methods³⁰. This highlights the need to understand the factors that influence these constructs in order to better inform the development of effective interventions and promote safer conception among PLWHIV. The findings reported here show that individual, partner and provider level variables are associated with knowledge and attitudes towards SCM, with particular emphasis on communication between clients and providers about childbearing desires and needs, partners knowing about the respondent's HIV and partner willingness to use SCM, and equality in decision making power related to sex. These findings suggest the need for training and advocacy to promote open communication between clients and providers about the clients' childbearing needs, and to integrate safer conception counselling for couples into routine HIV care and sexual and reproductive services for PLWHIV.

Acknowledgements

We would like to thank Christopher Tumwine and Jimmy Mayatsa for their efforts in participant enrolment and data collection, and the study participants. This research was funded by the Eunice Kennedy Shriver National Institute of Child Health & Human Development Grant 5R01HD072633-03 (PI: Wagner).

Contribution of authors

GJW, KG, JB, DM, SF, SK, RKW conceived and designed the study; MAW, GJW analyzed the data; GJW, MAW, JB, KG, DM, SF, SK, RKW

helped prepared the manuscript. All authors approved the manuscript for submission and publication.

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