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ORIGINAL PAPER

Sexual and Relationship Benefits of a Safer Conception Intervention Among Men with HIV Who Seek to Have Children with Serodifferent Partners in Uganda

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Abstract

Many men with HIV (MWH) in Uganda desire children, yet seldom receive reproductive counseling related to HIV care. Because men are under engaged in safer conception programming, they miss opportunities to reap the benefits of these programs. The objective of this sub-analysis was to explore the relationship and intimacy benefits of integrating safer conception counseling and strategies into HIV care, an emergent theme from exit interviews with men who participated in a pilot safer conception program and their partners. Twenty interviews were conducted with MWH who desired a child in the next year with an HIV-uninfected/status unknown female partner, and separate interviews were conducted with female partners (n = 20); of the 40 interviews, 28 were completed by both members of a couple. Interviews explored experiences participating in The Healthy Families program, which offered MWH safer conception counseling and access to specific strategies. Data were analyzed using thematic analysis. Three major subthemes or "pathways" to the relationship and intimacy benefits associated with participation in the program emerged: (1) improved dyadic communication; (2) joint decision-making and power equity in the context of reproduction; and (3) increased sexual and relational intimacy, driven by reduced fear of HIV transmission and relationship dissolution. These data suggest that the intervention not only helped couples realize their reproductive goals; it also improved relationship dynamics and facilitated intimacy, strengthening partnerships and reducing fears of separation. Directly addressing these benefits with MWH and their partners may increase engagement with HIV prevention strategies for conception.

Keywords HIV · Pre-exposure prophylaxis (PrEP) · Treatment as prevention (TasP) · Sexuality · Relationships · Conception · Global health

Sadly, Dr. Bwana passed away on October 27, 2020.

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Introduction

Globally, up to 50% of men with HIV (MWH) intend to have children [1–4], and as the effectiveness of HIV treatment and prevention strategies continues to become more widely known, more MWH will want to meet important reproductive goals and milestones [5]. HIV care, prevention, and reproductive services provide education and tools to reduce HIV transmission [6, 7] during periconception and pregnancy periods. However, men in sub-Saharan Africa (SSA), where HIV prevalence rates remain high, have limited options for counseling that directly addresses their reproductive goals [8].

Among MWH who have sex with women and mixed-sex couples affected by HIV, little is known about the relational factors that influence decisions to start and continue using

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HIV prevention in preparation for conception. Qualitative research on serodifferent couples in Uganda and Kenya [9, 10], who were not necessarily seeking to meet specific reproductive goals, has found that reduced stress and increased trust, in addition to the prospect of a return to "live sex" (sex without condoms) and a re-establishment of intimacy, were associated with pre-exposure prophylaxis (PrEP) acceptance and willingness to initiate use. A proposed explanation for PrEP adherence among serodifferent couples in sub-Saharan Africa focuses on PrEP as a solution to the "discordance dilemma", which emerges when the desire to avoid acquiring HIV and the advantages of preserving the relationship become competing priorities [11]. PrEP is then seen as a means of safeguarding health without ending the relationship, as an HIV diagnosis in the partnership may lead to tension, quarreling over suspected infidelities, and decreased sexual intimacy. In the US, there have been similar discussions about the positive and negative effects of PrEP among youth with partners who are living with HIV and among men who have sex with men [12–14]. For example, Black men who have sex with men (MSM) within primary relationships described PrEP use both as an indication of distrust and as a sign of respect to their partners [13]. Researchers are also starting to describe the effects of PrEP use and other HIV prevention strategies on other relationship domains in mixed-sex couples, including caretaking and health crisis management [10]. Though relationships and associated factors are now considered relevant to PrEP use in different contexts, the positive effects of PrEP and other HIV prevention/safer conception strategies on MWH who have sex with women and mixed-sex couples seeking to conceive in sub-Saharan Africa and similar settings have yet to be thoroughly described.

The prospect of increased sexual intimacy and pleasure may also factor into decision-making around the use of HIV prevention strategies during the periconception period. In recent years, increased attention has been paid to issues of intimacy, sexual pleasure, and sexual autonomy among persons with HIV, though the majority of this work has focused on women as well as gay, bisexual, and other MSM, not men who have sex with women or couples. Efforts to move beyond "safer sex" and reduced transmission rates as the only meaningful sexual health outcomes in this population have led to important conversations about the dangers of reducing the sexuality of people with HIV to a public health prevention concern and, relatedly, the importance of developing nuanced understandings of intimacy among people with HIV [15]. Guided by feminist perspectives on sexuality, which emphasize intersectionality and address the ways in which women's sexual experiences are tied to societal structures and inequities [16–18], researchers have advocated for assessing the sexual health outcomes that are desired by people with HIV and then studying the factors that enable those outcomes, rather than exclusively focusing on HIV prevention goals and other deficit-based analyses [15, 19–23]. Though a few studies have addressed these issues in MWH who have sex with men [24–26], there is a notable dearth of information on intimacy and pleasure among MWH who have sex with women, particularly around conception.

To support the involvement of men in reproductive planning and to minimize HIV transmission in preparation for and during pregnancy, our team developed and tested a safer conception intervention for MWH and their HIV-uninfected female partners, adapted the intervention for Uganda, and integrated it into HIV care [27]. Initiating and retaining men in both HIV and reproductive care across SSA and in other high prevalence regions can improve their health and reduce HIV incidence among women and children [28–30]. The intervention offered MWH counseling on and access to a set of safer conception counseling strategies, which included treatment as prevention (TasP), pre-exposure prophylaxis (PrEP) for their partners, timed condomless sex to peak fertility, contraception until the couple was ready to conceive, information about sperm washing, and treatment for sexually transmitted infections [29].

In a series of qualitative exit interviews with participants and their partners, we examined motivations to participate in the intervention as well as benefits and disadvantages of the program with respect to HIV-related outcomes [31]. Themes from the initial analysis of these data included primary motivations for engaging in a safer conception intervention (e.g., to increase family size, to have an HIV-uninfected baby), challenges to engaging in safer conception care (e.g., men's fears about HIV disclosure, uncertainty about the effectiveness of ART for HIV prevention), and additional benefits (e.g., eliminating HIV transmission risk worries, accessing other sexual and reproductive services). Though exploring the relationship benefits of PrEP, TasP, and the other safer conception strategies that were offered was not the focus of the exit interviews, these benefits emerged as an additional theme in the initial analysis [31]. The desire to improve their relationship was a strong motivation for engaging in safer conception care, and key benefits of the program included improvements in marital and sexual intimacy between partners [31].

For the current analysis, we returned to the data to examine relevant subthemes that identified specific "pathways" to improved relationships. That is, we knew from the previous analysis that the intervention strengthened relationships, but it was unclear which aspects of participants' interactions with their partners improved and how those improvements occurred as a result of the intervention.

Therefore, the purpose of this qualitative sub-study was to examine the sexual and relationship subthemes described by participants who engaged in the safer

conception intervention in Uganda. We also aimed to consider the implications of these benefits for increasing engagement of MWH and their partners in HIV treatment and prevention as they seek to meet their reproductive goals.

Methods

Study Setting

The study was conducted in Mbarara, Uganda, a rural area approximately 265 km southwest of Kampala. In 2020, the HIV prevalence rate among men aged 15–49 years was 3.9, with corresponding rates of 6.8 among women and 5.4 among all adults [32]. Current HIV incidence per 1000 individuals aged 15–49 is 1.72, with over 21,000 women newly infected in 2020, almost twice the number of new infections in men (11,000) [33]. Compared to women, men in Uganda remain under engaged in HIV care and have made less progress toward achieving the 95–95–95 goals by 2030 [34]; 86% of MWH know their status, 89% of men who know their status are on antiretroviral therapies (ART), and 89% of those who know their status have suppressed HIV-RNA, whereas the corresponding figures for women are 93%, 97%, and 92%, respectively [35]. As of 2018, the fertility rate in Uganda was 4.96 children per woman [36].

Eligibility Criteria and Recruitment

Men living in Mbarara and the surrounding region were eligible to participate in the parent study (known as "Getting to Zero") if they were (1) aged 18 years or older; (2) living with HIV; (3) naïve to the Healthy Families Clinical Program, which offers integrated safer conception care for couples and individuals affected by HIV; and (4) interested in having a child with an HIV-uninfected or serostatus-unknown female partner within the next year. Participants were asked to identify their pregnancy partners and to provide consent for the study team to contact them. Participants were encouraged to bring their pregnancy partners to all study visits, but partners were not required to participate.

A total of 50 MWH were recruited for Getting to Zero through the ISS Clinic at the Mbarara Regional Referral Hospital (MRRH), the HIV counseling and testing service within the MRRH, referrals to the Healthy Families Clinic, community outreach at local HIV-related events, and support groups for HIV-serodifferent couples. Of the 50 participants, 47 completed the Getting to Zero study, which included three study visits and an exit interview, and three were lost to follow-up.

Procedures

The study procedures for the parent Getting to Zero study are described briefly here (please see reference [31] for a more detailed description). Getting to Zero was a 6-month, mixed-methods, prospective cohort study assessing safer conception care uptake among MWH. Participants completed study visits at enrollment, 3-months post-enrollment, and 6-months post-enrollment. Each study visit involved individual safer conception counseling (though partners were welcomed to attend), following the protocol established by Khidir et al. [27], which is described briefly below.

After providing informed consent, participants completed an interviewer-administered questionnaire at enrollment that assessed demographics, sexual and reproductive history, and psychosocial factors that might impact participation. Participants and their partners (if present) were then offered the first of three safer conception counseling sessions at the Healthy Families clinic. The first session covered safer conception education, used motivational interviewing strategies to help participants prepare for behavior change, and introduced participants to a range of safer conception strategies, including the importance of initiating antiretroviral therapy (ART) and adhering to ART for MWH, HIV RNA-suppression and delaying sex without condoms until virally suppressed, the menstrual cycle and timed sex at peak fertility, PrEP, adherence to PrEP for the HIV-uninfected partner, and contraception. Disclosure of serostatus and prevention and treatment of STIs was also discussed, as were pregnancy-related concerns. Participants were then given a chance to ask questions and share current or anticipated concerns about safer conception method use, social support, and adherence to PrEP. Finally, participants were asked to articulate the strategies that they wished to pursue. Subsequent counseling sessions (at 3-months post-enrollment and 6-months post-enrollment) were individually tailored to help the participant and his partner engage with their chosen strategies and achieve their specific goals. During these sessions, the counselor and the participants engaged in problem-solving to address anticipated and actual barriers to implementing the strategies. The counselor also provided some basic communication skills training to facilitate participants' disclosure of their HIV status to their pregnancy partners as well as enable joint discussions about their fertility goals.

MWH and their partners were also offered clinical services, including pregnancy testing, HIV testing, and STI testing and treatment [37]. In addition, participants and partners living with HIV were assessed for HIV-RNA suppression via GeneXpert at enrollment and at 6-months post-enrollment.

MWH and their partners who participated in the intervention were invited to complete a semi-structured exit interview to explore their experiences. The development of the

interview guide was informed by a conceptual framework for understanding HIV transmission risk and supporting reproductive goals among serodifferent couples [38]. The framework addresses individual (e.g., fertility desire, HIV status), couple-level (e.g., gender power, communication), and structural (e.g., gender norms, health system) factors that influence safer conception behavior, and it guided the design and implementation of several integrated HIV, reproductive health, and family planning services [27]. The questions included in the interview guide encouraged participants to explore the ways in which the program influenced motivations to engage in the safer conception strategies.

Data Collection and Analysis for the Current Study

Of the 47 men who completed the Getting to Zero study, all 47 were willing to complete a qualitative exit interview. Men were provided with letters describing the nature of the interviews to give to their partners. Ultimately, 27 partners were willing to participate and contacted the study team to complete an exit interview. Although we could not formally document partners' reasons for not participating in the interviews, logistics were likely a contributing factor; some men were living apart from their partners, and there were anecdotal reports that men had not yet had a chance to invite their partners due to lack of communication, or that partners were interested in participating but could not access the study site.

Though all 47 index participants and 27 partners indicated willingness to participate, our research team was only able to contact and schedule individual interviews with 40 participants and 20 partners. Of the remaining 14 who had initially expressed interest, some were unreachable, others were not available to be interviewed at mutually convenient times, and others did not attend their scheduled interviews. However, by the time we completed 40 total interviews (MWH and partners), we had also reached data saturation, and enrollment into the qualitative interviews was closed.

Overall, 40 individual semi-structured interviews were conducted with MWH (n = 20) and female partners (n = 20) who participated in the study; 28 interviews were completed by both members of a couple (14 couples totals), six interviews were completed by MWH, and six interviews were completed by female partners. The interviews were conducted in either Ruyankole or English (based on participant preference) by research assistants who were trained in qualitative methods, audio-recorded, translated into English (if necessary), and transcribed.

Following the principles of thematic analysis [39], the researchers read the transcribed data several times to familiarize themselves with the material and compared the data to the audio-recordings for accuracy. Summaries of each transcript were written and reviewed by the team; this process generated initial suggestions, ideas, and concepts, which were applied to develop the codebook. Prominent features and patterns in the data were identified and grouped into a codebook, which was then uploaded into NVivo 11.4 software for coding and data management. Two investigators coded all of the interviews according to the codebook; the investigators discussed and compared their data for consistency, and discrepancies were resolved via consensus after an initial round of coding. Thematic saturation was assessed following the inductive approach specified by Saunders et al. [40], such that saturation was determined when no new themes or codes were identified within the data and when no new theoretical insights were gained from the data. As described in the "Introduction", the primary qualitative analysis of the exit interviews identified several emergent themes [31], including improved sexual intimacy and marital relationships, which we revisited in the current analyses. In this study, we assessed subthemes within this overarching sexual and relationship benefits theme, with the goal of specifying the pathways or the means by which these benefits emerged. We did not formally assess the saturation of the subthemes given that the data was already collected. However, subthemes were only categorized as such if around a quarter of the sample (~ 10 participants) mentioned relevant content.

Some results of the larger parent study may help contextualize the qualitative findings described below. Within 3 months after the first counselling session, 14 of the 20 men who completed the exit interviews had chosen to use safer conception, of whom 100% (n = 14) selected TasP, 86% (n = 12) chose to time condomless sex to peak fertility, 43% (n = 6) selected partner PrEP, and 21% (n = 3) planned on timing condomless sex until viral suppression. None chose to pursue sperm washing with insemination.

Results

The 20 index participants had a median age of 33 and a median of 3 children. At the time of the exit interviews, all 20 MWH were on ART, and 19 (95%) had HIV-RNA < 200 copies/mL. The 20 female partners had a median age of 27 and were all HIV-uninfected. Please see Table 1 for additional demographic information.

We initially separated and analyzed the data by gender, but findings were consistent for MWH and their partners. Therefore, we present the combined results for men and women below.

Overview of Qualitative Findings

Three key subthemes or pathways that facilitated the sexual and relationship-oriented benefits associated with the intervention were identified within the data. MWH and their female partners conveyed that the intervention and its

Table 1 Sociodemographic characteristics of the male index participants and female partners who completed the exit interviews

	Male index participants (n = 20)	Female partners (n = 20)
Age (median)	33	27
Education		Not available
Primary through Grade 6 or 7	45% (n = 9)	
Some secondary	25% (n = 5)	
Tertiary/vocational	25% (n = 5)	
University	5% (n = 1)	
Employment status		Not available
Full-time employed	30% (n = 6)	
Part-time employed	15% (n = 3)	
Self employed	50% (n = 10)	
Not employed	5% (n = 1)	
Relationship status		
Spouse/legal partner	80% (n = 16)	90% (n = 18)
Living as married for at least 6 months	15% (n = 3)	10% (n = 2)
Other	5% (n = 1)	
Relationship length (median)	4.5 years	6 years
Anticipated timing of conception		
In 1 year or sooner	70% (n = 14)	60% (n = 12)
In 1–2 years	20% (n = 4)	20% (n = 4)
In 3–4 years	10% (n = 2)	15% (n = 3)
In 5 or more years		5% (n = 1)
ART status	100% (n = 20) on ART	Not applicable
HIV-RNA suppression (< 200 copies/mL)	95% (n = 19)	Not applicable

associated strategies, which included TasP for the men and PrEP for the HIV-uninfected partner, (1) improved dyadic communication, (2) increased joint decision-making and relationship power equity during reproduction and family planning, and (3) increased sexual and relational intimacy in the context of reduced fear. Overall, participants indicated that the program fundamentally altered the ways in which they interacted with their partners, which strengthened their relationships and ultimately supported their reproductive goals.

Improved Dyadic Communication

MWH indicated that, prior to engaging in the program, they struggled to communicate their reproductive goals to their partners. The challenges of pregnancy planning were not explicitly discussed, resulting in misinformation and misunderstandings that may have adversely impacted the relationship. For some participants, these misunderstandings were rectified or improved with the counseling that was built into the intervention. One participant expressed this challenge, noting that the intervention resulted in improved communication and important clarifications about the possibility of having an HIV-negative child:

> I wanted us to be taught and understand so that we don't get misunderstandings. Since I am HIV positive and she's not, we almost had misunderstandings. So I told her 'let us go and see what we shall do.'… Before she came to this study, we had misunderstandings but when she came [to the safer conception counselling visit] she was taught, and all that ended and we benefited from the study. (ID GTZ021C, male index participant, age 27).

When the interviewer asked the participant to clarify the misunderstanding, he noted that his partner "did not understand how a person with HIV can stay with another that's not HIV positive and fail to infect the other". Yet, after participating in the counseling, he explained that he and his partner communicated their misunderstandings to each other and to the counselor, and his partner initiated PrEP. At the time of the interview, he reported that his partner was 5 months pregnant, HIV-negative, and carrying a baby boy.

Another participant reported that the safer conception intervention created opportunity for discussion that was otherwise difficult to find in the course of their busy lives:

> Before I came to this program, when I got my wife, we decided to have children, but we had never got any chance to talk about such things. We would wake up

> in the morning, go and dig, we cook, we eat, go bed sleep. (GTZ009C, male index participant, age 43)

One MWH reported that a sense of guilt or responsibility for his HIV status held him back from discussing his desire for a child with his wife. He indicated that the counseling and safer conception strategies provided him with the tools that he needed to express his reproductive goals.

> I was the one responsible for bringing the sickness in the home; I still wanted to have a child. I did not know how to go about telling my wife that I wanted a child yet I was sick. But when I went to the counselor and I explained to him, and he explained to me how to begin it. (GTZ033C, male index participant, age 36).

Several partners of MWH also specified that their involvement in the program and adoption of safer conception strategies, including PrEP, led to direct communication, discussion, and eventual agreement on specific steps needed to achieve their reproductive goals.

> We both agree. If we see this will work, we both agree. If we are going to argue we first see and say this goes like this and that like that and you find that we've both agreed. It's not that everyone does what they want. (GTZ029F, pregnancy partner, age 28)

Another partner noted that she and her partner were able to identify and openly discuss issues that were preventing them from conceiving.

> When we saw what was disturbing us and preventing the pregnancy, we kept on discussing about it. He said we will continue working on it and see to it that it ends and then I would be pregnant. (GTZ035F, pregnancy partner, age 28).

Increased Joint Decision-Making and Relationship Power Equity in the Context of Family Planning

Men noted that the safer conception program helped them navigate joint decision-making specific to pregnancy planning and childrearing, with several participants reporting that the intervention enabled joint reproductive planning, shifts in roles such that men became more involved in antenatal care, and overall changes in the dynamics of their relationships.

Several participants and partners discussed the impact of the program on engaging in activities that support the pregnancy as a couple, improving power imbalances within relationships. In rural Uganda, antenatal activities—attending clinic visits, monitoring the development of the fetus—are typically the responsibility of the female partner [41, 42]. Indeed, one MWH reported that the program led to "cooperation" and joint attendance at pregnancy-related appointments, indicating that he now considers participation in antenatal care to be part of his role as a parent.

> We have been cooperating, continue going for check-ups, seeing how the child is doing, knowing the birth dates and going to hospital for child delivery. (GTZ023C, male index participant, age 46).

Another participant expressed the degree to which the safer conception strategies altered life at home such that he and his partner are aware that they can have healthy children and now make fertility planning decisions together, again supporting relationship power equity:

> Your program has changed the situation in our home, because now I am firm, we take decisions together, and I know we shall have healthy children basing on the services you give us. (GTZ003C, male index participant, age 43).

One female partner described the role of program counselors in changing the dynamics of her relationship for the better. This woman indicated that participating in the safer conception intervention promoted relationship equity, as she and her partner began to treat each other with more kindness and respect:

> When he is in such a mood he can be so rude when I ask him anything he does not reply. This keeps me wondering if he has another wife or if it is just anger and also I keep wondering if there is anything wrong that I did to him that is making him angry. The counselor told him that it is bad to behave like that and he promised to change. We agreed to treat each other well and if there's anything the other hates, we should leave it and that he should be happy and let go. (GTZ023F, pregnancy partner, age 28).

In a few cases, jointly addressing the challenge of HIV prevention when planning for conception led to reductions in intimate partner violence. One male participant reported that the intervention made for a more peaceful home life, characterized by an increased understanding of how to "live together" and engage with his partner, which resulted in decreased violence and a more balanced relationship dynamic that enabled him and his partner to achieve common goals:

> It has helped us to know how to live together, it also helped us to build us on how to plan for our children's future, to understand how to live together and to reduce on domestic violence. After learning, it helped us not to look at someone as if he is the one that brought the disease, but we work together to address the problem. (G2Z035C, male index participant, age 36).

For this participant, the program also contributed to a shift in roles within the relationship, as both he and his partner began to reduce blame toward the "one that brought the disease" and together focus on the larger goal of HIV prevention during conception.

Increased Sexual and Relational Intimacy, Reduced Fear of Relationship Dissolution

Multiple participants explained the ways in which the safer conception intervention facilitated increases in sexual intimacy and pleasure as well as enhanced connectedness between partners. Among some MWH, these increases were associated with condomless sex, or skin-to-skin genital contact that participants may have considered unsafe prior to engaging in the program and using the strategies. Importantly, this type of contact was perceived to be more intimate than sex with a condom. One participant expressed this sentiment:

> I love this program because my wife and I had spent more than 6 years without us knowing each other's skin, we were using condoms. But ever since we joined this program we went back to the kind of love we had for each other at the beginning when we had just gotten married to each other. (GTZ013C, male index participant, age 45).

For some MWH, the increase in sexual intimacy was primarily related to a decrease in fear of transmitting HIV to their partners, given their partners' PrEP use and/or use of other safer conception strategies. This reduction in fear seems to have led to feeling more present and engaged during sexual activity. The same participant as above described notable differences between prior sexual experiences that were dominated by fear and current experiences, which are characterized by a sense of protection:

> Life has changed, you feel happy compared to the time when you would have sex with fear. You have fear of the condom bursting, and she is also worried that the condom should not get stuck in her. The condom might also be expired and then she gets infected. But now she knows that she has a 'guard' (Says it in English) to protect her, nothing can happen. We do not have any worry. (GTZ013C, male index participant, age 45).

Participants and their partners also noted that the strategies included in the program taught them "how to love", in the sense that it was safe to love and be intimate with each other without fear of a break-up. This decreased fear of relationship dissolution was associated with increased connectedness and perceived relationship strength; indeed, the intervention helped build love and support during pregnancy planning, which seemed to enable MWH to trust that their partners would not leave them because of their HIV status. By taking PrEP and/or using other HIV prevention strategies learned throughout the intervention, the partners, in turn, demonstrated their trust, strengthening their love as well as their commitment to the relationship and to their reproductive goals. A participant described this experience in detail:

> The good things that I see, my partner continued to have a heart of loving me so much, in some people who have different serostatus, some keep thinking about separation. But for us since we joined this program, she trusted me.... I know that we will reach our destination…we do every activity together, and we have a lot of love. (GTZ009C, male index participant, age 43)

One of the partners also expressed similar feelings, noting that the program and associated safer conception strategies taught her how to love herself and her partner in the presence of HIV.

> It has helped us in many ways, it has taught me, us, to love, we know that even if he is sick we can live… I found love and learned to love myself, even if my partner is HIV positive, he is not sick that he will die so I saw that he is normal and we can live just like anybody else. (GTZ043F, pregnancy partner, age 40)

Discussion

In this sub-analysis of exit interviews conducted with MWH and female partners who participated in a safer conception intervention integrated into HIV care, three subthemes associated with the overarching theme of sexual and relationship benefits emerged from the data. Although some studies have examined the ways in which PrEP, TasP, and other approaches that dramatically reduce risk of HIV transmission increase sexual pleasure, sexual satisfaction, and relational intimacy [10, 25, 43, 44], few have done so with couples or from the context of reproductive planning. Moreover, studies based in low- and middle-income settings with high HIV burden tend to frame PrEP, timed condomless sex at peak fertility [45], sperm washing [46, 47], and other strategies exclusively in terms of potential to reduce HIV transmission risk, not in relation to potential positive relationship outcomes that may be particularly appealing to individuals with HIV or partnered with someone with HIV. In these exit interviews, participants and partners articulated that the safer conception program had three powerful relationship benefits: improved dyadic communication, increased joint decision-making and relationship power equity during family planning, and increased sexual and relational intimacy. These benefits are additive to other advantages of the

intervention that have already been documented elsewhere [31], including reduced or eliminated concerns about HIV transmission and gaining knowledge and support for realizing reproductive goals.

Lack of communication between partners and gendered power imbalances influence sexual interactions and relationship dynamics in addition to increasing HIV risk [48–51]. Gendered sexual scripts inform power in the dyadic context [52]; traditionally, harmful heterosexual male norms accept male aggression over women in marital relationships or intimate partnerships [53], and women are encouraged to be submissive, prioritizing the needs of their partners or the relationship over their own, which facilitates exposure to HIV [54, 55]. These gendered sexual scripts likely influence the prevalence of intimate partner violence, which decreased as a result of the intervention for some participants. In Uganda, intimate partner violence is common, with over 60% of women and 40% of men reporting violence between spouses [56]. Intimate partner violence has been shown to increase risk for HIV through compromised safe sex negotiation and forced sex with discordant partners [57, 58]; among women in Uganda, intimate partner violence is associated with up to a 55% increased risk of HIV acquisition [59]. Given these high rates and the reported decreases in intimate partner violence following an intervention that did not explicitly seek to do so, it may be useful for programs that aim to prevent HIV transmission in serodifferent couples who are planning for conception to highlight these benefits for increased participation. Similarly, although the counseling included in the Getting to Zero intervention did not purposively address power imbalances, gender roles, or relationship dynamics, MWH in this study also noted that the intervention and the safer conception strategies led to increases in relationship equity, which were not only viewed as positive and supportive of reproductive goals but also linked to a greater sense of trust within the partnership. This sense of trust likely enabled couples to engage in joint-decision making and problem-solving during family planning as well as to attend antenatal and other appointments, traditionally viewed as "women's business" [60, 61], as a unit.

The safer conception program may have rebuilt sexual and relational intimacy that was eroded in part by stigma associated with both HIV and serodifferent partnerships [62]. People with HIV often report that the general public perception is that they should not give birth to children, which increases their sense of stigma from the local community and especially from providers when they express their desire to conceive [63–65]. Research on the development of a safer conception toolkit for HIV-affected individuals and couples in Kenya found high perceived HIV-related stigma prior to counseling [66]. For example, participants perceived that HIV infection meant the end of life, that conception is impossible, or that all offspring of HIV-affected couples are inherently infected. Relatedly, in Uganda, the cultural and personal significance of having children is high; manhood is defined by the ability to produce offspring and ensure lineage continuity, and women feel insecure in this environment if they cannot deliver a child to their male partners [67]. It is likely that stigma surrounding fertility and conception in serodifferent couples strains relationships and reduces intimacy between partners.

Related work on relationship dynamics in HIV-affected couples across SSA has demonstrated that, relative to couples in which both partners are living with HIV, serodifferent couples face heightened levels of anxiety and may have poor coping skills [68]. Engaging in a dyadic program to support safer conception may counteract uncertainty about the permanence of a couple's serostatus, which, in the presence of stigma and misinformation, may otherwise lead to avoidance of intimacy and sexual activity [69].

Notably, men described associations between increased intimacy and reduced fears of relationship dissolution. In studies examining relationship dynamics and HIV serostatus disclosure among couples in SSA, fear of abandonment and separation has more so been associated with women with HIV than with men [70, 71]. However, the results of other qualitative analyses do align with our finding that men in serodifferent relationships are indeed concerned with relationship dissolution. For example, in an exploration of relationship dynamics and gender inequalities as barriers to HIV serostatus disclosure, specific fears related to separation differed by gender [72]. While women in serodifferent relationships feared the loss of the relationship itself, especially the social and economic support associated with the relationship, men were concerned about losing the partner with whom they might have a child. With these reproductive goals in mind, future safer conception and HIV prevention programming for men and their partners may be enhanced by highlighting the degree to which these interventions increase the stability of relationships, with potential decreases in the likelihood of HIV-driven separations.

Framing safer conception programming and associated HIV prevention strategies as tools that allow for condomless sex solely for conception may be a missed opportunity for engaging serodifferent couples in Uganda, who face challenges connecting both physically and emotionally due in part to traditional gender roles and to the societal stigma associated with being in a serodifferent partnership [73]. Despite the global consensus that viral suppression eliminates the risk of HIV transmission [74–76] to sexual partners ("undetectable equals untransmittable", or U = U), health providers in higher resourced settings have reported concerns about implementing the treatment as prevention strategy with their patients, and it appears that providers in SSA experience similar difficulties. In a recent study that explored knowledge and acceptance of the U = U approach

among clinicians in Kenya, many lacked confidence in U = U and continued to support condom use after viral suppression [77]. They expressed that U = U messaging might lead patients with HIV to engage in multiple sexual relationships, and they feared that they would be blamed if HIV transmission did occur. Given the hesitancy around U = U, it is important for providers to be aware of the relationship benefits associated with these strategies that have been expressed by MWH and their partners.

Branding PrEP, TasP, and other HIV prevention strategies as tools for nurturing intimate relationships in couples may support uptake and persistence during periconception, conception, and pregnancy, all periods of high transmission risk [78]. Research assessing the efficacy of campaigns that highlight relationship benefits to promote safer conception programs among heterosexual couples needs to be conducted, as does research on couples' experiences in such programs. Others have also suggested that the most effective PrEP demand creation tactics may be those that meaningfully address everyday life priorities, such as strengthening partnerships and renewing sexual desire, rather than focusing narrowly on risk reduction [10]. Campaigns like "PrEP4Love" [26], which used health equity and sex-positivity approaches to disseminate information about PrEP in the United States, could guide the development of culturally relevant programming for serodifferent couples in Uganda (and elsewhere) who are hoping to conceive. These approaches may also build trust between local communities and providers, while (1) validating the sexual and reproductive rights of people with HIV [79] and (2) including sexual intimacy and positive relationship dynamics as part of HIV prevention [80] for uninfected partners and their infants.

This study has limitations. The Getting to Zero study recruited a motivated population, most of whom had previously disclosed their HIV status to their partner. This may not be representative of the larger community of MWH in Uganda or in sub-Saharan Africa. Participants were already engaged in HIV care, and most had an undetectable viral load at baseline. Therefore, they were already receiving HIV prevention benefits (for conception purposes or otherwise), even if they were unaware of those benefits prior to participating in the intervention. In addition, this was a sub-analysis of a qualitative exit interview data that were collected to assess motivations for as well as, challenges, and benefits of a safer intervention for MWH. We identified subthemes or pathways to improved relationships, one of the benefits that emerged from those interviews. Because the data were already collected and coded by the time we started the analysis, we could not formally assess the theoretical saturation of each of the subthemes. Importantly, this analysis included data from MWH and partners of MWH who participated in the intervention, but did not assess perceived sexual and relationship benefits dyadically. Both members of a given couple did not always complete the interview; in six cases, just the male participant completed an interview, and in six other cases, just the female partner. Participants often had to travel long distances to the study site, such that it was not always practical for both members of a couple to attend each assessment. In addition, because these benefits were an emergent theme from the initial qualitative analysis of the exit interviews, which broadly characterized participant perspectives on the intervention, both members of a given couple (if both members did in fact complete the interview) did not necessarily comment on the ways in which the intervention improved their relationship, which precluded dyadic analyses. Similarly, we were unable to meaningfully assess difference by gender, given the emergent nature of the relationship and intimacy benefits theme and the small sample sizes. In future studies that assess the efficacy and benefits of HIV prevention strategies for MWH and/or mixed-sex, serodifferent couples who are seeking to conceive, potential relationship and intimacy benefits should be explicitly assessed, and from a dyadic framework if possible. Analyses that assess benefits by gender may also be useful for intervention development and refinement, as the perceived effects of safer conception programs on relationships and intimacy may differ by gender.

In spite of the limitations, these findings suggest several avenues for future research and speak to the importance of addressing the sexual and relationship benefits of safer conception strategies among MWH and their HIV-uninfected partners. The integration of safer conception programing, reproductive planning for individual adults and couples who are interested in conception, and HIV care needs to be tested in large scale effectiveness studies. Widespread scale up of these integrated services will ensure that goals for conception and family planning are safely met. Given that men in Uganda are typically not engaged in formal reproductive planning, it will be important to test the effects of regularly asking men who receive HIV care across multiple district HIV clinics if they are interested in having children. If men report an interest, even a remote interest, integrating explicit discussions about safer conception, with the provision of specific strategies and specific attention paid to possible relationship benefits, into those visits will likely be beneficial at the individual, relational, and community levels. These relationship benefits—stronger dyadic communication, increased joint decision making, increased relational intimacy with reduced fear of relationship dissolution—may be very compelling to MWH. If conveyed by counselors or HIV care providers without judgment, the possibility of attaining these benefits may provide additional motivation to support male engagement in safer conception programming and support for partner uptake of safer conception strategies (including PrEP), ultimately serving the goals of reproduction, HIV prevention, and relationship support.

Author Contributions AMS, LTM, and AK conceptualized the analysis. AMS and AK analyzed the data. MO, EA, EM, HE, and CP helped interpret the results. AMS drafted the paper with guidance from AK. All authors contributed to revisions and have approved the final draft of the manuscript. AK and LTM conceived the primary study, EM conducted the qualitative interviews, AK and LTM oversaw initial coding and analysis, AK supervised writing of the article, and AK provided mentorship on this project.

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Data Availability Not applicable.

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Declarations

Conflict of interest The authors have no relevant financial or non-financial interests to disclose.

Ethical Approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards. The study was approved by Simon Fraser University Research Ethics Board, University of Alabama's Institutional Review Board, Mbarara University of Science and Technology institutional Review Committee and the Uganda National Council for Science and Technology (UNCST).

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