

A Qualitative Systematic Review of Women's Experiences Using Contraceptive Vaginal Rings: Implications for New Technologies

CONTEXT: Vaginal rings are available for contraception and hormone replacement, and are being developed as HIV/STD or multipurpose prevention technologies. A comprehensive understanding of women's expectations of and experiences with rings is urgently needed to inform product development and to optimize ring use.

METHODS: Three databases (PubMed, Global Health and CINAHL) were searched for English-language, peer-reviewed articles published between January 1996 and November 2017 that reported qualitative data on barriers to and facilitators of use of female-controlled contraceptive methods. Data on study methods, findings and conclusions pertaining to contraceptive rings were extracted, organized and analyzed.

RESULTS: Twenty-six articles, all published since 2008, met the inclusion criteria. Seven studies focused largely or entirely on rings (and involved current, former or potential users), while the others focused on other contraceptive methods but included ring-specific data. Familiarity with the ring was low, and women commonly had initial concerns about the method—often related to insertion and removal, cleanliness and discomfort with touching their vagina—that were typically overcome over time. Other major themes were issues related to ring use and discontinuation, the importance of ring-related properties and characteristics, and considerations related to sexual partners and health care providers.

CONCLUSIONS: Qualitative data have the potential to inform ring design and promotion. Future research should further explore women's expectations and experiences with the ring, the value of involving male partners in ring evaluation, and evaluation of interventions to improve patient-provider communication concerning ring choice and use.

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Women are disproportionately affected by negative sexual and reproductive health outcomes, including unintended pregnancy and STDs.¹ It is critically important that women have access to effective and acceptable products that prevent unintended pregnancy and disease. Vaginal rings have the potential to deliver one or multiple drugs into the vaginal environment.^{2,3} Rings are currently available for hormonal contraception^{2,4} and hormone replacement therapy,⁵ and versions that may prevent HIV and other STDs, or that may offer some combination of disease and pregnancy prevention, are currently being developed and investigated.^{3,6} Exploring factors associated with uptake and use of contraceptive rings can inform future efforts to promote currently available rings, and can guide the development of investigational products.

Research suggests that users are generally satisfied with the contraceptive ring, but rates of uptake remain relatively low. Women are more likely to be satisfied with the ring if they find it easy to use, they experience no side effects, they do not feel the ring's presence during sex or in general, and the ring stays in place.⁷ Perceived advantages of the method include high rates of efficacy, menstrual cycle control, a nondaily dosing schedule, relatively low drug doses and high user acceptability; disadvantages include changes in vaginal discharge, involuntary ring expulsions, and

discomfort during insertion or when engaging in sex.^{2,8,9}

In a sample of adolescents, willingness to try the ring was positively associated with such factors as comfort with touching one's genitals, and negatively associated with concerns about the ring falling out of the vagina or getting lost in the body.¹⁰ Despite the generally positive evaluations the ring has received in many studies, data from a national U.S. sample revealed that in 2014, the ring was the most effective method used in the past month for only 2% of female contraceptive users.¹¹

In clinical trials, women have indicated their interest in using rings to prevent disease and their willingness to do so.^{12–14} Results from the phase 3 ASPIRE trial,¹⁵ and its sister trial, The Ring Study,¹⁶ suggest that rings have the potential to prevent HIV transmission. Among women aged 18–45, the investigational dapivirine ring reduced HIV incidence by 27% in the ASPIRE trial's overall sample (and by 37% in an analysis that excluded some sites with lower adherence),¹⁵ and reduced HIV incidence by 31% in The Ring Study's overall sample (and by 37% among participants older than 21).¹⁶ These trials provided proof of concept and were an important step in the development of rings designed to provide dual or multipurpose prevention.

As ring development continues, complementary behavioral science research can provide valuable insight into strategies

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for optimizing ring uptake and long-term use among women who would benefit from single- or multipurpose prevention technologies. Overall, studies show that contraceptive vaginal rings are well-tolerated by and highly acceptable to women.^{17,18} In studies that have compared them to oral contraceptive pills, rings have yielded similar rates of acceptability and higher rates of continuation and adherence.^{9,19–21} In clinical and intervention trials, most women were satisfied with investigational rings (>80%) and were willing to recommend them to a friend (>90%).^{22,23} However, aggregate reports of satisfaction from quantitative surveys may obscure potentially important information that may help explain why high acceptability does not necessarily translate to high rates of uptake and use.

Qualitative approaches are well-suited to understanding complex, in-depth and multifactorial decisions, such as women's choices regarding contraceptive method use. We conducted a systematic review of published qualitative research that identified, characterized and summarized self-reported barriers to and facilitators of female-controlled contraceptive use for the purpose of pregnancy prevention. Here, we present findings related to contraceptive rings to better understand women's experiences and to identify directions for further research and development.

METHODS

Study Design

This systematic review, which was conducted in accordance with a modified version of the PRISMA statement,²⁴ was part of a large-scale review undertaken to evaluate all qualitative research published from January 1996 to November 2017 on self-reported barriers to and facilitators of use of female-controlled contraceptive methods by women who were medically eligible to use contraceptives.²⁵ We searched PubMed, Global Health and CINAHL for English-language, peer-reviewed manuscripts published during the aforementioned time frame; there were no restrictions on study location or participant age. Search terms were chosen on the basis of a preliminary review of published data on contraceptive methods and verified MeSH (medical subject heading) terms. Our search strategy included a combination of contraception terms (compiled using the 20th edition of *Contraceptive Technology*²⁶), qualitative methodology terms (e.g., "interview," "focus group") and terms for women or girls. We included studies that used any qualitative methodology, including interviews, focus groups and mixed-methods approaches, provided that it was possible to extract narrative findings derived from qualitative data collection. If a study included both male and female participants, we included the study only if the results for women could be disaggregated.

We limited our search to manuscripts published in or after 1996, to reflect the publication of the World Health Organization's medical eligibility criteria for contraceptive use;²⁵ these guidelines were intended for policymakers, program managers and the scientific community as a reference in the development of family planning guidance and

methods, and served as an important step forward in contraceptive research and ethics.²⁶

Our initial search yielded 9,932 unique records. The first and second authors divided these records, independently examined the titles and abstracts, and excluded 9,297 references that were not available in English, were not peer-reviewed studies, did not pertain to female-controlled contraception or did not use qualitative methods. The discarded abstracts were reviewed by other members of the research team to ensure that exclusion was appropriate. Full-text review of the remaining 635 articles identified 374 that met our eligibility criteria.

For this analysis, we further restricted eligibility to studies that reported on barriers to or facilitators of ring use, or that reported narrative data on the knowledge and perceptions of ring users or on the perceived advantages and disadvantages of use. Eligible articles had to contain at least one piece of information related specifically to ring use from actual or potential users. These criteria yielded 26 articles that contained data specific to rings. Additional details of the search results can be found in an appendix figure (Supporting Information).

Assessment and Synthesis

We assessed the methodological quality of all included articles using the Critical Appraisal Skills Programme (CASP) quality assessment tool to inform the interpretation of findings.²⁷ Teams of two reviewers independently evaluated study quality across 10 domains: description of study aims; appropriateness of qualitative methodology; study design; recruitment strategy; data collection methods; researcher bias; ethical considerations; rigor of data analysis; clarity of statement of findings; and value of the research. Any differences in reviewers' opinions were resolved through discussion.

The methods, findings and conclusions of the studies were extracted independently by reviewers who organized the information into tables. For 14 of the 26 articles, two reviewers each independently extracted data and then compared their results; any inconsistencies in thematic summaries between reviewers were resolved using an iterative process of discussion until consensus was reached, and a master, combined version of the extracted data was entered in a spreadsheet as the primary data source. Once consistency had been established, data extraction for each of the remaining 12 articles was carried out by one of the two reviewers, who entered the extracted data into the spreadsheet. We then used the master spreadsheet to perform a thematic data-driven analysis by summarizing the findings from different studies under thematic headings, noting major and minor themes, and assessing the breadth of data within those themes. We summarized the main points for each of the themes and organized findings into categories of barriers and facilitators. Because a given factor (e.g., access to contraceptive services) could be perceived as either a barrier (if access is lacking) or a facilitator (if access is good), depending on the context, our classifications

follow those of the original studies' authors, who would be best able to describe the findings in the context of their study population and setting.

RESULTS

Overview

The 26 articles we identified were published between 2008 and 2017 (Table 1),^{28–53} and 16 (62%) were published during the last five years of our search range (2013–2017). Twenty-four articles exclusively reported qualitative data (other than basic descriptive data on the sample's demographic and other characteristics), while one was a mixed-methods study⁴⁷ and another was part of a larger ethnographic study.⁴³ Twenty-three were conducted in the United States, while the other three were conducted in India,⁴⁰ Kenya⁵³ and Australia.⁴³ Most studies had all-female samples, although three also included males^{29,33,35} and two others collected data from couples.^{38,53} One study also included other key informants.³⁴ The number of female participants in qualitative samples ranged from 14 to 212. Study participants were generally between 15 and 51 years old, though Wilson et al. focused on postpartum women who had been aged 13–17 at the time of delivery,³⁴ and Ireland et al. included both women aged 16–33 and an older group of 49–90-year-olds.⁴³ Most studies collected data using either focus groups or individual in-depth interviews, although some used both formats.

The studies—and in particular, their content pertaining to vaginal rings—varied greatly in quality and depth of analysis. Most of the studies met the CASP quality assessment tool criteria for sufficient clarity of aims and findings, as well as for the appropriateness of using qualitative methods to address the research questions. However, 19 of the 26 manuscripts did not provide enough information for us to adequately assess potential researcher bias in elements such as the research question or participant recruitment. Some articles were based on posthoc analyses related to patient–provider interactions.^{49,51} Studies varied in their analytic rigor and in the clarity with which the analytic strategy was described.

The degree to which the analyses centered on vaginal rings also differed. Seven studies focused entirely or substantially on the ring.^{28,30,40,41,45,47,53} All participants were current or former ring users in the U.S. studies by Epstein et al.,²⁸ Guthrie et al.⁴¹ and Rosen et al.⁴⁵ Participants in the observational study by McLellan-Lemal et al. were ring users in Kenya,⁵³ while those in the study conducted in India by Das et al. were nonusers who examined and considered prototype rings.⁴⁰ Although only 6% of the teenagers and young adults in the U.S. study by Raine et al. had used the ring, the study focused not on method use but on opinions of the ring and transdermal patch.³⁰ Similarly, the study by Francis et al. examined women's perceptions of the ring (and other vaginally placed products, such as gels and IUDs), and only one participant had ever used the method.⁴⁷ The remaining studies all examined broader categories of contraceptives, such as nondaily

methods,³⁷ long-acting reversible contraceptives^{42,46,49,52} or contraceptives in general (i.e., both hormonal and nonhormonal methods).^{29,31–36,38,39,43,44,48,50,51} In many of the studies, information about the ring was limited to brief summaries, along with a few illustrative examples and quotes (sometimes only one) pertaining to the method.

Qualitative Themes

•**Initial perceptions of the ring.** Adolescent and young adult users and nonusers alike expressed very similar initial concerns about how to insert and remove the ring, cleanliness (e.g., odor or increased vaginal discharge) and discomfort touching their vagina. Other common concerns were the possibility that the ring might get stuck or lost internally, the sensation of feeling the ring inside the vagina (including during sex), the possibility that the ring might fall out of the vagina, the ring's effectiveness and mechanisms of action, and the method's lack of popularity.^{28,30,35,37,47}

Many studies found that participants' knowledge of the ring was quite limited. Women in Australia, India and Kenya unanimously reported having no knowledge of rings prior to their study participation.^{40,43,53} U.S. research—including two of the earlier studies, both conducted with adults,^{31,32} and a 2017 study with adolescents⁵²—also revealed lack of awareness of the ring, as well as limited knowledge about the method even among those who had heard of it. Sundstrom noted that some young women were unsure how the ring worked and were under the impression that a doctor always inserts it into the vagina.³⁷ Another study reported that young women confused the female condom with the ring, and found the ring confusing in general.³⁵ One young adult in a focus group study believed that the ring is something a woman wears on her finger, like jewelry.³¹ Such lack of knowledge was not limited to adolescents and younger women, as women older than 35 were also largely unfamiliar with the ring.³²

This lack of familiarity may have been related to some of the concerns that study participants expressed. For example, in an exploration of nondaily contraceptive methods, one college-age woman in the United States said that her mother had called the ring “weird” and had expressed the concern that less information was available for the ring than for more established methods like the pill.³⁷ In another study, when asked which contraceptives they would recommend to a friend, teenagers ranked the ring lowest among eight methods.⁵² Although the authors did not explicitly state what led to these ratings, one participant noted that people know very little about the ring and how to use it.

In the Kenyan observational trial of ring use, women aged 18–34 indicated that they were willing to try rings, but expressed concerns related to the cultural meanings behind contraception in general, including low male acceptance of birth control, the perception that birth control might increase female promiscuity and cultural norms that promote having numerous children.⁵³ A group of adult women

TABLE 1. Characteristics of articles included in systematic review of qualitative data related to vaginal rings

Study and location	Qualitative methods used (no. of female participants)	Contraceptive methods studied	Primary eligibility criteria	Age range (mean)	Other sociodemographic characteristics	Main outcome of interest
Epstein et al., ²⁸ 2008, United States	In-depth interviews (N=32)	Ring	Age 15–24, prior ring use, racial/ethnic minority	15–24 (unknown)	28% Latina, 25% Asian/Pacific Islander, 22% black, 25% mixed or other	Ring use experiences among racial and ethnic minority adolescents
Higgins and Hirsch, ²⁹ 2008, United States	In-depth interviews (N=24)	Various	Age ≥18, contraceptive use in past year	19–51 (35)	50% socially advantaged, 50% less socially advantaged	Factors influencing sexual risk reduction
Raine et al., ³⁰ 2009, United States	Focus group discussions (N=113)	Ring, patch, pill	Age 15–26, sexually active	15–26 (unknown)	46% black, 21% Latina, 20% Asian/Pacific Islander, 9% mixed, 4% white	Attitudes and perceptions about the ring and patch
Campo et al., ³¹ 2010, United States	Focus group discussions (N=106)	Various	Age 18–30	18–30 (22)	>90% white	Contraceptive use (to develop intervention)
Godfrey et al., ³² 2011, United States	In-depth interviews (N=17)	Various	Age >35, sexually active, not sterilized	35–49 (unknown)	47% black, 47% white, 6% Latina	Contraceptive attitudes in women with and without unintended pregnancy
Moore et al., ³³ 2011, United States	In-depth interviews (N=10), focus group discussions (N=33)	Various	Age 18–35, women and men, had had heterosexual intercourse	18–35 (unknown)	Mostly Latina and black (exact numbers unknown)	Role of abortion and contraception in preventing pregnancy
Wilson et al., ³⁴ 2011, United States	In-depth interviews (N=21)	Various	Adolescent mother	13–17 (unknown)	38% black, 33% Latina, 29% white	Postpartum contraceptive behavior and attitudes
Carter et al., ³⁵ 2012, United States	Interviews (N=70), focus group discussions (N=142)	Various	Age 18–25, black or Puerto Rican	18–25 (20)	Interviews: 51% female; 53% black, 47% Puerto Rican; focus groups: 55% female; 48% black, 52% Puerto Rican	Sources of contraceptive knowledge and understanding
Dennis and Grossman, ³⁶ 2012, United States	In-depth interviews (N=10), focus group discussions (N=35)	Various	Age 18–45, sexually active, low income	Unknown (unknown)	53% did not have health insurance, 38% had public insurance, 9% had private insurance	How low-income women access contraceptives
Sundstrom, ³⁷ 2012, United States	In-depth interviews (N=18)	Various	College age	18–23 (unknown)	78% white, 11% Asian, 6% black, 6% Latina	Contraceptive perceptions, with focus on nondaily methods
Fennell, ³⁸ 2014, United States	In-depth interviews (N=30)	Various	Not specified	18–30 (unknown)	92% white (mixed males and females)	Contraceptive decision making in couples
Chernick et al., ³⁹ 2015, United States	In-depth interviews (N=14)	Various	Age 14–19, high risk for pregnancy	16–19 (unknown)	93% Latina	Why adolescents do not use contraceptives
Das et al., ⁴⁰ 2015, India	Focus group discussions (N=103)	Ring	Age 18–49, low socioeconomic status	Unknown (unknown)	31% unmarried, 31% married with no children, 30% married with children, 8% married using traditional birth control methods	Hypothetical acceptability of prototype rings
Guthrie et al., ⁴¹ 2015, United States*	Focus group discussions (N=21)	Ring	Age 18–45, ring use in the past 12 months	Unknown (28)	67% white, 14% Asian, 10% black, 5% multiracial, 5% other; 5% also specified Latina	Characteristics users consider with vaginal rings
Higgins et al., ⁴² 2015, United States**	In-depth interviews, focus group discussions (N=50)	Focus on IUD	Age 18–29, university students or locals on public assistance, history of contraceptive use	Unknown (unknown)	Not stated	Whether and how IUD affects sexual experience
Ireland et al., ⁴³ 2015, Australia	Ethnographic, in-depth interviews, focus group discussions (N=31)	Various	Age ≥16, residing in Aboriginal community in Australia	Unknown (unknown)	61% aged 49–90, 39% aged 16–33	Sexual health behavior and knowledge
Melo et al., ⁴⁴ 2015, United States	In-depth interviews (N=21)	Various	Age 14–24, initiating or switching contraceptive method	15–23 (unknown)	41% white, 36% Latina, 14% black, 9% Asian	Influences on contraceptive decision making
Rosen et al., ⁴⁵ 2015, United States*	Focus group discussions (N=50, including 21 ring users)	Ring, gel	Age 18–45, used ring or lubricant in past year, had sex with male in past year	Unknown (28)	67% white, 14% Asian, 10% black, 5% multiracial, 5% other; 5% also specified Latina	Meaning ascribed to ring that may affect future use
Sundstrom et al., ⁴⁶ 2015, United States	In-depth interviews (N=53)	Various	Age 18–24, familiar with LARCs	18–24 (20)	87% white, 9% black, 4% Latina	LARC knowledge and attitudes among college women
Francis et al., ⁴⁷ 2016, United States	In-depth interviews (N=22)	Ring, IUD, gel	Age 14–20, sexually experienced	15–20 (18)	73% Latina, 23% black, 4% white	Perceptions of vaginal health and vaginal products

Table continues

TABLE 1 (continued)

Study and location	Qualitative methods used (no. of female participants)	Contraceptive methods studied	Primary eligibility criteria	Age range (mean)	Other sociodemographic characteristics	Main outcome of interest
Frohwrith et al., ⁴⁸ 2016, United States	In-depth interviews (N=52)	Various	Age 18–30, low to middle income, unmarried, sexually active	52% age 20–25, 48% age 26–30 (unknown)	40% Latina, 35% black, 25% white	Contraceptive use in the past 12 months
Higgins et al., ⁴⁹ 2016, United States**	In-depth interviews, focus group discussions (N=50)	Focus on LARCs	Age 18–29, university students or locals on public assistance, history of contraceptive use	Unknown (unknown)	64% white, 12% Latina, 10% black, 6% Asian, 10% other	Users' attitudes toward and experiences with provider influence and bias regarding LARCs
Downey et al., ⁵⁰ 2017, United States***	In-depth interviews (N=38)	Various	Age 18–24, black or Latina, had vaginal sex in past 3 months	18–24 (22)	53% black, 50% Latina	Contraceptive decision making and perspectives on IUDs
Gomez and Wapman, ⁵¹ 2017, United States***	In-depth interviews (N=27)	Various	Age 18–24, black or Latina, had vaginal sex in past 3 months	18–24 (22)	56% Latina, 48% black, 26% multiracial	Impact of providers on contraceptive decision making
Greenberg et al., ⁵² 2017, United States	Focus group discussions (N=24)	Various	Age 15–19, involved in positive youth-development program	15–19 (unknown)	60% black, 16% white, 20% multiracial, 4% Latina	Contraceptive knowledge and attitudes at outset of LARC intervention
McLellan-Lemal et al., ⁵³ 2017, Kenya	In-depth interviews (N=24)	Ring	3 months of ring use, had a male partner to interview	18–34 (25)	75% Luo, 25% non-Luo	User experience of contraceptive ring

*Guthrie et al.⁴¹ and Rosen et al.⁴⁵ used the same sample. **Higgins et al.⁴² and Higgins et al.⁴⁹ used the same sample. ***Downey et al.⁵⁰ and Gomez and Wapman⁵¹ drew from the same sample. Notes: Percentages may total more than 100% because of rounding or because participants could indicate multiple categories (e.g., Latina and white). LARC=long-acting reversible contraceptive.

in India who were shown ring prototypes did not expect to have problems inserting or removing the ring, had few concerns about the initial (preinsertion) color of the ring and anticipated that the main side effect would be increased vaginal discharge.⁴⁰ However, they did wish to be informed that the ring may change color (e.g., to light brown) after use so they would know to expect this change.⁴⁰

•**Adjustment period.** Adolescent and young adult women in the United States²⁸ and adult women in Kenya⁵³ reported having a 1- to 2-month learning curve following initiation of ring use. Former and current ring users noted that after this adjustment period, removing the ring (to wash it or to have sex) and then reinserting it was easier, and they became more comfortable with these tasks;²⁸ many tried to convince their friends to use the ring, in part because they liked not having to remember to take birth control pills every day.²⁸

In the Kenyan study, some women had some placement issues during the first 1–2 months that led to shifting or expulsion of the ring.⁵³ Generally, initial concerns that the ring would migrate into the body, or cause infections or pain, were assuaged as ring use continued without such events.⁵³ Although these practical concerns diminished with experience, some questions and misconceptions persisted, even after regular use; these concerns tended to be drug-specific, such as whether the ring is effective and whether it reduces future fertility.

•**Ring use and discontinuation.** Many users were satisfied with rings, were continuing to use the method, or both. In the study by Epstein and colleagues, 27 (84%) of the 32 teenagers and young adults who had tried the ring were still using the method.²⁸ The study by Wilson

et al. included two adolescent ring users, one of whom was satisfied with the method. Adult ring users in the Kenyan study liked that the method had minimal side effects and allowed them to limit family size; in addition, they noted that a product would be unlikely to be used by women or be acceptable to male partners if it did not prevent pregnancy as well as HIV.⁵³ Women in India also stated that dual protection (i.e., protection from STDs and pregnancy) would make the ring more acceptable to men. In another study, young adults weighed the pros and cons of the ring against those of other contraceptive methods; they noted that although, for example, periodic insertion and removal of the ring is easier to remember than taking the pill every day, there are tradeoffs in that the ring can have irritating side effects.³⁸ In comparing the ring to the IUD, a young adult in one study said that she preferred the latter because the hormone dose was lower,⁴² while in another study a young woman said that the ring had an advantage over the IUD in that it could be removed without the need to see a doctor.⁵⁰ Some women reported using the ring in combination with other contraceptives, either as backup for methods that they used inconsistently or to gain additional protection against pregnancy.⁴⁸

In Epstein et al.'s sample of 32 current or former ring users, five women (16%) had discontinued the method for one of the following reasons: They could feel the ring during intercourse, they could consistently feel the ring in the vagina, they experienced nausea or they did not like touching their vagina.²⁸ In other studies that included (but were not restricted to) former or current ring users, reasons for discontinuing or planning to discontinue ring use included expulsions,³⁴ too much wetness,²⁹ partner's

physical discomfort during sex,³⁸ pain attributed to ring use³⁴ and inability to afford the insurance copay.³⁶

•**The importance of ring characteristics.** Former ring users in the United States^{41,45} and nonusers in India⁴⁰ examined ring prototypes and were asked to discuss ring characteristics and the meanings associated with them. In the U.S. studies, participants identified the ring's appearance, tactile properties (e.g., texture), material properties (e.g., hardness) and dimensions as characteristics that have implications for a woman's ability to hold or grip the ring for insertion and removal, her comfort once the ring is placed in the vagina and the device's ability to deliver hormones or drugs. Matte and textured surfaces, for example, were viewed as potentially more porous than smooth surfaces, and thus more effective for drug delivery.^{41,45} Rings composed of softer materials with smaller dimensions were considered easier to hold and squeeze for insertion, and potentially more comfortable once placed in the vagina, than were larger rings made of harder materials.^{41,45} Similarly, nonusers in India generally preferred small, thin, monthly rings that provided dual protection from pregnancy and disease.⁴⁰

The 28-day ring use cycle was considered preferable to other cycles by many women in the United States and India, because it tracked with and regulated monthly menstrual bleeding, which some participants perceived as "natural."^{40,45} Women in both countries (users in the United States, nonusers in India) expressed a desire to remove and rinse (or otherwise clean) their rings, particularly after menses. Indian women expressed concerns that the ring would start to break down while in their body, and some noted that they would likely cut the ring prior to disposal, to prevent children from playing with it if they found it.⁴⁰ Women in India also revealed that they might be willing to use larger rings (either larger rod diameter or larger overall ring diameter) for longer periods of time if they were first given the opportunity to use and get comfortable with smaller rings for shorter periods of time.⁴⁰

•**Partner-related concerns, expectations and experiences.** Participant perspectives of partner-related themes were given substantial coverage in 12 of the 26 articles.^{28–30,32,39,40,42,43,47,50,52,53} Four included both male and female participants,^{33,35,38,53} and nearly every article discussed partner-related considerations to some degree, although most partner-related comments were not specifically related to rings. For example, Fennell emphasized the importance of considering the effects of contraceptive methods (including the ring) on users' sexual experience and sexual pleasure, and included data from one participant who had discontinued ring use because of her partner's physical discomfort with the device during sex.³⁸ In other studies, some teenagers and young adults reported wanting to inform their partner that they were using the ring in case he felt it during sex,²⁸ while in India women expressed concern that removing the ring for sex would reduce the device's efficacy.⁴⁰ Most of the ring users in the Epstein et al. study said they could not feel the ring during sex, but

several said that they removed it before having intercourse because of their partner's or their own discomfort.²⁸

Among women in the Kenyan observational study, ring users reported a variety of approaches to informing their partners of ring use. Some were open about their use, either for the sake of openness or because they were concerned that something undesirable might happen (e.g., the partner might notice the ring during sex). Others wanted to test their partner (i.e., to see whether he could feel the ring while they were having sex) and did not tell him about the device until after they had had intercourse, while some told their partner only after he had felt the ring during sex.⁵³ In another study, the option of using the ring without telling a partner was seen as a positive aspect of the method by some teenagers and young adults.³⁰ Potential users in India did not think that their partner would feel the ring, but nonetheless noted that they would prefer to obtain permission from male partners to use the ring, both because of its cost and to avoid conflict.⁴⁰

•**The role of providers.** Some U.S. teenagers reported that providers were either under- or overenthusiastic about the ring, or did not mention the ring as an option at all.³⁹ In a study exploring the implicit bias that many patients perceive from their providers, one young adult reported feeling pressured to have an IUD inserted; she explained that her provider had given her more information about the IUD than about other methods, and had demonstrated a flat affect when speaking about such options as the ring.⁵¹ A young adult in a different U.S. study felt pressured to use the ring because her provider said it was a great method; she anticipated that she would not like it, was proven correct after trying it and discontinued use after one week.⁴⁹

DISCUSSION

The burden of STDs (including HIV) and unintended pregnancy^{54,55} creates an urgent need for methods that provide multipurpose protection. Access to effective and affordable prevention technologies, both those currently available and those being developed, may facilitate protection; however, access is not enough. For example, many unintended pregnancies can be attributed to incorrect use, inconsistent use or nonuse of available contraceptives, or to interruptions in contraceptive coverage during periods of discontinuation or method switching.^{56,57} Whether an individual uses contraceptives is related to a constellation of individual and social factors, such as desire to avoid pregnancy, demographic characteristics (e.g., education, race, age), frequency of sexual intercourse, relationship status and interactions with health care providers.^{58,59} In addition, product-specific factors, such as overall satisfaction with a method,⁵⁸ as well as users' evaluations and perceptions of specific product characteristics,²¹ influence patterns of contraceptive use. To develop and offer effective prevention technologies, we must have an in-depth understanding of these person- and product-related factors.^{58,59} Users must be able and willing to use an accessible method that suits their lifestyle and relationships. We chose to examine

barriers to and facilitators of ring use, in particular, because contraceptive rings are widely available in the developed world,^{2,4} are becoming increasingly available in the developing world and may offer advantages over other contraceptive methods (e.g., less burdensome dosing schedules than the pill^{19,21}). More significantly, with the recent successes of The Ring Study and the ASPIRE trial,^{15,16} vaginal rings are poised to be approved for HIV prevention, as well as to be used as multipurpose prevention technologies that simplify pregnancy and disease prevention by delivering both drugs and contraceptives.

Our results indicate that some women express initial concerns about ring use, but that these concerns can be overcome once individuals commit to using the method and avail themselves of necessary and accurate information. The findings support previous work suggesting that once most users complete an adjustment phase, they are quite satisfied with the method and are highly willing to recommend it to others.^{22,23} This is also consistent with data published in 2016 from an early clinical trial of ring use for HIV prevention, which found that ring-related concerns declined or resolved with use.⁶⁰ Anticipating and addressing women's initial concerns and the inconveniences they may experience are potential intervention strategies for promoting use of and preventing early discontinuation of the ring.

Moreover, our findings underscore the distinction between the demands of trying a method and those of using a method consistently for an extended period of time.⁴¹ In some cases, because of the nature of the method itself, trying a method can be vastly different from using it. For example, comfort with touching one's genitals for product insertion and removal²⁸ may be particularly associated with whether a person is willing to ever try, or even consider trying, the ring, and it may be less associated with sustained use once a participant is willing to at least try using the method. We believe it erroneous to presume that the "try" and "use" experiences are equivalent and driven by similar, overly generalized latent constructs (e.g., ease of use, side effects). Even the small volume of in-depth qualitative data presented here suggests that initial concerns give way to differential use experiences over time. Future qualitative work may further clarify users' decision making and their implementation of those decisions over time.

Examination of prototype rings by contraceptive ring users in the United States^{41,45} and by nonusers in India⁴⁰ yielded in-depth data on perceptions of ring properties, how those properties might interact with the user and her partner, and the meanings that are attributed to ring properties and to sensory perceptions and experiences. Research on HIV prevention microbicides has demonstrated that a user's experiences and sensory perceptions of a vaginal product influence her opinion of product efficacy⁶¹ and her willingness to use that product now and in the future.^{62,63} Increased focus on women's understanding of delivery system characteristics and of the demands of use in relation to their life circumstances can elucidate potential innovations in product design and marketing strategies, as well

as how to address anticipated barriers to use and how to leverage facilitators of use.

Interactions with partners and medical providers were major themes in many of the articles. For some women, ring-specific factors (e.g., concerns about their partner being able to feel the ring during sex) may intersect with issues about contraceptives in general (e.g., concerns that male partners may not approve of contraceptive use and may respond to such use with violence).⁶⁴ This is consistent with other research that has highlighted the importance of male partners in women's contraceptive use.⁶⁵ Using a ring without telling a partner may not be feasible, but women may wish to modulate the messages they convey to partners. For example, some participants noted that it would be easier to gain male acceptance of antimicrobial rings if the devices were actually multipurpose, so that they could focus on pregnancy prevention in their discussions with their partners without having to acknowledge use for HIV/STD prevention.^{40,53} Clinicians, as gatekeepers for many contraceptive methods (including the ring, which is available only by prescription in the United States), may play a crucial role in providing information and support for ring use.⁶⁶ To communicate with patients and share decision making, providers need the time and ability to elicit patients' concerns and expectations, discuss patients' contraceptive preferences and experiences, and strategize about solutions.

Twenty-three of the 26 studies we reviewed were conducted in the United States, which is likely in part a function of both the contraceptive ring market and our review criterion restricting inclusion to articles published in English. In the United States, perceptions of the contraceptive ring must be considered against the backdrop of high-profile reports in the media about potential adverse effects of ring use—in particular, morbidity and mortality related to deep vein thrombosis (DVT)—and lawsuits against the manufacturer.^{67,68} Members of the medical community have acknowledged the risk of adverse effects, but have sought to balance the narrative by noting the elevated risk of DVT associated with other contraceptive methods (e.g., the pill and contraceptive patch), and the even greater risk of DVT associated with pregnancy.⁶⁹ Although DVT risk was not a theme identified in the studies included in our review (perhaps because much of the data was collected prior to the aforementioned media coverage), a study of Canadian ring users who were interviewed in 2015 found that negative media reports were cited as a reason for contraceptive ring discontinuation.⁷⁰ Women's awareness and perceptions of these reports may be worth exploring in future work.

A small number of non-U.S. studies were included in this review. The studies conducted in India⁴⁰ and Australia⁴³ were hypothetical in nature, while the one in Kenya⁵³ was an observational study of ring use. These studies were published relatively recently (2015–2017) and represent a growing effort to evaluate the potential utility of introducing the ring internationally. Although cultural differences may play a role in decision making about the use of rings or contraceptives in general, future research should

investigate whether similarities exist across cultures regarding preferred product characteristics (e.g., preference for smaller, thinner rings in both the United States^{41,45} and India⁴⁰) to inform product development.

Limitations

Limitations of the review and of the papers it included should be noted. Although the literature search was highly sensitive and yielded thousands of references that we examined for potential inclusion, there may be relevant industry-sponsored or other research that was not published in peer-reviewed journals and thus not represented in this review. As noted previously, we also restricted our search to English-language articles, which may have excluded pertinent international studies. Our review was further confined by the limitations of the primary studies, including lack of clarity in methodological reporting and lack of information about meaningful subgroups of participants. Although the articles appeared to meet most of the CASP criteria,²⁷ including having clear statements of study aims and findings, some areas were lacking. For example, the articles contained very little information about how the relationship between the researchers and participants may have influenced the study. We propose that use of a tool such as the CASP guidelines during study planning, execution and dissemination will improve the quality and reporting of qualitative research, increase rigor and reproducibility, and more comprehensively inform the development of new sexual and reproductive health products.

Conclusions

This review of qualitative research contributes to our understanding of how women approach currently available contraceptive rings and offers lessons for investigational anti-HIV and multipurpose prevention rings. Our work contributes to ongoing efforts to integrate in-depth user feedback^{71,72} and to explore product acceptability^{73–78} earlier in the product development and clinical trial pipeline. Preclinical qualitative studies, and basic science studies comparing the characteristics of various ring prototypes, require time and interdisciplinary design efforts, but the richness of the data that emerge has the potential to alter the course of how we approach product design and promotion. In this review, we find the nexus of a problem: the necessity for comprehensive, in-depth understanding of the needs and desires of women as a function of their actual method experience, and the need for the publication of high-quality, rigorous and comprehensive qualitative data. Areas of future research should include, but are not limited to, evaluations of ring expectations (and how they may differ from experience), the inclusion of male partners in ring evaluation, and the implementation and evaluation of interventions to improve patient–provider communication concerning ring choice and use. By better incorporating interdisciplinary methods and by listening to the perspectives of potential users, we can develop contraceptive and

disease prevention options that will fit into the real lives of the women who need them.

REFERENCES

- Centers for Disease Control and Prevention (CDC), 10 ways STDs impact women differently from men, CDC Fact Sheet, Atlanta: CDC, 2011.
- Brache V, Payan LJ and Faundes A, Current status of contraceptive vaginal rings, *Contraception*, 2013, 87(3):264–272, <https://doi.org/10.1016/j.contraception.2012.08.037>.
- Thurman AR et al., Intravaginal rings as delivery systems for microbicides and multipurpose prevention technologies, *International Journal of Women's Health*, 2013, 5:695–708, <https://doi.org/10.2147/IJWH.S34030>.
- Population Council, Population council's one-year contraceptive ring advances to FDA review, news release, New York: Population Council, Jan. 3, 2018, <http://www.popcouncil.org/news/population-councils-one-year-contraceptive-ring-advances-to-fda-review>.
- Sarkar NN, Low-dose intravaginal estradiol delivery using a Silastic vaginal ring for estrogen replacement therapy in postmenopausal women: a review, *European Journal of Contraception & Reproductive Health Care*, 2003, 8(4):217–224, <https://doi.org/10.1080/ejc.8.4.217.224>.
- Kiser PF, Johnson TJ and Clark JT, State of the art in intravaginal ring technology for topical prophylaxis of HIV infection, *AIDS Reviews*, 2012, 14(1):62–77.
- Merkatz RB et al., Acceptability of the Nestorone/ethinyl estradiol contraceptive vaginal ring: development of a model; implications for introduction, *Contraception*, 2014, 90(5):514–521, <https://doi.org/10.1016/j.contraception.2014.05.015>.
- Brache V and Faundes A, Contraceptive vaginal rings: a review, *Contraception*, 2010, 82(5):418–427, <https://doi.org/10.1016/j.contraception.2010.04.012>.
- Roumen FJ, Review of the combined contraceptive vaginal ring, NuvaRing, *Therapeutics and Clinical Risk Management*, 2008, 4(2):441–451, <https://doi.org/10.2147/TCRM.S1964>.
- Terrell LR et al., Acceptability of the vaginal contraceptive ring among adolescent women, *Journal of Pediatric and Adolescent Gynecology*, 2011, 24(4):204–210, <https://doi.org/10.1016/j.jpjag.2011.02.003>.
- Guttmacher Institute, Contraceptive use in the United States, *Fact Sheet*, New York: Guttmacher Institute, 2018, http://www.guttmacher.org/pubs/fb_contr_use.html.
- Montgomery ET et al., Vaginal ring adherence in Sub-Saharan Africa: expulsion, removal, and perfect use, *AIDS and Behavior*, 2012, 16(7):1787–1798, <https://doi.org/10.1007/s10461-012-0248-4>.
- Nel A et al., Safety, acceptability and adherence of dapivirine vaginal ring in a microbicide clinical trial conducted in multiple countries in Sub-Saharan Africa, *PLoS One*, 2016, 11(3):e0147743, <https://doi.org/10.1371/journal.pone.0147743>.
- van der Straten A et al., Adherence and acceptability of a multidrug vaginal ring for HIV prevention in a phase I study in the United States, *AIDS and Behavior*, 2016, 20(11):2644–2653, <https://doi.org/10.1007/s10461-016-1299-8>.
- Baeten JM et al., Use of a vaginal ring containing dapivirine for HIV-1 prevention in women, *New England Journal of Medicine*, 2016, 375(22):2121–2132, <https://doi.org/10.1056/NEJMoa1506110>.
- Nel A et al., Safety and efficacy of a dapivirine vaginal ring for HIV prevention in women, *New England Journal of Medicine*, 2016, 375(22):2133–2143, <https://doi.org/10.1056/NEJMoa1602046>.
- Soni A et al., Efficacy, user acceptability, tolerability, and cycle control of a combined contraceptive vaginal ring: the Indian perspective,

- Journal of Obstetrics and Gynaecology of India*, 2013, 63(5):337–341, <https://doi.org/10.1007/s13224-013-0391-5>.
18. Wieder DR and Pattimakiel L, Examining the efficacy, safety, and patient acceptability of the combined contraceptive vaginal ring (NuvaRing), *International Journal of Women's Health*, 2010, 2:401–409, <https://doi.org/10.2147/IJWH.S6162>.
 19. Gilliam ML et al., Adherence and acceptability of the contraceptive ring compared with the pill among students: a randomized controlled trial, *Obstetrics & Gynecology*, 2010, 115(3):503–510, <https://doi.org/10.1097/AOG.0b013e3181cf45dc>.
 20. Roumen FJ and Mishell DR, Jr., The contraceptive vaginal ring, NuvaRing, a decade after its introduction, *European Journal of Contraception & Reproductive Health Care*, 2012, 17(6):415–427, <https://doi.org/10.3109/13625187.2012.713535>.
 21. Schafer JE et al., Acceptability and satisfaction using Quick Start with the contraceptive vaginal ring versus an oral contraceptive, *Contraception*, 2006, 73(5):488–492, <https://doi.org/10.1016/j.contraception.2005.11.003>.
 22. Dieben TO, Roumen FJ and Apter D, Efficacy, cycle control, and user acceptability of a novel combined contraceptive vaginal ring, *Obstetrics & Gynecology*, 2002, 100(3):585–593.
 23. Pandit SN et al., Multicenter study of contraceptive vaginal ring (NuvaRing) in normal daily practice in Indian women, *Journal of Obstetrics and Gynaecology of India*, 2014, 64(6):409–416, <https://doi.org/10.1007/s13224-014-0559-7>.
 24. Moher D et al., Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement, *PLoS Medicine*, 2009, 6(7):e1000097, <https://doi.org/10.1371/journal.pmed.1000097>.
 25. Gaffield ML and Kiarie J, WHO medical eligibility criteria update, *Contraception*, 2016, 94(3):193–194, <https://doi.org/10.1016/j.contraception.2016.07.001>.
 26. Hatcher RA et al., *Contraceptive Technology*, 20th ed., New York: Ardent Media, 2011.
 27. Critical Appraisal Skills Programme, CASP checklists, 2018, <https://casp-uk.net/wp-content/uploads/2018/01/CASP-Qualitative-Checklist-2018.pdf>.
 28. Epstein LB et al., Adolescent experiences with the vaginal ring, *Journal of Adolescent Health*, 2008, 43(1):64–70, <https://doi.org/10.1016/j.jadohealth.2007.12.007>.
 29. Higgins JA and Hirsch JS, Pleasure, power, and inequality: incorporating sexuality into research on contraceptive use, *American Journal of Public Health*, 2008, 98(10):1803–1813, <https://doi.org/10.2105/AJPH.2007.115790>.
 30. Raine TR et al., Attitudes toward the vaginal ring and transdermal patch among adolescents and young women, *Journal of Adolescent Health*, 2009, 45(3):262–267, <https://doi.org/10.1016/j.jadohealth.2009.02.007>.
 31. Campo S et al., Preventing unintended pregnancies and improving contraceptive use among young adult women in a rural, Midwestern state: health promotion implications, *Women & Health*, 2010, 50(3):279–296, <https://doi.org/10.1080/03630242.2010.480909>.
 32. Godfrey EM et al., Contraceptive methods and use by women aged 35 and over: a qualitative study of perspectives, *BMC Women's Health*, 2011, 11:5, <https://doi.org/10.1186/1472-6874-11-5>.
 33. Moore AM, Singh S and Bankole A, Do women and men consider abortion as an alternative to contraception in the United States? An exploratory study, *Global Public Health*, 2011, 6(Suppl. 1):S25–S37, <https://doi.org/10.1080/17441692.2011.568948>.
 34. Wilson EK et al., Adolescent mothers' postpartum contraceptive use: a qualitative study, *Perspectives on Sexual and Reproductive Health*, 2011, 43(4):230–237, <https://doi.org/10.1363/4323011>.
 35. Carter MW et al., A qualitative study of contraceptive understanding among young adults, *Contraception*, 2012, 86(5):543–550, <https://doi.org/10.1016/j.contraception.2012.02.017>.
 36. Dennis A and Grossman D, Barriers to contraception and interest in over-the-counter access among low-income women: a qualitative study, *Perspectives on Sexual and Reproductive Health*, 2012, 44(2):84–91, <https://doi.org/10.1363/4408412>.
 37. Sundstrom B, Fifty years on "the pill": a qualitative analysis of non-daily contraceptive options, *Contraception*, 2012, 86(1):4–11, <https://doi.org/10.1016/j.contraception.2011.10.016>.
 38. Fennell J, "And isn't that the point?": pleasure and contraceptive decisions, *Contraception*, 2014, 89(4):264–270, <https://doi.org/10.1016/j.contraception.2013.11.012>.
 39. Chernick LS et al., Barriers to and enablers of contraceptive use among adolescent females and their interest in an emergency department-based intervention, *Contraception*, 2015, 91(3):217–225, <https://doi.org/10.1016/j.contraception.2014.12.003>.
 40. Das U et al., Exploring vaginal ring acceptability for contraception and sexually transmissible infection protection in India: a qualitative research study, *Sexual Health*, 2015, 12(6):532–540, <https://doi.org/10.1071/SH15045>.
 41. Guthrie KM et al., The promise of intravaginal rings for prevention: user perceptions of biomechanical properties and implications for prevention product development, *PLoS One*, 2015, 10(12):e0145642, <https://doi.org/10.1371/journal.pone.0145642>.
 42. Higgins JA et al., The sexual acceptability of intrauterine contraception: a qualitative study of young adult women, *Perspectives on Sexual and Reproductive Health*, 2015, 47(3):115–122, <https://doi.org/10.1363/47e4515>.
 43. Ireland S et al., 'Jumping around': exploring young women's behaviour and knowledge in relation to sexual health in a remote Aboriginal Australian community, *Culture, Health & Sexuality*, 2015, 17(1):1–16, <https://doi.org/10.1080/13691058.2014.937747>.
 44. Melo J et al., Adolescent and young women's contraceptive decision-making processes: choosing "the best method for her," *Journal of Pediatric and Adolescent Gynecology*, 2015, 28(4):224–228, <https://doi.org/10.1016/j.jpag.2014.08.001>.
 45. Rosen RK et al., Meaning-making matters in product design: users' sensory perceptions and experience evaluations of long-acting vaginal gels and intravaginal rings, *Contraception*, 2015, 92(6):596–601, <https://doi.org/10.1016/j.contraception.2015.08.007>.
 46. Sundstrom B, Baker-Whitcomb A and DeMaria AL, A qualitative analysis of long-acting reversible contraception, *Maternal and Child Health Journal*, 2015, 19(7):1507–1514, <https://doi.org/10.1007/s10995-014-1655-0>.
 47. Francis JKR et al., Qualitative analysis of sexually experienced female adolescents: attitudes about vaginal health, *Journal of Pediatric and Adolescent Gynecology*, 2016, 29(5):496–500, <https://doi.org/10.1016/j.jpag.2016.04.003>.
 48. Frohwirth L et al., The complexity of multiple contraceptive method use and the anxiety that informs it: implications for theory and practice, *Archives of Sexual Behavior*, 2016, 45(8):2123–2135, <https://doi.org/10.1007/s10508-016-0706-6>.
 49. Higgins JA, Kramer RD and Ryder KM, Provider bias in long-acting reversible contraception (LARC) promotion and removal: perceptions of young adult women, *American Journal of Public Health*, 2016, 106(11):1932–1937, <https://doi.org/10.2105/AJPH.2016.303393>.
 50. Downey MM et al., More than a destination: contraceptive decision making as a journey, *Women's Health Issues*, 2017, 27(5):539–545, <https://doi.org/10.1016/j.whi.2017.03.004>.
 51. Gomez AM and Wapman M, Under (implicit) pressure: young black and Latina women's perceptions of contraceptive care,

- Contraception*, 2017, 96(4):221–226, <https://doi.org/10.1016/j.contraception.2017.07.007>.
52. Greenberg KB et al., A snapshot of urban adolescent women's contraceptive knowledge at the onset of a community long-acting reversible contraceptive promotion initiative, *Journal of Pediatric and Adolescent Gynecology*, 2017, 30(4):474–478, <https://doi.org/10.1016/j.jpag.2017.01.003>.
 53. McLellan-Lemal E et al., Contraceptive vaginal ring experiences among women and men in Kisumu, Kenya: a qualitative study, *Frontiers in Women's Health*, 2017, 2(1):1–7.
 54. Gipson JD, Koenig MA and Hindin MJ, The effects of unintended pregnancy on infant, child, and parental health: a review of the literature, *Studies in Family Planning*, 2008, 39(1):18–38, <https://doi.org/10.1111/j.1728-4465.2008.00148.x>.
 55. McElligott KA, Mortality from sexually transmitted diseases in reproductive-aged women: United States, 1999–2010, *American Journal of Public Health*, 2014, 104(8):e101–e105, <https://doi.org/10.2105/AJPH.2014.302044>.
 56. Jain AK et al., Contribution of contraceptive discontinuation to unintended births in 36 developing countries, *Studies in Family Planning*, 2017, 48(3):269–278, <https://doi.org/10.1111/sifp.12023>.
 57. Reeves MF et al., Risk of unintended pregnancy based on intended compared to actual contraceptive use, *American Journal of Obstetrics & Gynecology*, 2016, 215(1):71.e1–71.e6, <https://doi.org/10.1016/j.ajog.2016.01.162>.
 58. Frost JJ and Darroch JE, Factors associated with contraceptive choice and inconsistent method use, United States, 2004, *Perspectives on Sexual and Reproductive Health*, 2008, 40(2):94–104, <https://doi.org/10.1363/4009408>.
 59. Wellings K et al., Stopping and switching contraceptive methods: findings from Contessa, a prospective longitudinal study of women of reproductive age in England, *Contraception*, 2015, 91(1):57–66, <https://doi.org/10.1016/j.contraception.2014.09.008>.
 60. van der Straten A et al., Adherence and acceptability of a multidrug vaginal ring for HIV prevention in a phase I study in the United States, *AIDS and Behavior*, 2016, 20(11):2644–2653, <https://doi.org/10.1007/s10461-016-1299-8>.
 61. Morrow KM et al., User-identified gel characteristics: a qualitative exploration of perceived product efficacy of topical vaginal microbicides, *Archives of Sexual Behavior*, 2014, 43(7):1459–1467, <https://doi.org/10.1007/s10508-013-0235-5>.
 62. Morrow KM et al., Designing preclinical perceptibility measures to evaluate topical vaginal gel formulations: relating user sensory perceptions and experiences to formulation properties, *AIDS Research and Human Retroviruses*, 2014, 30(1):78–91, <https://doi.org/10.1089/aid.2013.0099>.
 63. Guthrie KM et al., Perceptibility and the “choice experience”: user sensory perceptions and experiences inform vaginal prevention product design, *AIDS Research and Human Retroviruses*, 2016, 32(10–11):1022–1030, <https://doi.org/10.1089/aid.2015.0275>.
 64. Baird K et al., Intimate partner violence and pregnancy intentions: a qualitative study, *Journal of Clinical Nursing*, 2017, 26(15–16):2399–2408, <https://doi.org/10.1111/jocn.13394>.
 65. Blackstone SR and Iwelunmor J, Determinants of contraceptive use among Nigerian couples: evidence from the 2013 Demographic and Health Survey, *Contraception and Reproductive Medicine*, 2017, 2:9, <https://doi.org/10.1186/s40834-017-0037-6>.
 66. Hoopes AJ et al., Adolescent perspectives on patient–provider sexual health communication: a qualitative study, *Journal of Primary Care & Community Health*, 2017, 8(4):332–337, <https://doi.org/10.1177/2150131917730210>.
 67. Karlsson J and Brenner M, Danger in the ring, *Vanity Fair*, Jan. 2014, <https://www.vanityfair.com/news/politics/2014/01/nuvaring-lethal-contraceptive-trial>.
 68. Langhart K, NuvaRing caused my daughter's death: Like so many women, she had no idea of the risks, *Guardian*, June 22, 2015, <https://www.theguardian.com/commentisfree/2015/jun/22/nuvaring-merck-daughter-death-women-risks>.
 69. Gueren C, Is the NuvaRing ACTUALLY going to kill you? A look at the evidence, *Women's Health*, Dec. 11, 2013, <https://www.women'shealthmag.com/health/a19930636/nuvaring/>.
 70. LaRoche KJ et al., Put a ring in it: exploring women's experiences with the contraceptive vaginal ring in Ontario, *Women's Health Issues*, 2018, 28(5):415–420, <https://doi.org/10.1016/j.whi.2018.04.009>.
 71. Laborde ND et al., Impact of the dapivirine ring on sexual experiences and intimate partnerships of women in an HIV prevention clinical trial: managing ring detection and hot sex, *AIDS and Behavior*, 2018, 22(2):437–446, <https://doi.org/10.1007/s10461-017-1977-1>.
 72. Montgomery ET et al., Reasons for nonadherence to the dapivirine vaginal ring: narrative explanations of objective drug-level results, *AIDS*, 2018, 32(11):1517–1525, <https://doi.org/10.1097/QAD.0000000000001868>.
 73. Devlin B et al., Development of dapivirine vaginal ring for HIV prevention, *Antiviral Research*, 2013, 100(Suppl.):S3–S8, <https://doi.org/10.1016/j.antiviral.2013.09.025>.
 74. Guthrie KM et al., User evaluations offer promise for pod-intravaginal ring as a drug delivery platform: a mixed methods study of acceptability and use experiences, *PLoS One*, 2018, 13(5):e0197269, <https://doi.org/10.1371/journal.pone.0197269>.
 75. Plagianos M et al., End-user opinions about the future of HIV prevention: results from a global internet survey about multipurpose preventions technologies (MPTs), poster presented at the 2018 HIV Research for Prevention meeting, Madrid, Spain, Oct. 22–25, 2018.
 76. Smith DJ et al., An evaluation of intravaginal rings as a potential HIV prevention device in urban Kenya: behaviors and attitudes that might influence uptake within a high-risk population, *Journal of Women's Health*, 2008, 17(6):1025–1034, <https://doi.org/10.1089/jwh.2007.0529>.
 77. van der Straten A et al., The Tablets, Ring, Injections as Options (TRIO) study: what young African women chose and used for future HIV and pregnancy prevention, *Journal of the International AIDS Society*, 2018, 21(3):e25094, <https://doi.org/10.1002/jia2.25094>.
 78. van der Straten A et al., High acceptability of a vaginal ring intended as a microbicide delivery method for HIV prevention in African women, *AIDS and Behavior*, 2012, 16(7):1775–1786, <https://doi.org/10.1007/s10461-012-0215-0>.

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RESUMEN

Contexto: Los anillos vaginales están disponibles para la anticoncepción y el reemplazo hormonal, y se están desarrollando como tecnologías de prevención del VIH/ETS o de propósitos múltiples. Se necesita con urgencia una comprensión integral de las expectativas y experiencias de las mujeres con los anillos para fundamentar el desarrollo del producto y optimizar el uso del anillo.

Métodos: Entre enero de 1996 y noviembre de 2017, se realizaron búsquedas en tres bases de datos (PubMed, Global Health y CINAHL) sobre artículos en idioma inglés sometidos a revisión por pares, que aportaron datos cualitativos sobre barreras y facilitadores del uso de métodos anticonceptivos controlados por mujeres. Los datos sobre los métodos de estudio, hallazgos y conclusiones relacionados con los anillos anticonceptivos se extrajeron, organizaron y analizaron.

Resultados: Veintiséis artículos, todos publicados desde 2008, cumplieron con los criterios de inclusión en el análisis. Siete estudios se centraron en gran medida o completamente en los anillos (e involucraron usuarias actuales, anteriores o potenciales), mientras que los otros estudios se centraron en otros métodos anticonceptivos, pero incluyeron datos específicos sobre el anillo. La familiaridad con el anillo era baja y las mujeres generalmente expresaron preocupaciones iniciales sobre el método —muchas veces en relación con la inserción y extracción, la limpieza y la incomodidad al tocar su vagina— que típicamente se superaban con el tiempo. Otros temas importantes fueron aspectos relacionados con el uso y la interrupción del uso del anillo, la importancia de las propiedades y características relacionadas con el anillo y consideraciones relacionadas con parejas sexuales y proveedores de servicios médicos.

Conclusión: Los datos cualitativos tienen potencial para fundamentar el diseño y la promoción de los anillos vaginales. Las investigaciones futuras deben explorar más a fondo las expectativas y experiencias de las mujeres con respecto al anillo, el valor de involucrar a los compañeros masculinos en la evaluación del anillo y la evaluación de las intervenciones para mejorar la comunicación entre paciente y proveedor con respecto a la elección y el uso del anillo.

RÉSUMÉ

Contexte: L'anneau vaginal, déjà proposé à des fins de contraception et de traitement hormonal de substitution, fait aujourd'hui l'objet d'une mise au point parmi les technologies de prévention du VIH/sida ou polyvalente. Il est impératif de bien comprendre les attentes et le vécu des utilisatrices pour éclairer la mise au point du produit et en optimiser l'usage.

Méthodes: Trois bases de données (PubMed, Global Health et CINAHL) ont été consultées à la recherche d'articles en langue anglaise évalués par les pairs et publiés entre janvier 1996 et novembre 2017, faisant état de données qualitatives sur les obstacles et les facteurs propices à l'usage des méthodes contraceptives contrôlées par les femmes. Les données relatives aux méthodes d'étude, aux observations et aux conclusions pertinentes à l'anneau contraceptif en ont été extraites, puis organisées et analysées.

Résultats: Vingt-six articles publiés, tous depuis 2008, ont répondu aux critères d'inclusion. Sept études concernaient largement ou exclusivement l'anneau (avec participation des utilisatrices actuelles, passées ou potentielles); les autres examinaient d'autres méthodes contraceptives mais présentaient des données spécifiques à l'anneau. L'anneau n'était guère familier aux femmes, dont les préoccupations initiales à l'égard de la méthode — souvent liées aux questions d'insertion et de retrait, d'hygiène et de gêne au contact du vagin — se dissipaient toutefois au fil du temps. Les autres grands thèmes touchaient à l'utilisation de l'anneau et à l'arrêt de la méthode, à l'importance de ses propriétés et caractéristiques et à des considérations relatives aux partenaires sexuels et aux prestataires de soins de santé.

Conclusion: Les données qualitatives offrent un potentiel utile à la conception et à la promotion de l'anneau. La recherche future devra examiner davantage les attentes et le vécu des femmes à son égard, l'importance de la participation des partenaires masculins à son évaluation et l'évaluation des interventions entreprises pour améliorer la communication entre patientes et prestataires quant au choix et à l'utilisation de la méthode.

APPENDIX FIGURE. Flowchart depicting number of studies reviewed, included and excluded during systematic review

