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What qualities of long-acting reversible contraception do women perceive as desirable or undesirable? A Systematic review

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Abstract

Background

Little research examining qualities of contraception which make them attractive or unattractive to users, particularly young women, exists. We aimed to systemically review the evidence regarding desirable and undesirable qualities of long-acting reversible contraception (LARC), including IUDs, Implants and Injections, as perceived by women.

Methods

The electronic databases Medline, Sociological Abstracts, PsycInfo, CINAHL and Embase were searched in May 2015 using terms related to LARC and method preference or decision making. Studies were included if they concerned women aged 18-23 years from developed countries and reported on perceived positive or negative qualities of LARC.

Results

30 articles were deemed relevant, of which 18 were quantitative and 9 were qualitative. Five key themes emerged under which all qualities could be categorised. These included: impact on bleeding; impact on body; device specific characteristics; general characteristics; and perceptions and misbeliefs. Fit and forget, high efficacy and long term protection were considered the top desirable qualities of LARC. Undesirable qualities varied among the LARC methods, however irregular bleeding, painful insertion and removal procedure, weight gain and location in the body were among those most commonly reported.

Conclusion

The contraceptive benefits of LARC, including their high efficacy and longevity, are generally considered to be positive qualities by women, while the potential impact of side effects on the body are considered as negative qualities. This information is crucial in the clinical setting as it provides practitioners with a greater understanding of the qualities women do and do not like about LARC methods. Discussion about these qualities, positive and negative, during consultations about contraception may increase rates of uptake.

Additional keywords

Contraception, women

Introduction

Unintended pregnancy continues to be a significant, but preventable public health issue among developed countries. Estimates suggest that half of all pregnancies are considered mistimed or unwanted at the time of conception in Australia (1) and the United States of America (USA) (2), while in France the rate is approximately one in three (33%) (3), and in Britain, approximately one in six (16.2%) (4). Importantly, research has demonstrated that unintended pregnancies do not always occur in the absence of contraception, with half of women reporting an unintended pregnancy indicating use of some form of contraception in the month prior to unintended conception (5). These figures highlight the diminished effectiveness of contraceptive methods which require regular and consistent action by the user, such as the oral contraceptive pill (hereafter the pill). Despite diminished effectiveness when not used perfectly, the pill is the most popular method among reproductive aged women in Australia (6), the USA, France and the United Kingdom (7). Rates of pill use are particularly high among young women (6), who are at greater risk of experiencing an unintended pregnancy (2).

Long-acting reversible contraception (LARC) has been proposed as one way to reduce rates of unintended pregnancy. LARC methods are those which require action by the user less than once per cycle or month and include intrauterine devices (IUD), implants and contraceptive injections. As LARC do not require regular action, rates of effectiveness are generally higher during typical use than their less effective counterparts (8). Despite guidelines promoting LARC as an effective contraceptive method suitable for all women during their reproductive life course (9-11), rates of LARC uptake among women using contraception remain much lower than other less effective methods in Australia (12), France (13) and the USA (14). Particularly, the method of contraception used has been found to be age dependent, with younger women (less than 30 years old) more likely to use the pill or condoms over more effective LARC methods (6).

Given that LARC has been proposed as one solution to reducing rates of unintended pregnancy, but that these methods are underutilised by women, it is essential to investigate why uptake remains low. An important part of this exploration is developing a greater understanding of what qualities of LARC act as an incentive or disincentive to use these methods, about which we currently know little. While research from the USA suggests that a high level of effectiveness, a lack of regular user action, and the longevity of long acting methods are all potential incentives for use (15), discontinuation due to unacceptable bleeding patterns has also been noted (16-19). Bleeding changes are a clear disincentive for some women. In the clinical context, understanding the qualities of LARC which women perceive as desirable or undesirable may facilitate conversations about which contraceptive methods are most able to meet the needs of the individual.

Hence, the aim of this review was to identify the desirable and undesirable qualities of LARC as perceived by women, regardless of whether they had actually used a LARC or not. We were particularly interested in young women (aged 18-23), due to their greater incidence of unintended pregnancy (2), and lower use of LARC as compared to older women (12). For the purpose of this review, we considered LARC to be an IUD (hormonal and copper), the Implant, and the Injection.

Methods

A systematic review utilising the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement (20) was undertaken to meet the aims of the study.

Eligibility Criteria

Insert Table 1 about here

Detailed inclusion and exclusion criteria are shown in Table 1. Studies were considered for inclusion if they focused on women and their sample included female participants aged 18-23 years. Studies which focused on developed countries (Australia, United States of America, New Zealand, Japan, Canada or Western Europe) were included, as our aim was to compare findings from similar sociocultural backgrounds, rather than dissimilar backgrounds. Included studies also had to report on the perceived desirable or undesirable characteristics of at least one LARC as deemed by the participants, regardless of whether the participants had actually used a LARC or not. Although studies were excluded if they focussed on a subset of contraceptive using women (for example, women with cancer), studies using a post-abortion sample were included as this was considered a significant reproductive event and thus potential catalyst for changing contraceptive use. Literature reviews and opinion pieces were also excluded, although these were hand searched.

While some LARC methods have been available for decades, the advent of implants and hormonal IUDs are relatively recent (21). To encompass recent developments in LARC types and availability, studies were included if they were published within the last 10 years (i.e. from 2005 onwards). The grey literature was not consulted. For the purpose of this review, we considered LARC to be an IUD (hormonal and copper), the Implant, and the Injection.

Information sources

The databases searched were Medline, Sociological Abstracts, PsycInfo, CINAHL and Embase. All databases were searched during May 2015 by the first author (JC).

Search strategy

Search terms used included the names and/or brand name of each LARC method, as well as terms relating to experiences with, or attitudes towards these methods. Search terms were entered according to the requirements of each database (see Supplementary Table for

the search terms used in each database). Limits included English language, women and age range (adolescent, young adult, adult).

Study selection

All articles were downloaded into Endnote, and duplicates were removed. Articles were screened for eligibility based on their title by the first author (JC) and sorted accordingly. Abstracts were then screened by two reviewers (JC and MH) and any disagreements resolved by discussion. Full text articles were then retrieved for the remaining articles, screened by two reviewers (JC and MH) and non-relevant studies excluded. Any disagreements were again resolved by discussion and consensus was reached.

Data items

Data for each study were extracted by the first author (JC). First author, year of publication, study design and country of focus, objectives, participant characteristics (including total number of participants, age range and mean where reported), the LARC of interest, findings and limitations were extracted from each study and placed in a table (see Table 2). Perceived positive and negative qualities were also extracted from each article and placed in a separate table (Table 3), categorised by method (Injection, IUD Hormonal, IUD Copper and Implant) and quality reported. Each quality was then organised by an overarching theme driven by the qualities extracted. Additionally, all qualities reported were tallied for each method and ranked by top negative and top positive qualities reported (Table 4).

Results

Study selection

Of the 743 articles identified, a total of 30 were deemed relevant to the aims of this review (see Figure 1). Articles were excluded systematically at each stage of the process if they did not meet the aforementioned inclusion criteria.

Insert Figure 1 about here

Study characteristics

The majority of studies were conducted in the United States of America (USA), followed by the United Kingdom (UK) and Australia. Eighteen studies utilised a quantitative methodology, which was usually in the form of a questionnaire or survey. Nine studies used qualitative methods, generally semi-structured interviews. Two studies were mixed methods. Most of the studies reported on perceptions of, or side-effects experienced with an IUD, with 25 of the 30 studies focussing on the Hormonal IUD alone or in combination with another method, and 20 studies reporting on the Copper IUD either alone or in combination with another method. Sixteen studies focused on the Implant either alone or in combination with another method and only 6 studies reported on the Injection either alone or in combination with another method. Only four studies reported on all four LARC

methods. No studies reported on the specific age range of interest (18-23), however six focussed on young women (combined age range 14-25). While 15 studies stratified their respondents by age group, this was generally just to illustrate demographic characteristics and results were not reported by age group. Most studies recruited their participants via a clinical setting (N = 20), including sexual health and family planning clinics. Bar one, study participants were all either LARC users (N = 12), or a mixture of LARC and non-LARC users (N = 17). Sample sizes ranged from 20 participants in one qualitative study to 5000 participants in one quantitative study. Detailed characteristics for each study are shown in Table 2.

Insert Table 2 about here

Reported perceived positive and negative qualities of LARC

Overall, the studies reported a multiplicity of perceptions about, or experiences with LARC, both positive and negative. Negative qualities were more often reported than positive; 20 studies reported more negative qualities, while only two studies reported more positive qualities than negative. Eight studies were balanced in their reporting of qualities. Five overarching categories were developed based on the qualities reported. These categories were the impact on bleeding, which included any quality that referred to changing bleeding patterns as a consequence of LARC use; impact on the body, which included any quality which referred to perceived side effects on bodily function as a consequence of LARC use; device specific characteristics, which encompassed any quality that was specific to the individual LARC method; general characteristics, that included any quality that referred to the general characteristics of LARC and other hormonal methods; and perceptions and misbeliefs which referred to any quality which was a perception or misbelief about a LARC. Overall, there were no significant variations between the qualities reported by the studies who only recruited LARC users versus studies with mixed LARC and non-LARC users, apart from the tendency for LARC user only studies to report the physical side effects of use, such as heavier bleeding or weight gain, over perceptions or characteristics of the methods. See Table 3 for the full overview of the perceived positive and negative qualities of each LARC.

Insert Table 3 about here

In addition to exploring the full spectrum of perceived positive and negative qualities reported across all four methods, we also tallied the top positive and negative qualities to identify their prevalence. By doing so, we were able to compare each individual method and observe the emerging patterns. High efficacy, long term protection and “fit and forget” were the top positive qualities across the four methods. The top negative qualities varied among the methods, however weight gain, pain, cramping, irregular bleeding and moodiness were among those reported. See Table 4 for the top ranked perceived positive and negative qualities reported for each LARC method.

Insert Table 4 about here

Discussion

Overall, this review identified a multiplicity of reasons women do and do not like LARC, and these varied among women. On the whole, the articles reviewed reported ease of use, fit and forget, and high efficacy as positive qualities of LARC. Additionally, lighter bleeding and no interference with sex were also considered positive qualities of all four methods. Comparatively, negative qualities were mostly around perceived side-effects of LARC, with depression, moodiness and weight gain considered as negative characteristics of all methods.

Recent research has demonstrated the role in which ‘desired’ and ‘undesired’ side effects play in the decision to use, or not to use specific contraceptive methods (22, 23). Our review identified high efficacy, a lack of regular user action, and longevity as desired qualities of LARC while weight gain and mood changes, among others, were considered undesired. This is consistent with previous literature which have demonstrated that a ‘loss of bodily control’ as a consequence of these undesired side effects contributes to dissatisfaction and discontinuation of LARC, and that these negative experiences discourage women from using other LARC methods in the future (24). In addition, it has been shown that women are prepared to change or stick with a method that meets their specific desires (22-24).

Interestingly, our study also identified a number of qualities of LARC that some studies reported as positive and others as negative. These mixed perceptions were particularly prevalent around qualities regarding device specific characteristics, including the longevity of the devices, and impact on bleeding, highlighting the important influence of personal preferences on contraceptive choice. Indeed studies have demonstrated that bleeding pattern preferences in regards to hormonal methods of contraception vary among women, and that these desires can influence what methods women choose to use (25). Our review identified that while lighter bleeding was generally considered positive, and heavier or irregular bleeding negative, amenorrhea received mixed perceptions. Additionally, this finding sheds light on reasons why women may choose or continue a LARC method for its impact on bleeding patterns, rather than why they may discontinue. A large majority of studies focus on reasons for discontinuation, which is usually a result of heavier or irregular bleeding, and this is often reported in a way which obscures the potentially positive aspect of less bleeding.

Another positive quality identified for all four LARC methods was their lack of interference with sex for the user. The relationship between sexual pleasure and contraceptive use has been noted (26), although there is little research which explores this link. We do know, however, that women are more likely to continue using a contraceptive method if it does not hinder sexual pleasure (27, 28). More recently, a study conducted in

the USA found that a lack of interference with sexual pleasure was considered a positive quality of IUDs (15). Considering these findings, future research investigating LARC use could benefit from exploring this relationship further, particularly if it provides valuable insight into a previously under explored motivator for LARC use.

Specifically regarding young women, our review identified a prevailing misperception that LARC methods are not suitable for this group. One study identified the perception that the duration of the Implant was too long for young women, while IUDs were considered suitable only for women with children (29). The unsuitability of LARC, particularly IUDs, for young, nulliparous women was also echoed by a number of the reviewed studies (for example (30-33)). Further misperceptions regarding the use of LARC were also reported, including the notion that LARC use negatively impacts future fertility. For example, three quarters of the sample in the study conducted by Bracken et al (34) reported potential negative impact on future fertility as a disincentive towards LARC use. Perceptions of poor efficacy, concerns about increased risk of ectopic pregnancy and infection, as well as general concerns about safety were also reported (for example (35-37)).

Together, the above findings suggest that a lack of accurate knowledge about LARC, including their mechanism of action, their potential side effects, and their suitability for young women, continues to preclude women from choosing these methods. Research has shown that providing women with balanced information about all of their contraceptive choices, including the positive and negative qualities of each, can have a significant impact on LARC uptake (38). This in turn can have a positive impact on the rates of unintended pregnancy and abortion (38). Indeed, the American College of Obstetricians and Gynaecologists recently recommended that all women at risk of unintended pregnancy presenting to an obstetrician-gynaecologist should be provided with comprehensive counselling, covering all options including LARC (39). Similar recommendations by the National Institute for Health and Care Excellence in the UK and Family Planning Alliance Australia highlight the important role of LARC in reducing unintended pregnancy whilst emphasising the importance of women's individual needs and preferences (9, 40). Of course LARC is not for everyone, and women should not only be empowered to choose whatever method suits their individual needs best, but also supported to change these methods as desired (41). By outlining the qualities women do and do not like about LARC, our review provides a knowledge base for conversations about the suitability of LARC for the individual and could be used during contraceptive consultations to facilitate discussion. Additionally, addressing the misperceptions toward LARC, particularly for young women, during contraceptive counselling may further remove barriers to uptake (42).

Limitations

There were a number of limitations for the studies reviewed. Most of the studies reviewed focused on the reasons for discontinuation, and the negative qualities were reported and

recorded more than the positives. While some of the quantitative studies were large prospective cohort studies (i.e. the Contraceptive CHOICE Project) they often focused on one aspect of LARC use (for example the association between cramping and satisfaction with the IUD), rather than exploring the whole contraceptive experience. On the other hand, the qualitative studies were able to provide depth, but their samples were usually small and generally homogenous. The reporting of qualities by method also varied among the studies reviewed; in some cases it was difficult to ascertain which distinct method/s were being examined. In addition, the recruitment location may have introduced bias into the samples, with many studies recruiting in clinical settings.

Only six studies focussed on young women (combined age range 14-25), with none reporting on the specific age range of interest (18-23). Of these six, four were qualitative (31, 33, 43, 44) and two quantitative (45, 46). Three studies focussed on one method only; Hoggart et al (43) only reported on the Implant, and Teal et al (45) and Whitaker et al (46) only reported on the IUDs. One study reported on both IUDs and the Implant (31), while Okpo et al (33) and Rose et al (44) reported on all four LARC methods. Okpo et al (33) reported mainly on negative qualities, while Rose et al (44) explored both positive and negative qualities of all four LARC methods. Overall, the majority of the studies reviewed included older women in their sample. While a number of these studies reported demographic characteristics by age group, this was not usually the case in regards to reporting results.

There were also limitations to the current review. Firstly, the search terms used may have inadvertently excluded articles that reported reasons for starting, stopping or switching to or from a LARC, by not considering the whole spectrum of contraceptive methods. This means that we are also unable to compare the qualities that women liked or disliked about LARC with the qualities they liked or disliked about other types of contraception. Additionally any relevant studies not written in English, and studies published prior to 2005 were not considered. This may have also resulted in the exclusion of potentially relevant articles. However, as aforementioned, given the relatively recent advent of implants and hormonal IUDs, the inclusion of studies only published in the last 10 years allowed us to explore recent LARC development and availability.

While the studies identified in this review provided a good starting point for understanding what women do and do not like about LARC, further exploration is necessary, particularly from the perspectives of women. Additionally, it is important to also focus on the positive aspects of LARC, rather than only the negative. Ideally, a national, demographically representative sample which utilises both quantitative methods to capture the overall picture, and qualitative methods to explore the depth, is necessary to fully understand what acts as a motivator, and what acts as a disincentive for LARC use.

Conclusion

This review identified many perceived qualities of LARC that women do and do not like. Particularly, the contraceptive benefits of LARC, including high efficacy and longevity, are considered by women as positive qualities, while the perceived impacts of LARC on the body were generally considered negative. This information is important in the clinical setting as it provides practitioners a greater understanding of the qualities women do and do not like about LARC methods. Discussion about these qualities during conversations about contraception may increase rates of uptake, by providing women with balanced information about both the potentially negative aspects of LARC (i.e. irregular bleeding), as well as the positives (i.e. lack of interference with sex).

Conflict of interest

The authors report no conflicts of interest.

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Table 1. Criteria for the selection of studies

Inclusion criteria	Exclusion criteria
Studies including the age range of interest (18-23 years)	Focus on a subset of contraceptive using women (e.g. women with cancer)
Focus on women	Focus on developing countries
Focus on developed countries (Australia, United States of America, New Zealand, Japan, Canada or Western Europe)	Studies not written in English
Report on the desirable or undesirable qualities of at least one LARC, as deemed by the participants	Studies including men (unless results reported separately by gender)
	Studies that use chart or record review as their method
	Focus on LARC as emergency contraception
	Reported only demographic information regarding LARC
	Focus on the marketing of LARC
	Randomised controlled trial interventions studies
	Include claims data only

Figure 1. Study selection flow diagram

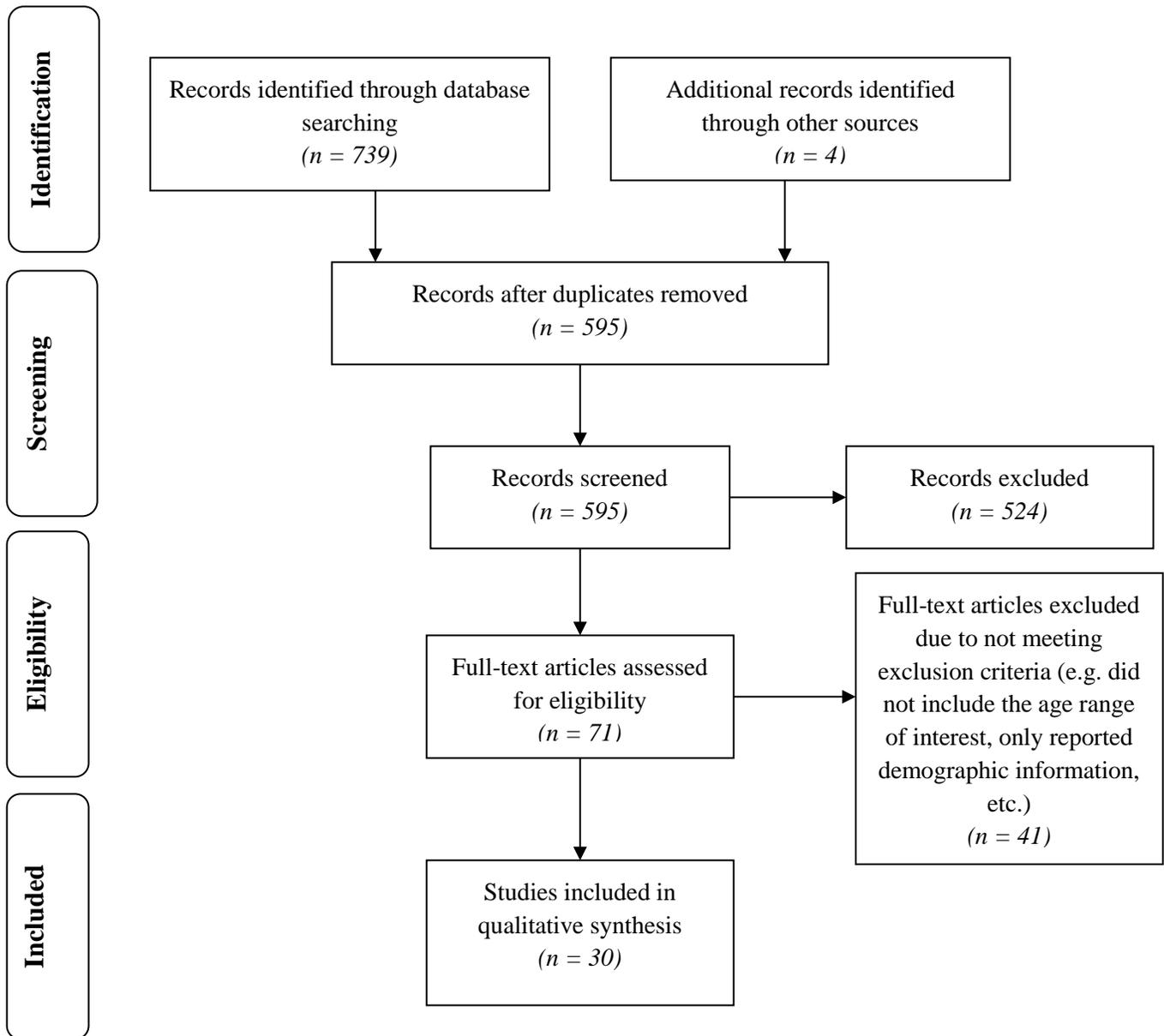


Table 2. Characteristics of articles included in review

First author, year of publication (reference)	Study design & country of focus	Participant characteristics ^a	LARC of interest	Perceived positive and negative qualities reported	Other Findings and Study Limitations
Anderson et al 2014 (37)	<p>Design: Qualitative (semi structured interviews and focus groups) Country: USA</p>	<p>N = 38 (interviews n = 24, focus groups n = 14) Age: 15-45 Recruitment setting: clinical and community Participant contraceptive use: mixed LARC and non-LARC</p>	IUDs unspecified	<p>Positive: High efficacy, longevity, amenorrhea Negative: Malfunctioning, cramping, heavy bleeding, difficulty returning to fertility, inability to easily discontinue, deaths caused by Dalkon Shield, method failure leading to pregnancy</p>	<p>Findings: Women communicate about contraceptive experiences regularly and negative experiences were considered more influential than positive. Women who had never used an IUD were less likely to receive information about these methods from their social networks and clinicians. Limitations: Findings not generalizable to broader population due to homogeneity of sample.</p>
Bracken et al 2014 (34)	<p>Design: Quantitative (cross sectional online questionnaire) Country: UK</p>	<p>N = 502 Age: 18-30 (Mean = 20.6) Recruitment setting: community Participant contraceptive use: mixed LARC and non-LARC</p>	Injection Implant IUD Hormonal IUD Copper	<p>Positive: Convenience, no interference with sex, amenorrhea, efficacy, longevity, no hormones, know other women who use it Negative: fear of needles and pain, foreign object in body, hormones, cannot be removed, weight gain, difficulty returning to fertility, irregular</p>	<p>Findings: High efficacy, protection against STIs and lack of interference with sex were the most important considerations when choosing contraception. Women who had used a LARC differed in their desired contraceptive qualities to women who had never used a LARC. Limitations: Findings not generalizable to the larger</p>

				bleeding.	population due to convenience sample. High discontinuation rate of questionnaire (>50% failed to complete the whole questionnaire).
Brockmeyer et al 2008 (47)	Design: Quantitative (prospective pilot study, questionnaire) Country: UK	N = 117 Age: 16-30 Recruitment setting: clinical Participant contraceptive use: LARC users	IUD Hormonal IUD Copper	Positive: None reported Negative: Pain, abnormal bleeding, partner can feel it during sex	Findings: Satisfaction with the IUD remained high at 1 year, despite reports of increased bleeding by almost half of the participants. Limitations: Lower than anticipated retention at follow up resulted in small sample size unsuitable for some statistical comparisons.
Dickerson et al 2013 (48)	Design: Quantitative (survey, observational study) Country: USA	N = 132 Age: >18 Recruitment setting: clinical Participant contraceptive use: LARC users	IUD Hormonal Implant	Positive: None reported Negative: Pain, increased bleeding frequency, weight gain, depression	Findings: Most participants were satisfied with their chosen method: >75% were still using their method at follow up. Limitations: Findings not generalizable to wider population due to small sample size and recruitment in only one area of the USA.
Diedrich et al 2015 (49)	Design: Quantitative (prospective cohort study – The CHOICE Project) Country: USA	N = 5011 (IUD hormonal n = 3001, IUD Copper n = 826, Implant n = 1184) Age: 14-45 (Mean = 25.6) Recruitment setting: clinical Participant contraceptive use: LARC users	IUD Hormonal IUD Copper Implant	Positive: Lighter bleeding, reduced bleeding frequency Negative: Increased cramping, heavier bleeding, increased bleeding frequency	Findings: Most LARC users were satisfied with their chosen method at 3 and 6 months follow up, however increased cramping, bleeding volume and bleeding frequency was associated with decreased short-term satisfaction. Limitations: Perceptions of

					symptoms were recorded rather than actual bleeding patterns; the size of the sample precluded collection of bleeding diaries.
Fleming et al 2010 (50)	Design: Quantitative (cross sectional survey) Country: USA	N = 252 Age: 14-27 Recruitment setting: clinical Participant contraceptive use: mixed LARC and non-LARC	IUD Hormonal IUD Copper	Positive: Efficacy, longevity, discrete, convenient, no hormones, no interference with sex, amenorrhea, lighter bleeding, spotting Negative: foreign object in body, painful insertion and removal, practitioner must insert or remove, no STI protection, hormones, amenorrhea, spotting, heavier periods, cramping.	Findings: Knowledge about IUDs was low and interest in this method was not greatly improved by the provision of information. Limitations: Cross sectional design limited ability to assess significant associations. Findings not generalizable due to convenience sample.
Foster et al 2014 (51)	Design: Quantitative (survey, case series study) Country: USA	N = 326 Age: 18-49 (Mean = 28) Recruitment setting: clinical Participant contraceptive use: LARC users	IUD Hormonal IUD Copper	Positive: none reported Negative: heavy and irregular bleeding, spotting, cramping	Findings: The majority of women were interested in IUD self-removal. Having this option increased their likelihood of recommending the method to others. Limitations: Participation rates recorded lacked detail at some study sites. Results not generalizable due to small study size.
Glasier et al 2008 (29)	Design: Qualitative (focus groups)	N = 55 Age: 16-35 Recruitment setting:	Injection IUD Hormonal IUD Copper	Positive: convenient, suitable for all ages, longevity, efficacy, quick	Findings: When choosing a method, effectiveness, ease of use and safety are important

	Country: UK	community Participant contraceptive use: mixed LARC and non-LARC	Implant	return to fertility, impact on period. Negative: fear/dislike needles, headaches, moodiness, bleeding changes, weight gain, bone density, difficult return to fertility, regular repeat injections, location in body, not suitable for young women, perception of poor efficacy, painful insertion and removal, malfunction, no protection against STIs, only for women with children, longevity.	considerations. Familiarity with the method, fear of real or perceived side effects and the experiences of others are also important. Limitations: Convenience sampling and passive snowballing recruitment limit generalisability of findings.
Gubrium 2011 (52)	Design: Qualitative (interviews) Country: USA	N = 34 Age: 18-65 (Mean = 32) Recruitment setting: community Participant contraceptive use: mixed LARC and non-LARC	Injection	Positive: No daily action Negative: frequent bleeding, moodiness, depression, decreased libido, weight gain, hair loss, bone density loss	Findings: Side effects have a significant impact on the daily lives of women. Method choice should be understood as a product of these experiences. Limitations: Context of the interviews (focus on injection) may have created an environment where women felt able to blame the method for their side effects (which may or may not have actually been a result of the method).
Hladky et al 2011 (36)	Design: Quantitative (survey, observational)	N = 1665 Age: 18 - >35 (Mean = 31.9) Recruitment setting:	IUDs unspecified	Positive: Efficacy, convenience, favourable side effects (not specified) Negative: Change in	Findings: Most participants were aware of IUDs although specific knowledge about the method was limited.

	study) Country: USA	community Participant contraceptive use: mixed LARC and non-LARC		bleeding, discomfort, pelvic pain or infection, increased risk of ectopic pregnancy, cancer or STI, belief tampons cannot be used with an IUD, not sure who they are appropriate for	Limitations: Potential recall and response bias in sample due to self-reported data in the context of a survey about contraception. Findings may not be generalizable to wider population due to recruitment of participants from one area of the USA.
Hoggart et al 2013 (53)	Design: Qualitative (semi-structured interviews) Country: UK	N = 20 Age: 16-23 Recruitment setting: clinical Participant contraceptive use: LARC users	Implant	Positive: none reported Negative: irregular and unpredictable bleeding, sense of losing bodily control, mood swings, weight gain, headaches, cost.	Findings: The combined impacts of multiple side effects lead participants to request removal. Many participants reported negative experiences in requesting removal, particularly in regards to feeling resistance from health professionals to carry out their request. Limitations: Findings not generalizable due to small purposive sample.
Kane et al 2009 (54)	Design: Mixed Method (retrospective survey and interviews) Country: UK	N = 155 (Of which 56 participated in interview) Age: <20 - >40 Recruitment setting: clinical Participant contraceptive use: mixed LARC and non-LARC	IUD Hormonal Implant (Also reports on sterilisation)	Positive: easy to use, convenient, lighter periods, reliability, longevity, few side effects, return to fertility Negative: pain, moodiness, frequent and irregular bleeding, mood swings or depression, bloating, weight gain, headaches, loss of libido, amenorrhoea, breast	Findings: Women choose sterilisation to avoid the potential effects of hormones and to avoid continually having to make decisions regarding childbearing. Lack of information about long-acting methods as an alternative to sterilisation was also identified. Limitations: Low response rate limits ability to generalise to wider population.

				tenderness, location in body, fatigue, hair growth, acne, vaginal discharge, nausea	
Kavanaugh et al 2013 (31)	Design: Qualitative (Interviews ^b) Country: USA	N = 48 interviews Age: 16-24 Recruitment setting: clinical Participant contraceptive use: mixed LARC and non-LARC	IUDs unspecified Implant	Positive: ease of use, longevity, efficacy, reversible, cost effective, amenorrhoea, lack of control over insertion and removal procedure, location in body Negative: only suitable for older women with children, foreign object in body, painful insertion and removal, others can feel implant, longevity, amenorrhoea, high upfront cost, lack of control over insertion and removal procedure, location in body.	Findings: Attitudes toward the advantages and disadvantages of IUDs and implants differed between health services providers and clients. Limitations: Study population had higher rates of IUD and Implant use as compared with the wider population. The context of the interviews may have influenced the responses of participants. Findings not generalizable to the wider population.
Marions et al 2011 (55)	Design: Quantitative (non-interventional cohort study) Country: Sweden	N = 226 Age: <20 - >31 (Mean = 22.9) Recruitment setting: clinical Participant contraceptive use: LARC users	IUD Hormonal	Positive: none reported Negative: unacceptable bleeding, pain, general discomfort, mood changes, long term impact on body	Findings: Continuation rate of the hormonal IUD was approx. 80%. Although most women experienced pain during (and after) the insertion procedure, this did not appear to impact their overall satisfaction with the method. Limitations: Survey design limited by crude measure of pain (no pain, moderate pain, severe pain) which was unable

					to capture the entirety of the experience. Additionally, women lost to follow-up may have been satisfied with their chosen method, and hence have little need or desire to talk to their health care provider.
Michie et al 2014 (56)	Design: Quantitative (questionnaire, observational study) Country: UK	N = 106 Age: 15-42 (Mean = 25) Recruitment setting: clinical Participant contraceptive use: mixed LARC and non-LARC	IUD Hormonal IUD Copper	Positive: none reported Negative: painful insertion procedure, perception it can more around your body	Findings: Although misconceptions about IUDs were minimal, a general lack of knowledge about IUDs was evidenced. Limitations: Findings not generalizable due to small sample size.
Moreau et al 2014 (32)	Design: Quantitative (population based survey: FECOND ^c) Country: France	N = 3563 (subsample of 1712 were asked specific questions about IUDs) Age: 15-49 Recruitment setting: community Participant contraceptive use: mixed LARC and non-LARC	IUD Hormonal IUD Copper	Positive: none reported Negative: only for women with children, impact on future fertility, uncomfortable to use	Findings: Misperceptions about IUD use amongst both women and their service providers evident, particularly regarding eligibility for IUD use. Limitations: Most women in study were above the age of 25 and 48% of the sample reported 2 or more previous births; these women are known LARC users.
Okpo et al 2014 (33)	Design: Qualitative (interviews) Country: UK	N = 65 Age: 16-24 Recruitment setting: community Participant contraceptive use: mixed LARC and non-	Injection Implant IUD Hormonal IUD Copper	Positive: convenience Negative: location in body, painful insertion and removal procedure, method malfunction, irregular bleeding, weight	Findings: Women did not recognise the phrase LARC and held many negative perceptions about LARC. Limitations: Findings not generalizable due to

		LARC		gain, impact future fertility, inability to easily discontinue, regular repeat injections, longevity, only for older women with children, appearance of device	convenience sample.
Peipert et al 2011 (57)	Design: Quantitative (prospective cohort study: The Choice Project) Country: USA	N = 4167 Age: not reported (Mean=25) Recruitment setting: clinical Participant contraceptive use: mixed LARC and non-LARC	IUD Hormonal IUD Copper Implant	Positive: none reported Negative: bleeding, cramping, acne, weight gain	Findings: LARC had the highest continuation rates and highest level of satisfaction, as compared to women who chose a non-LARC method. Limitations: Convenience sample, inclusion criteria and lack of randomisation to contraceptive method may limit the generalisability of the study findings.
Riney et al 2009 (58)	Design: Quantitative (Survey, observational study) Country: Ireland	N = 75 Age: 18-43 (Mean = 28) Recruitment setting: clinical Participant contraceptive use: LARC users	Implant	Positive: high efficacy, longevity, cost effective Negative: irregular bleeding, moodiness, weight gain	Findings: Pre-insertion counselling may be useful in alerting women to the potential change in bleeding caused by the Implant, which in turn may help reduce discontinuation rates Limitations: Lack of information regarding the methods, particularly recruitment and data analysis.
Rose et al 2011 (59)	Design: Qualitative (semi-structured	N = 30 Age: 16-25 Recruitment setting: clinical	Injection IUD Hormonal IUD Copper Implant	Positive: lighter or no period, timeframe between injections, fit and forget, longevity,	Findings: A lack of knowledge about LARC was evidenced among women seeking an abortion however attitudes

	interview) Country: New Zealand	Participant contraceptive use: mixed LARC and non-LARC		efficacy, no hormones, physical appearance, placement in body, cost, convenience Negative: repeat injections, dislike of needles, weight gain, depression, longevity, only for older women with children, physical appearance of device, location in body, insertion procedure, impact on bleeding, cost, hormones, amenorrhoea, not the 'normal' method	towards these methods were generally favourable once information was provided. Women expressed motivation to use more effective methods in the future. Limitations: Findings not generalizable to the wider population due to small sample size and recruitment at one abortion clinic. Additionally, women had spoken to a contraceptive counsellor prior to the interview, which may have impacted their responses.
Rubin et al 2010 (35)	Design: Qualitative (semi-structured interviews) Country: USA	N = 40 Age: 18-45 Recruitment setting: clinical Participant contraceptive use: mixed LARC and non-LARC	IUD Hormonal IUD Copper	Positive: longevity, efficacy, convenience, no hormones, comfortable Negative: location in body, lack of control over insertion procedure, perception of poor efficacy, not the 'normal' method, bleeding, cramping, pain, bloating, odour.	Findings: Women have many concerns regarding the IUD. Although it is perceived as reliable and convenient, a lack of knowledge about the device precludes use. Limitations: Findings not generalizable to the general population due to convenience sample.
Sonalkar et al 2013 (60)	Design: Quantitative (pilot study, telephone survey and bleeding diary, observational	N = 20 Age: 18-45 (Mean = 25.6) Recruitment setting: clinical Participant contraceptive use: LARC users	Implant	Positive: none reported Negative: moodiness	Findings: Commencing an implant at the time of abortion was acceptable for participants. Limitations: Findings not generalizable to the general population due to sample size. Potential recall bias and a lack

	cohort study) Country: USA				of comparison group also limit the findings of this study.
Spies et al 2010 (30)	Design: Mixed methods (telephone survey and focus groups, observational study) Country: USA	N = 543 survey, 106 focus groups Age: 18-30 Recruitment setting: community Participant contraceptive use: mixed LARC and non-LARC	IUD Hormonal Implant	Positive: longevity, efficacy, regular period, amenorrhea Negative: only for older women with children, cost, pain, cramping, irregular bleeding, foreign object in body	Findings: General knowledge about LARC was low, and specific information about the various LARC methods was lacking. More women had heard about the IUD than the implant. Limitations: Findings not generalizable to wider population due to convenience sample. Potential limitations in survey design around the wording of questions about IUDs and Implants by referring to them only by their brand name. Women may have had knowledge about IUDs and Implants, but were unaware of their brand names.
Teal et al 2012 (45)	Design: Quantitative (telephone interview, observational cohort study) Country: USA	N = 136 Age: 14-23 (Mean = 18.2) Recruitment setting: clinical Participant contraceptive use: LARC users	IUD Hormonal IUD Copper	Positive: none reported Negative: expulsion, pain, bleeding problems, location in body	Findings: More than half of the participants continued IUD use at 1 year however a number of women discontinued due to side effects and 4.7% due to pregnancy with the IUD in place. Limitations: Study recruited adolescents at pre-natal and post-partum care, and hence findings are not generalizable to the wider population of

					nulliparous young women. Women were not randomised to either IUD resulting in selection bias.
Venkat et al 2008 (61)	Design: Quantitative (questionnaire, observational cross sectional study) Country: USA	N = 102 Age: 16-70 (Mean = 29.1) Recruitment setting: clinical Participant contraceptive use: mixed LARC and non-LARC	Injection IUDs unspecified	Positive: none reported Negative: concerns about safety, weight gain, irregular bleeding, impact return to fertility, perception of poor efficacy	Findings: Concerns about the safety and efficacy of the methods studied (Injection, IUD, Oral Contraceptive pill, Contraceptive Patch) were raised by the participants. Limitations: Findings not generalizable to wider population due to small sample size, and recruitment at one reproductive health service. <50% of questionnaires were returned fully completed.
Weisberg et al 2014 (62)	Design: Quantitative (questionnaire, observational cohort study) Country: Australia	N = 200 IUD, 149 Implant Age: <30-51 Recruitment setting: clinical Participant contraceptive use: LARC users	IUD Hormonal Implant	Positive: Reversible, effective, lighter and less painful periods, amenorrhea, no hormones, convenient, cost effective, discrete Negative: unacceptable bleeding patterns, location in body, acne, weight gain, moodiness, cramping, pain, bloating, loss of libido	Findings: Women using the implant were more likely to discontinue than IUD users. Discontinuation was often due to dissatisfaction with bleeding patterns. Limitations: The study was non-randomised, thus introducing the potential for provider bias in recommending a particular method. Women often initiated discussion about LARC with their clinician; it is unclear how much information about other contraceptive options was given. Additionally bleeding data was

					retrospective and self-reported.
Weisberg et al 2005 (63)	Design: Quantitative (questionnaire, observational cohort study) Country: Australia	N = 475 Age: 15-50 Recruitment setting: clinical Participant contraceptive use: LARC users	Implant	Positive: convenience, longevity, fit and forget, efficacy, cost effective Negative: unacceptable bleeding, moodiness, breast tenderness, acne, decreased libido, weight gain	Findings: The “fit and forget” nature of implants was the most common reason for satisfaction with the method, while bleeding disturbance the major reason for dissatisfaction. Limitations: Potential selection bias by doctors recruiting women to the study and a poor response rate coupled with many incomplete responses and reliance on self-report data limit the findings of this study.
Whitaker et al 2008 (64)	Design: Quantitative (cross sectional survey) Country: USA	N = 144 Age: 14-24 Recruitment setting: clinical and community Participant contraceptive use: not reported	IUD Hormonal IUD Copper	Positive: reversible, fit and forget, discrete, longevity, decrease menstrual flow and cramps, practitioner must insert and remove, no hormones Negative: increased bleeding, cramps, hormones, no protection against STI.	Findings: A lack of knowledge about IUDs among young women was evidenced. However, a majority of women expressed a positive attitude to IUD after a brief (3 min) educational intervention. Limitations: Findings of the study are unable to be generalised to the wider population due to recruitment procedure (convenience sample), which contributed to sociodemographic differences between groups. Additionally no follow-up was conducted.
Wong et al	Design:	N = 439 (211 IUD, 228	IUD Hormonal	Positive: none reported	Findings: Higher rates of

2009(65)	Quantitative (questionnaire, prospective cohort study) Country: Australia	Implant) Age: 16-51 (Mean = 30.2) Recruitment setting: clinical Participant contraceptive use: LARC users	IUD Copper Implant	Negative: abnormal bleeding, pain, expulsion, moodiness, infection, weight gain, acne	dissatisfaction were evident among Implant users as compared to IUD users. However, dissatisfaction was not a predictor of removal. Side effects, particularly bleeding disturbance, were common among both IUD and Implant users. Limitations: The study was unable to attribute the difference between IUD and Implant users to the method itself due to lack of randomisation. Additionally, the difference between the ages of participants may have contributed to their method selection.
Xu et al 2011 (66)	Design: Quantitative (survey, NSFG and cross sectional survey) Country: USA	N = 3005 (246 IUD users) Age: 15-44 Recruitment setting: community Participant contraceptive use: mixed LARC and non-LARC	IUD Hormonal IUD Copper	Positive: efficacy, does not interrupt sex, cost effective, discrete Negative: none reported	Findings: Women who currently used IUDs reported the highest levels of satisfaction among all users of hormonal methods, although this was not statistically significant. Nulliparous women were less likely to use an IUD. Limitations: Potential for recall bias due to retrospective design limit the findings of this study.

^a N= total number of participants, Age = age range(mean). ^bFocus groups also conducted with providers, but this is not reported as it is not the focus of this review. ^cAlso included physician data, but this is not reported as it was not the focus of this review.

Table 3. Perceived positive and negative qualities of LARC reported in the included articles

✗ = negative ✓ = positive	Injection	IUD Hormonal	IUD Copper	Implant
Impact on bleeding patterns				
Abnormal/irregular/unacceptable/ unpredictable bleeding	✗	✗	✗	✗
Amenorrhea	✓ ✗	✓ ✗	✓ ✗	✓ ✗
Heavy bleeding/heavier periods		✗	✗	
Increased frequency of bleeding		✗	✗	✗
Irregular bleeding; impact on sexual relationships, cost of sanitary products				✗
Lighter bleeding	✓	✓	✓	✓
Reduced bleeding frequency		✓	✓	✓
Regular menstruation		✓		✓
Spotting		✗	✗	
Impact on body (other than bleeding)				
Acne		✗		✗
Bloating		✗	✗	✗
Changes in breast; tenderness, lumps	✗			✗
Cramping		✗	✗	✗
Decreased libido		✗	✗	✗
Depression	✗	✗	✗	✗
Fatigue				✗
Hair; growth or loss	✗			✗
Headaches	✗			✗
Long term impact on body		✗	✗	✗
Moodiness	✗	✗	✗	✗
Odour		✗	✗	
Pain		✗	✗	✗
PMS	✗			
Vaginal discharge	✗			

Weight gain	x	x	x	x
Device specific characteristics				
Appearance of device		✓ x	✓ x	
Can only be used for a maximum of 5 years	x			
Cannot be removed	x			
Comfortable to use		✓	✓	
Discrete (cannot be detected by partner/other people)		✓	✓	✓
Dislodge/expulsion		x	x	x
Fear of needles	x	-	-	-
Foreign object in body		x	x	x
Hormones – mechanism of action	x	x	-	x
Impact on bones; bone density loss	x	-	-	-
Inability to easily discontinue	x	x	x	x
Lack of control over insertion and removal; practitioner must insert and remove		✓ x	✓ x	✓ x
Location in body ; Intrauterine placement, in arm		✓ x	✓ x	✓ x
Location in body: Infection, itching pelvic pain, or expulsion due to location		x	x	x
No hormones	-	-	✓	-
No interference with sex	✓	✓	✓	✓
No STI protection		x	x	
Not considered the normal contraceptive method		x	x	
Others can feel implant				x
Painful insertion and removal procedure		x	x	
Partner can feel it during sex		x	x	
Regular repeat injections	✓ x	-	-	-
Uncomfortable		x	x	
General characteristics				
Convenience		✓	✓	✓

Cost		✓ x	✓	✓ x
Easy to use	✓	✓	✓	✓
Fit and forget; no daily or at event action, no need for regular follow up	✓	✓	✓	✓
High efficacy	✓	✓	✓	✓
Long term protection	✓	✓ x	✓ x	✓
Malfunctioning		x	x	x
Method failure leading to pregnancy		x	x	
Quickly reversible on removal		✓	✓	✓
Perceptions and misperceptions/beliefs				
Belief that you cannot use tampons with method		x	x	
Concerns about safety	x	x	x	
Deaths caused by Dalkon Shield		x	x	
Difficult to return to fertility	x	x	x	x
Know other women who use it	✓	✓	✓	✓
Not suitable for young women				x
Not sure who they are appropriate for		x	x	
Only for women with children		x	x	
Only suitable for older women		x		x
Peace of mind not pregnant or invisible therefore cannot tell you are not pregnant		✓ x	x	✓
Perceived concerns about increased risk of ectopic pregnancy, cancer or STI		x	x	
Perception it can move around body		x	x	
Perception of poor efficacy	x	x	x	
Sense of losing bodily control when faced with multiple side effects				x
Suitable for all ages	✓			✓

Table 4. Top ranked positive and negative qualities of LARC reported in included articles

Injection	IUD Hormonal	IUD Copper	Implant
Positive Qualities			
Fit and forget	High efficacy	High efficacy	High efficacy
Amenorrhea	Long term protection	Long term protection	Long term protection
	Fit and forget	Fit and forget	Fit and forget
	Lighter bleeding	Ease of use	Cost
	Ease of use	No hormones	Ease of use
	Amenorrhea	Amenorrhea	
	Quickly reversible		
Negative Qualities			
Weight gain	Pain	Painful insertion/removal	Weight gain
Fear of needles	Cramping	Cramping	Moodiness
Irregular bleeding	Painful insertion/removal	Only for women with children	Irregular bleeding
Impact on bones	Only for women with children	Location in body	Location in body
Regular repeat injections	Location in body	Long term protection	Cost
	Weight gain	Lack of control	Acne
	Long term protection		