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Common myths and misconceptions surrounding hormonal contraception

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ABSTRACT

Numerous community and professional myths and misconceptions around hormonal contraception exist, many promulgated through social media. As a result of these and other factors, people are moving away from hormonal methods and potentially exposing themselves to increased risk of unintended pregnancy. A number of key myths and misconceptions have been identified in a range of papers and here we summarise the evidence around the basis for these misunderstandings. The themes we explore are the physical side effects, the mental health effects, the impact on sexuality, the concerns about infertility, the concept of "unnaturalness", concerns about menstruation, concerns about safety and destigmatisation of side effects. For many of these themes, there is some evidence justifying the concern, but overall for most people, we argue that the benefits of hormonal contraception outweigh the disadvantages.

1. Introduction

Hormonal contraceptive methods are used by over 150 million women worldwide [1]. Combined hormonal methods include pills, patches and rings, and progestogen-only methods include pills, injectables, implants, and hormonal intrauterine devices (IUDs). These methods are not only highly effective for contraception but also offer a range of non-contraceptive benefits. Such benefits include reduced acne, lighter and regular periods with respect to the oral contraceptive pill, and reduced menstrual bleeding and pain with hormonal IUDs [1]. While globally we have seen an increase in the use of contraception [2], population surveys from the United States and the United Kingdom find over one in ten women who are having vaginal sexual intercourse are not using contraception [3,4]. While non-use may be driven by difficulties in accessing methods, lack of uptake will also be affected by more individual-level factors. Personal experiences, knowledge gained from others, and misinformation shape how women perceive and experience non-contraceptive effects and how they interpret bodily responses [5]. A systematic review of factors that influence contraceptive choice globally was undertaken by D'Souza et al. [6]. They summarised the factors influencing choice within the framework of social determinants of health (Table 1).

Beyond the complex interplay of all these influences, side effects associated with hormonal contraceptive methods, including changes in menstrual bleeding patterns, mood changes, depression, and weight gain, are important attributes considered by women when deciding upon which method to choose and are common reasons for their non-use or their discontinuation [7–9].

In recent years, increasing numbers of people are turning to the internet and social media to obtain information about

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contraception, which may be inaccurate or misleading. An analysis of TikTok identified 700 unique videos on contraception, with a total of 1.18 billion views [10]. Half of these videos recounted personal experiences, with around a third covering side effects, including comments on the size and length of information sheets found in contraceptive packaging. These social media platforms also spread information about the 'dangers' of hormonal contraception [11]. Tik Tok in particular hosts numerous "holistic healers" or "hormone coaches" who promulgate myths and misconceptions about hormonal contraception [12]. These social media influencers are persuading young women to rely on natural family planning methods, overstating the effectiveness of these. A systematic review examining why people in Western countries are rejecting hormonal contraception found 42 articles containing eight major themes. These themes are documented in Table 2 [13].

Thus, there are a range of factors that deter from using effective hormonal methods or choosing to discontinue the method early [14,15]. In this article, we will discuss some of the commonly held misunderstandings and provide evidence to support a more balanced view of the advantages and disadvantages of the range of hormonal contraceptive methods. We will use the theme headings from Le Guen et al. to organise the presentation of the perceived side effects.

2. Physical side effects

2.1. Weight gain

Weight gain is one of the side effects frequently attributed to hormonal contraception use. Concern about weight gain can hinder particularly young women from taking up more effective methods of contraception or may be a reason for early discontinuation [16]. Indeed weight gain has been documented in numerous studies among users of the injectable Depo-Provera® [17,18], implant [19], hormonal IUD [20], and oral contraceptive [21] as a reason to not use the method or discontinue early. However, many studies have shown that hormonal contraception causes little if any weight gain. For progestogen-only methods, a Cochrane review concluded that on average the user gains a mean of 2 kg over six and 12 months [22]. A separate Cochrane review on combined hormonal contraception reported that there was a lack of strong evidence to determine their effect on weight, but no large effect was evident [23]. Appropriate counselling about typical weight gain may help reduce discontinuation of contraceptives due to perceptions of weight gain.

2.1.1. Depot medroxyprogesterone acetate

The most convincing evidence for an association with weight gain exists for depot medroxyprogesterone acetate (DMPA) in its injectable form, commonly known as Depo-Provera®. A systematic review of studies examining the effects of DMPA identified 14 studies that investigated weight change and/or changes in body composition [24]. None of the included studies were randomised controlled trials (RCTs). The authors reported weight gain amongst the DMPA users over one-year follow-up ranged from 1.3 to 3 kg. This compared to 0.1–1.1 kg in the non-hormonal method comparison groups. Significant increases in body mass were also observed in DMPA users compared to the non-hormonal contraceptive users. A more recent RCT with women aged 16–35 years across 12 sites in eSwatini, Kenya, South Africa and Zambia, which conducted intention to treat and duration of continuous contraceptive use analysis, found that the mean weight increase amongst DMPA users was 3.5 kg over 12–18 months of use compared to 2.4 kg amongst levonorgestrel (LNG)-implant users and 1.5 kg amongst copper IUD users [25]. A small prospective study of DMPA users found significant increases in leptin levels (a hormone directly related to food intake) amongst those who gained the most weight, which may explain the observed weight gain [26]. There is also a suggestion from observational studies that weight gain amongst adolescents classified as overweight or obese at baseline is higher amongst those who use DMPA compared to those who use oral contraceptive pills or controls [27,28].

2.1.2. Contraceptive implant

In the Cochrane review of weight gain with progestogen-only methods, three studies examined the contraceptive implant (Norplant®) compared to the copper IUD. Two studies did find a difference in weight gain [29,30]. However, in a prospective cohort study of women who had been using the etonogestrel implant, LNG-IUD, DMPA or the copper IUD continuously for at least 11 months, a comparison between the implant and the copper IUD reported no significant weight change between the groups after adjusting for age and race [31]. Perception of weight gain associated with some contraceptive methods may differ from actual weight gain. A secondary analysis of women using LNG implants who had taken part in an RCT found that while they reported weight gain, none was observed when their weight was measured at one and three months follow-up [32]. The authors suggest this discrepancy may be due to the fact

Table 1
Factors influencing contraceptive choice within the social determinants of health [6].

Domain	Examples
Individual	Age, parity, knowledge, attitudes and practices
Partner	Relationship status, men's views
Family	Family dynamics and influence
Local community	Peers, friends
Health services	Access and cost, health professional factors
Wider society	Socio-economic factors, social networks

Table 2
Themes and subthemes summarised from 42 articles by Le Guen et al. [13].

Themes	Key Subthemes
Physical side effects	Weight gain
	Headaches
Mental health	Mood swings
	Depression
Negative impact of sexuality	Reduced libido
	Vaginal dryness
Concerns about future fertility	Impact on short- and long-term fertility
Concept of unnaturalness	Hormones are unnatural.
	Hormones disrupt the body
Concerns about menstruation	Having normal periods was desired.
	Heavy bleeding as adverse side effect
Concerns about safety	Mistrust and lack of confidence about safety
	Fear of side effects
Delegitimisation of the side effects of hormonal contraception	Women not heard regarding side effects
	Having to manage side effects

that women were anticipating weight gain.

2.1.3. Other progestogen-only hormonal methods

No significant weight gain has been found amongst users of other progestogen-only contraceptives [33] but a small prospective study that compared peri-menopausal women using desogestrel POP or the LNG-IUD with those not using hormonal contraception did observe a statistically significant difference in fat mass amongst women using the hormonal methods [34]. In addition to the aforementioned study, the Cochrane review that examined the studies of weight gain with progestogen-only methods [22] concluded that there was limited evidence of change in weight or body composition with the use of progestogen-only methods and that mean weight gain at 6 or 12 months was less than 2 kg for most studies.

2.1.4. Combined hormonal contraception

Evidence on weight gain for combined hormonal methods is even more limited. No large effect in weight gain is observed in users of the combined oral contraceptive (COC) [35,36] A Cochrane review that investigated trials of combined hormonal contraceptive pills or patches, where the woman's weight was measured, concluded that "Available evidence is insufficient to determine the effect of combination contraceptives on weight, but no large effect is evident" [23]. So whilst there is a common belief that pills containing drospirenone may have less effect on weight due to the anti-mineralocorticoid effect than those containing levonorgestrel, given that none of the pills exert a significant impact then this is a misunderstanding [37].

3. Mental health and mood changes

Mood changes are commonly reported by hormonal users but the evidence is conflicting and causal relationships are not definitely found. A systematic review of neuroimaging studies has documented visual changes with the use of hormonal contraception, mainly in areas of the brain involved in emotional and cognitive processing [38]. However, results should be interpreted cautiously given the methodological limitations of the included studies. The authors report that only one neuro-imaging study was identified that specifically looked at adolescents and therefore effects on the developing brain during adolescence remains inconclusive. Two systematic reviews have investigated whether or not there is a relationship between depression and use of hormonal contraceptive methods [39,40]. In their systematic review, Worley and colleagues (2019) [39] found no association with use of progestogen-only methods and depression in the higher-quality studies but reported that less robust studies indicated that a small minority of users may experience depression symptoms. These differences in the latter group findings may be explained by confounding factors, but the authors acknowledge that different modes of administration, doses and types of progestogens make it difficult to form any absolute conclusions. Three prospective studies of adolescents using DMPA were included in the review and again no association between its use and depression were observed, but high prevalence of depression at baseline and high dropout rates were reported. A large retrospective analysis of health registry data, which was included in the systematic review, with over a million women aged 15–34 years in Denmark found a two-fold increase during adolescence in first-time diagnosis of depression and first-time use of anti-depressants amongst progestogen-only contraceptive users relative to users of barrier methods [41]. However, given the limitations of the design and the potential for confounding these findings should be treated with caution.

The systematic review and meta-analysis conducted by de Wit and colleagues (2021) [40] compared hormonal contraception method users to non-hormonal method users and only included RCTs. Hormonal methods included the combined oral pill, the POP and the vaginal ring. Different pill formulations were also examined. They found no association with use of these methods and depressive symptoms when compared to the placebo group. They acknowledge that as most of the women in the included trials were in their mid-twenties and good quality studies examining the risk of depression amongst first-time hormonal method users are sparse, further research amongst this group is needed [40].

4. Impact on sexuality

Female sexual dysfunction covers a range of disorders from lack of desire to impaired arousal, inability to achieve orgasm or dyspareunia. The association between these disorders and hormonal contraception is controversial as female sexual dysfunction is often multifactorial and involves mood, relationship, health, culture and other factors [42]. People can be concerned about the impact of hormonal contraception on sexual function and indeed in one study of combined hormonal contraception users, the issue was cited as a reason for discontinuation in 8% of users [43]. Further, in a large study of oral contraception and sexual function, the pill users had lower scores on desire, arousal, orgasm, lubrication, and satisfaction [44]. Nevertheless, a beneficial impact of oral contraception on sexual function has also been reported [45]. Pills containing drospirenone have been demonstrated in an RCT to improve sexual desire, arousal and sexual satisfaction compared to those taking gestodene-containing pills [46].

With regard to POP, only one study has examined its effect on sexual function and it found no impact [47]. DMPA has been reported to be associated with a lower sexual function [48] and to negatively impact libido in around 1 in 20 users [49], but other research has contradicted this finding [50]. Very low rates of removal of the contraceptive implant have been attributed to sexual problems. Further, a study demonstrated enhanced sexual function with implant use compared to women not using hormonal contraception [51]. Similarly, the hormonal IUD has been found to have a beneficial impact on sexual desire and arousal [52].

A recent review described the evidence on the relationship between hormonal contraception and sexuality as conflicting. While acknowledging that hormonal contraception can cause impairment to female sexual function, the review noted that study findings vary, showing worsened, neutral or improved influence on sexuality [42]. An individualised approach is recommended, involving a discussion about sexual health and desire at the time of consultation. If sexual function is a significant concern or is adversely impacted by a particular method, exploring alternative contraceptive options is advised.

5. Impact on fertility

The connection between beliefs about infertility and the use of contraceptive methods is intricate, with the perceived ease or difficulty of conceiving after discontinuing contraception significantly influencing decisions to start and continue contraceptive use [53]. This concern is particularly pronounced among young individuals, where one of the primary apprehensions regarding hormonal contraception is the potential delay in the return to fertility or fear of impaired fertility upon discontinuation [54]. These concerns stem largely from the notion that exogenous hormonal therapy might postpone the restoration of normal hypothalamic/pituitary/ovarian function, potentially leading to temporary infertility [55]. For instance, oral contraceptive use has been associated with secondary amenorrhea, characterised by an absence of menstruation due to anovulation and diminished reproductive capacity [56,57]. Similarly, the use of IUDs has raised concerns about infertility secondary to pelvic inflammatory disease (PID) [58]. However, recent studies have dispelled these fears, partly owing to advancements such as the development of low-dose hormonal contraception, improved PID prevention, and enhanced scientific methodologies [56–58].

Despite lingering concerns regarding the impact of contraception on future fertility, emerging evidence reveals that pregnancy rates within one year after discontinuation are comparable to those of non-users [53,55,59]. Extensive research, including numerous studies and specialised reviews, has thoroughly examined the effects of various contraceptive methods on subsequent pregnancies [55, 56,59]. Recent findings indicate no significant association between contraceptive use and secondary amenorrhea, except in cases involving higher doses of estrogen [55]. Notably, a recent review reported a substantial pregnancy rate of 83.1% (95% confidence interval (CI): 78.2–88%) among women who ceased contraception in the previous 12 months [55]. Additionally, recent research suggests that serum anti-Müllerian hormone (AMH) levels, a marker of ovarian reserve, may be lower among current users of most forms of hormonal contraceptives [60]. However, reassuringly, the suppressive effect of hormonal contraceptives on AMH levels appears to be reversible after discontinuation [60]. These findings collectively provide valuable insights into the nuanced relationship between contraception and fertility, offering reassurance to individuals navigating their reproductive choices.

5.1. DMPA

Early studies have delved into the restoration of fertility after discontinuation of DMPA injectable contraception. A recent meta-analysis, drawing from these studies, revealed a pregnancy rate of 77.74% within one year of stopping this injectable contraceptive [61]. Injectable contraceptives with forming drug depots like medroxyprogesterone acetate, display a more variable and delayed return to ovulation and fertility following cessation [61]. This delay is ascribed to the prolonged impact of low circulating levels of progestogen, persisting even after the period of peak contraceptive effectiveness [62].

Ovarian function suppression remains consistent throughout the targeted dosing interval of 13 $\pm$ 1 weeks, with the earliest occurrence of ovulation resurgence noted at 15 weeks. The median duration for the return to ovulation is approximately 30 weeks (equivalent to 212 days), and by the conclusion of one year, the cumulative rate of ovulation return reaches 97% for women who received the subcutaneous DMPA formulation, compared to 95% for those administered intramuscular DMPA [63].

5.2. Contraceptive implant

Several studies have evaluated return to fertility following the discontinuation of contraceptive implants, with the one-year pregnancy rate following implant removal as the primary indicator of return to fertility [64]. According to the findings from these investigations, approximately 74.7% of individuals who have discontinued implants conceive within 12 months [55]. However, when

the results of one Indonesian study which had an exceptionally low rate of pregnancy (48.8% among Implanon® and 37.5% among Norplant®) are removed, the mean weighted pregnancy rate increases to 83.45% [65]. Furthermore, these studies did not identify any significant disparity in fertility return rates among various types of implants. This lack of distinction could be attributed to the uniform hormone composition found in these implants, suggesting that hormonal consistency may contribute to similar fertility outcomes across different implant varieties [55].

5.3. Hormonal intrauterine device

The return of fertility among women trying to conceive after the removal of a hormonal IUD remains uncompromised, with resumption rates ranging from 71.2% to 96.4%, averaging 83.8% [55]. Furthermore, neither the type of IUD nor the duration of its use seems to affect the likelihood of pregnancy [59,66,67]. These findings align with a study indicating a one-year pregnancy rate of 79%–96% following a hormonal IUD removal, comparable to rates observed among users of natural contraceptive methods and non-users [59]. This underscores the swift restoration of fertility following IUD removal. Moreover, another study found that levels of AMH were notably decreased among current users of COCs, a vaginal ring, and DMPA, but not among current users of the LNG-IUD [68].

5.4. Progestogen-only pills

The use of POPs does not demonstrate any association with delayed conception, as indicated by evidence [69,70]. Following the discontinuation of the POP, the conception rates within a six-month timeframe were documented at 73.7%, compared to 81.5% for condom users [69]. Moreover, at the one-year mark, the conception rate for women discontinuing POPs to pursue conception reached 95% [70]. Notably, these rates closely mirror the 12-month conception rates observed in women transitioning from condom use (91%) or practising natural methods based on timed intercourse, with 92% achieving conception within the same timeframe [70].

5.5. Combined hormonal pills

Several studies have explored the impact of COCs use on the menstrual cycles immediately following discontinuation [61]. While these studies suggest some transient effects on the initial cycles, they do not indicate any lasting detrimental impact, as evidenced by unaltered one-year pregnancy rates [61]. Despite earlier studies yielding variable results regarding potential delays in return to fertility after COC use, more recent extensive investigations, such as the large prospective multinational study EURAS-OC [71] and a comprehensive systematic review in 2018 [55], have found no adverse effects on time to conception following one year of COC use, regardless of duration or formulation. In addition, a study examining the association between long-term COC use and antral follicle count (AFC) suppression reported reversible AFC suppression, returning to normal levels within 6–7 months after cessation of COC use [72]. Furthermore, a subsequent review concluded that the type of progestogen used in COCs or POPs does not significantly influence short-term or long-term pregnancy rates [71].

6. Are contraceptive hormones unnatural?

In recent years, there has been a growing trend in the preference for natural and organic products, driven by a desire for healthier, more environmentally friendly, and less chemically processed options [73]. This movement extends beyond food and personal care items, influencing decisions in reproductive health, including contraception [13]. Increasingly, individuals are becoming sceptical of synthetic substances and seek alternatives that align with their natural lifestyle preferences, or they choose to discontinue contraception to give their bodies a break from exogenous hormones. As a result, women are moving away from hormonal contraceptives, largely due to their synthetic hormone content, which is often perceived as “unnatural” [13].

The term "synthetic" refers to substances that are artificially created or synthesised outside the body [74]. Synthetic hormones undergo a sophisticated process of chemical synthesis that involves the construction of molecules with precise configurations and functional groups intended to replicate natural hormones. The ultimate objective is to formulate a compound that can interact with the body’s hormone receptors in a manner similar to naturally occurring hormones [74]. For example, ethinyloestradiol, a commonly used synthetic oestrogen in hormonal contraception, is structurally modified to enhance its stability and oral bioavailability relative to natural oestradiol [75]. These modifications allow it to resist metabolic breakdown in the liver, thereby maintaining its efficacy as an oral contraception [75].

Parallel to the trend to naturalness, the evolution of hormonal contraceptives has seen the introduction of products that incorporate more natural forms of oestrogen [75]. The first natural oestrogens used in COCs are oestradiol valerate and micronised 17β-oestradiol, the predominant oestrogen produced by women [75]. Oestradiol valerate, used in the COC named Qlaira®, is immediately metabolised to 17β-oestradiol after oral administration and is therefore identical to 17β-oestradiol as regards pharmacodynamics and clinical effects [76]. Zoely®, on the other hand, uses 17β-oestradiol directly in a monophasic preparation combined with nomegestrol acetate, a progestogen that closely mimics natural progesterone [76]. Estetrol, an oestrogen produced by the human fetal liver, is the most recently described natural oestrogen [77]. Combined with drospirenone, a well-established progestogen, estetrol is used in an oral contraceptive, with a potentially reduced thrombotic risk and improved side effect profile [77,78].

The development of these bioidentical hormone-based contraceptives marks an important step forward, addressing consumer demand for natural products without compromising on efficacy and safety [75]. One challenge with using natural oestrogens is that they can sometimes lead to poorer control of the endometrium, resulting in irregular bleeding patterns [75,77].

7. Concerns about menstruation

Women's individual preferences on bleeding patterns -ranging from having a regular bleed to no bleed at all-vary widely [79]. Qualitative studies have found that while many women viewed menstruation as inconvenient and, for some, painful, others valued having a regular bleed as it was seen as more 'natural', a process to 'cleanse' the body and a signifier that they are not pregnant [80,81]. For these women, methods that would disrupt regular bleeding were less appealing. Bleeding associated with combined hormonal contraceptives was understood as 'having a period' rather than a withdrawal bleed.

Bleeding changes with hormonal methods are common and can be unpredictable, particularly for those using progestogen methods DMPA injectable, hormonal-IUD, POPs and implants. Bleeding patterns experienced will differ based on contraceptive method formation, dose, and duration of use. Generally, healthcare professionals provide women with reassurance when experiencing changes in bleeding (including spotting, frequency, amount of blood loss, and duration) within the first six months of use of a new method, unless other clinical explanations arise [82]. Additionally, women should be informed that bleeding changes may not resolve within the first six months, and alternative treatment options should be discussed if disruptive bleeding persists.

A systematic review of studies comparing bleeding patterns indicated that only one in ten DMPA users reported normal bleeding, and this remained steady over a one-year period [83]. Amenorrhea rates for DPMA users were found to be 12% at the three-month mark, rising steadily to 46% by the one-year reference period. The comparable estimates for the LNG implant were 11% and 13%. The mean number of spotting days declined from 20.6 days over the 90-day reference period to 9.6 days by the 360-day one [83]. In contrast, LNG implant users did not experience a decrease in the number of spotting days, which averaged 20.8 days in the first reference period and remained at 19.2 days by the 360-day mark [83]. Bleeding irregularities associated with subdermal implants continue to be a prevalent reason for discontinuation [84]. In the case of hormonal IUDs, a meta-analysis showed that the combined days of menstrual bleeding and spotting gradually decreased throughout the first year, dropping from 35.6 days (95% CI: 32.2–39.1) during the first 90-day interval to 11.7 days (95% CI: 9.7–13.7) by the fourth interval [85].

8. Hormonal contraception and cancer

Numerous epidemiological studies have sought to elucidate the association between hormonal contraception and cancer risk. Hormonal contraceptives exert their effects primarily through the modulation of sex hormone levels, namely oestrogen and progesterone. These hormones wield considerable influence over cell growth and reproduction, thus raising the plausible concern that their regulatory effects could contribute to carcinogenesis in susceptible tissues [86]. However, amidst these concerns, evidence suggests that hormonal contraception also offers protective effects against certain cancers, particularly ovarian cancer and endometrial cancer [86]. The most extensively studied cancers include breast, ovarian, endometrial, and cervical cancers. These cancers are of particular interest due to their prevalence and their potential association with hormonal factors.

8.1. Breast cancer

The risk of breast cancer development remains a concern for individuals using hormonal contraception or considering starting contraceptive methods [13,87]. Given that both oestrogen and progesterone have proliferative effects on breast tissue, the impact of exogenous hormones in hormonal contraception has been extensively researched. A meta-analysis [88] noted an increase in the overall risk of breast cancer among users of modern hormonal contraceptives, with a pooled odds ratio of 1.33 (95% CI: 1.19–1.49) [88]. Moreover, another meta-analysis underscores this association by revealing that current or recent use of hormonal contraceptives, regardless of the specific formulation, is linked to an elevated risk of breast cancer [89]. This risk remains consistent across various delivery methods, including oral combined, oral or non-oral progestogen-only contraceptives [89]. However, it is important to note that while an association between hormonal contraception and breast cancer risk is observed, the absolute risk attributed to contraceptive use is low, particularly in comparison to other well-established risk factors for breast cancer, such as age, family history, and lifestyle factors (Fig. 1) [86,89]. Nevertheless, individuals considering hormonal contraception should have open discussions with their healthcare professionals about their individual risk factors and preferences to make informed decisions about contraception

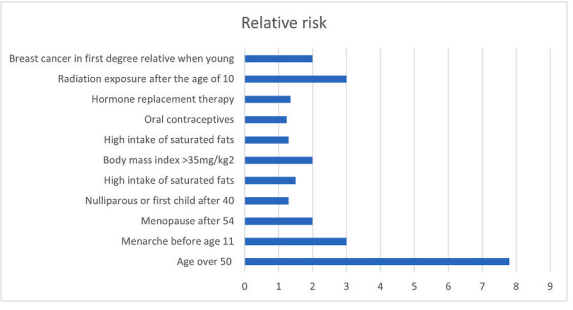

Fig. 1. Relative risk of breast cancer compared with hormonal contraception compared to other medical and lifestyle factors (adapted from Kluttig et al. and Jevtic et al.) [90,91].

options.

8.2. Ovarian cancer

In a prospective cohort study by Iversen et al. (2018) [92], the association between all forms of hormonal contraception and the risk of ovarian cancer was explored [92]. The results unveiled a noteworthy trend: individuals who were current or recent users, as well as former users, displayed lower risks of ovarian cancer compared to those who had never used hormonal contraception. Specifically, the relative risk (RR) stood at 0.58 (95% CI: 0.49–0.68) for current or recent users and 0.77 (95% CI: 0.66–0.91) for former users. Translating these findings into tangible impact, the population prevented fraction was estimated at 21%. This implies that hormonal contraception use potentially averted 21% of ovarian cancers within the study cohort. The study reported that, among current or recent users, the RR diminished from 0.82 (95% CI: 0.59–1.12) with $\leq$1 year of use to a strikingly low 0.26 (95% CI: 0.16–0.43) with over 10 years of usage, indicating a clear dose-response relationship ($p < 0.001$ for trend) [92]. These findings align with previous research focusing on COCs [93–95]. Some studies have suggested a protective effect linked to hormonal IUDs [96–98]. Yet, others show no significant association between ovarian cancer risk and hormonal IUDs, as well as other progestogen-only products [92, 99–101].

8.3. Endometrial cancer

Research indicates that the use of COCs is associated with a reduced risk of endometrial neoplasia [86]. Moreover, prolonged use of COCs amplifies this risk reduction [102]. On average, every 5 years of COC usage correlates with a RR of 0.76, resulting in a 50% decrease in risk after approximately 10–15 years of use. Notably, this protective effect persists for over 30 years following discontinuation [102]. Recent findings from the Nurses' Health Cohort Study II in 2021, which included 107,069 women, support the association between oral hormonal contraception use and a reduced risk of endometrial cancer [103]. The protective effect of hormonal contraception is attributed to the progestogen component, which promotes differentiation and inhibits the proliferation of endometrial cells [104]. Considering this mechanism, progestogen-only contraceptives appear to offer even stronger protection against endometrial carcinogenesis [96,105]. Upon diagnosis of endometrial intraepithelial neoplasia and endometrial cancer, oral progestogens and hormonal IUDs are recognised as non-surgical treatment options [106,107].

8.4. Cervical cancer

Besides tobacco smoking, immunodeficiency, infections of other sexually transmitted infections, and multiparity, exposure to COCs is hypothesised to potentially increase the risk of progression from high-risk strains of human papillomavirus (HPV) infection to cervical dysplasia or cancer [108]. Some studies indicate that prolonged use of hormonal contraceptives, particularly COCs ($\geq$5 years), may increase the risk of cervical cancer, likely due to prolonged exposure to oestrogen and its influence on cervical cell proliferation [109–111]. However, this increased risk tends to diminish after discontinuation and returns to levels comparable to never-users within 10 years [111]. Conversely, findings regarding the association between progestogen-only contraceptives and cervical cancer have been inconsistent. While some studies report an increased risk [112,113] others suggest no significant association [109] or even a potential protective effect of progestogen-only contraception against cervical dysplasia and cancer, especially among long-term users [114,115]. Despite the complexities in the research findings, it is essential to consider the broader context of cervical cancer prevention. Regular cervical cancer screening, including Pap smears and HPV testing, coupled with HPV vaccination, remains the cornerstone of cervical cancer prevention efforts.

9. Hormonal contraception and sexually transmitted infections

There are 150 million women worldwide using hormonal contraceptive methods and more than 1 million curable sexually transmitted infections (STIs) are acquired each day in people aged 15–49 years [116]. An understanding of the impact of the use of different contraceptive methods on STI prevalence is important to provide informed counselling. A recent systematic review and meta-analysis of studies published between 2005 and 2020 examined whether there is an association between use of hormonal contraception and increased STI risk, focusing on the range of STIs (*Neisseria gonorrhoeae*, syphilis/*Treponema pallidum*, *Chlamydia trachomatis*, *herpes simplex virus*, and *Trichomonas vaginalis*) and non-sexually transmitted infections (bacterial vaginosis) [117]. Comparing hormonal contraception to non-hormonal contraception or no contraception, the review noted a positive association between hormonal contraceptive methods/use and the risk of chlamydia and herpes but a negative association for *trichomoniasis* and vaginosis. A negative but statistically insignificant association was observed between hormonal contraceptive methods/use and gonorrhoea. The authors recognised that the acquired prevalence estimates indicate only an association, but concluded that hormonal contraceptive methods/use influences a woman's risk of STIs and bacterial vaginosis, with the level of risk varying by the type of STI [117].

With regard to HIV, a meta-analysis found no evidence that COCs or contraceptive implant use increased the risk of HIV in women but suggested that DMPA may increase HIV risk [118]. Following this, a large trial in South Africa, Kenya, eSwatini, and Zambia, The Evidence for Contraceptive Options and HIV Outcomes (ECHO) trial, was carried out to try and settle the ongoing uncertainty and debate around Depo-Provera® and increased HIV transmission [119]. The study compared HIV risk of women assigned to DMPA when compared with those using an IUD or hormonal implants and reported no significant difference. The authors concluded that "all

methods were safe and highly effective" [119]. The World Health Organization subsequently declared support for continued and increased access to these three contraceptive methods [120].

10. Hormonal contraception and venous thrombo-embolism

The risk of venous thromboembolism (VTE) in the use of combined hormonal contraception is documented to be elevated in numerous studies. Overall the risk of VTE with combined hormonal contraception is higher than in non-users; 3–15 per 100,000 women-year in users versus 1–5 per 10,000 in non-users. Nonetheless, the risk is low compared to pregnancy (5–20 per 10,000) and the immediate postpartum periods (40–65 per 10,000) [121,122]. The risk does vary with the progestogen component of the formulation with a pooled risk ratio of 1.5–2.0 for pills containing cyproterone acetate, desogestrel, and drospirenone compared to LNG-containing pills [123]. When these data were initially released in the United Kingdom about the newer formulations of combined hormonal contraception having a higher risk of VTE there was a 3.5% fall in the number of women prescribed the pill and a shift from third-generation to second-generation pills [124]. The risk is also increased with the oestrogen dose, with higher doses of oestrogen conferring greater odds [125]. Compared to a LNG pill containing 30–40 μg of ethinyloestradiol, pills containing drospirenone and 20 μg ethinyloestradiol have an adjusted risk ratio of 1.39 (95% CI 1.16–1.67), while those containing 30–40 μg had a risk ratio of 1.46 (95% CI 1.33–1.59) [125].

A systematic review evaluating the risk of VTE associated with progestogen-only methods used for contraception found that, compared to non-use, there was no statistically significant increase in the odds of arterial or venous thrombosis among women using POPs, implants or LNG-IUDs [126]. However, based on findings in two studies, the use of DMPA may be associated with elevated odds of VTE (OR 2.2 in both studies) [127,128].

11. Destigmatisation of the side effects of hormonal contraception

One of the key challenges of healthcare professionals to enhance effective hormonal contraceptive uptake is to destigmatise the side effects. A Cochrane review of interventions to improve contraceptive adherence and acceptability found evidence to suggest that counselling women about side effects is beneficial [129]. However, when discussing options, women's fears about non-contraceptive effects are often not elicited at consultations with healthcare professionals and they can feel unheard or dismissed when raising concerns about their experience of side effects during method use [130–132]. When the importance of the components of the contraceptive consultation was assessed, 26.3% of women placed side effects in their top three issues that mattered the most to discuss whereas only 16.3% of providers had this as one of their priorities [130]. An Australian study documented that women felt disappointed that potential side effects were not fully discussed [131].

Although not delved into in this article, misconceptions amongst healthcare professionals working in primary care regarding short-term side effects associated with hormonal contraception have been found to be common [133] and may discourage women's uptake or continuation of these methods. For example, the perceived negative impact amongst physicians of combined oral hormonal contraception on mood, appetite, and weight gain may deter users [134] Providers, for example, continue to counsel nulliparous women and young women that hormonal and non-hormonal IUDs are an inappropriate method for them despite no evidence to support this [135,136].

12. Conclusion

Hormonal contraception has received much bad press, but as we highlight here, for many women the risk of side effects and adverse events will be outweighed by the benefits. Beyond providing reliable birth control, hormonal contraception offers numerous non-contraceptive advantages. For example, combined hormonal contraceptive pills can regulate the cycle, reduce the amount of bleeding and pain, are one of the most effective acne treatments and provide protective effects against endometrial and ovarian cancer.

The repercussions of inadequate information provision and failure to counteract media misinformation have resulted in adverse outcomes for women in the past, as evidenced by the "pill scare" where the risk of VTE with COCs was not understood in context. The overreaction to data on the risk of venous thromboembolism associated with third-generation combined hormonal contraceptive pills in the United Kingdom led to a loss of confidence in the pill, discontinuation of the method and an increase in abortion rates [137].

The recent surge in negative publicity, particularly via social media, surrounding hormonal contraceptive methods underscores the necessity for healthcare professionals to effectively communicate a balanced perspective on the associated risks and benefits. By ensuring that accurate information is readily accessible, healthcare professionals can help to override prevalent myths and misconceptions, thereby empowering women to make informed decisions about their reproductive health.

13. Practice points

- Myths and misconceptions are promulgated in social media
- Many but not all of the concerns people have about hormonal contraception are not based on evidence
- Where side effects are proven it is important for healthcare professionals to provide detailed information about these and make sure that women's concerns are listened to

14. Research agenda

- How can the healthcare sector most effectively reach people with balanced information on hormonal contraception?
- What is the best way to communicate the side effects of hormonal contraception so people can make evidence- and preference-based decisions on the options available to them?
- How can we incorporate community concerns into studies on contraception so that better data are available for counselling?

CRediT authorship contribution statement

Kirsten I. Black: Writing – review & editing, Writing – original draft, Conceptualization. **Maxime Vromman:** Writing – review & editing, Conceptualization. **Rebecca S. French:** Writing – original draft, Conceptualization.

Conflicts of interest statement

None of the authors have a conflict of interest with respect to the contents of this manuscript.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.bpobgyn.2024.102573.

References

[1] Brant AR, et al. Non-contraceptive benefits of hormonal contraception: established benefits and new findings. Current Obstetrics and Gynecology Reports 2017;6(2):109–17.
[2] Slaymaker E, et al. Trends in sexual activity and demand for and use of modern contraceptive methods in 74 countries: a retrospective analysis of nationally representative surveys. Lancet Global Health 2020;8(4):e567–79.
[3] Kavanaugh ML, Pliskin E. Use of contraception among reproductive-aged women in the United States, 2014 and 2016. F S Rep 2020;1(2):83–93.
[4] Baxter AJ, et al. Contraceptive use and pregnancy planning in Britain during the first year of the COVID-19 pandemic: findings from a large, quasi-representative survey (Natsal-COVID). BMJ Sexual & Reproductive Health 2023;49(4):260–73.
[5] Wigginton B, et al. A qualitative analysis of women's explanations for changing contraception: the importance of non-contraceptive effects. J Fam Plann Reprod Health Care 2016;42(4):256–62.
[6] D'Souza P, et al. Factors influencing contraception choice and use globally: a synthesis of systematic reviews. Eur J Contracept Reprod Health Care 2022;27(5):364–72.
[7] Diedrich JT, et al. Three-year continuation of reversible contraception. Am J Obstet Gynecol 2015;213(5):662.e1–8.
[8] Madden T, et al. The role of contraceptive attributes in women's contraceptive decision making. Am J Obstet Gynecol 2015;213(1):46.e1–6.
[9] Costescu D, et al. Discontinuation rates of intrauterine contraception due to unfavourable bleeding: a systematic review. BMC Wom Health 2022;22(1):82.
[10] Stoddard RE, et al. Popular contraception videos on TikTok: an assessment of content topics. Contraception 2024;129:110300.
[11] Huang M, et al. Contraceptive content shared on social media: an analysis of Twitter. Contracept Reprod Med 2024;9(1):5.
[12] Mahdawi A. TikTok influencers fearmongering about birth control are playing into the hands of the right. In: The guardian. Sydney, Australia: Guardian Australia; 2022.
[13] Le Guen M, et al. Reasons for rejecting hormonal contraception in Western countries: a systematic review. Soc Sci Med 2021;284:114247.
[14] Hall KS, et al. An exploratory analysis of associations between eating disordered symptoms, perceived weight changes, and oral contraceptive discontinuation among young minority women. J Adolesc Health 2013;52(1):58–63.
[15] Schneider-Kamp A, Takhar J. Interrogating the pill: rising distrust and the reshaping of health risk perceptions in the social media age. Soc Sci Med 2023;331:116081.
[16] Roberts J, et al. The effect of perceived weight gain on hormonal contraception choice for women: a review. McGill J Med 2022;20(2).
[17] Bonny AE, et al. Weight gain, adiposity, and eating behaviors among adolescent females on depot medroxyprogesterone acetate (DMPA). J Pediatr Adolesc Gynecol 2004;17(2):109–15.
[18] Paul C, Skegg DC, Williams S. Depot medroxyprogesterone acetate. Patterns of use and reasons for discontinuation. Contraception 1997;56(4):209–14.
[19] Dickerson LM, et al. Satisfaction, early removal, and side effects associated with long-acting reversible contraception. Fam Med 2013;45(10):701–7.
[20] Silva-Filho AL, et al. Non-hormonal and hormonal intrauterine contraception: survey of patients' perceptions in four Latin American countries. Eur J Contracept Reprod Health Care 2016;21(3):213–9.
[21] Pratt WF, Bachrach CA. What do women use when they stop using the pill? Fam Plann Perspect 1987;19(6):257–66.
[22] Lopez LM, et al. Progestin-only contraceptives: effects on weight. Cochrane Database Syst Rev 2016;2016(8):Cd008815.
[23] Gallo MF, et al. Combination contraceptives: effects on weight. Cochrane Database Syst Rev 2014;(1).
[24] Dianat S, et al. Side effects and health benefits of depot medroxyprogesterone acetate: a systematic review. Obstet Gynecol 2019;133(2):332–41.
[25] Beksinska M, et al. Weight change among women using intramuscular depot medroxyprogesterone acetate, a copper intrauterine device, or a levonorgestrel implant for contraception: findings from a randomised, multicentre, open-label trial. EClinicalMedicine 2021;34:100800.
[26] Batista GA, et al. Body composition, resting energy expenditure and inflammatory markers: impact in users of depot medroxyprogesterone acetate after 12 months follow-up. Arch Endocrinol Metab 2017;61(1):70–5.
[27] Bonny AE, et al. Weight gain in obese and nonobese adolescent girls initiating depot medroxyprogesterone, oral contraceptive pills, or no hormonal contraceptive method. Arch Pediatr Adolesc Med 2006;160(1):40–5.
[28] Mangan SA, Larsen PG, Hudson S. Overweight teens at increased risk for weight gain while using depot medroxyprogesterone acetate. J Pediatr Adolesc Gynecol 2002;15(2):79–82.
[29] Salem HT, Abdullah KA, S M. Norplant and lactation. The Norplant subdermal contraceptive system. In: Proceedings of the symposium on longterm subdermal contraceptive implants. Assuit, Egypt: Assiut University; 1984.
[30] Sule S, Shittu O. Weight changes in clients on hormonal contraceptives in Zaria, Nigeria. Afr J Reprod Health 2005;9(2):92–100.
[31] Vickery Z, et al. Weight change at 12 months in users of three progestin-only contraceptive methods. Contraception 2013;88(4):503–8.
[32] Gallo MF, et al. Combination estrogen-progestin contraceptives and body weight: systematic review of randomized controlled trials. Obstet Gynecol 2004;103(2):359–73.

[33] Silva Dos Santos PN, et al. Changes in body composition in women using long-acting reversible contraception. Contraception 2017;95(4):382–9.
[34] Napolitano A, et al. Body composition and resting metabolic rate of perimenopausal women using continuous progestogen contraception. Eur J Contracept Reprod Health Care 2016;21(2):168–75.
[35] Gallo MF, et al. Association of progestin contraceptive implant and weight gain. Obstet Gynecol 2016;127(3):573–6.
[36] Warholm L, Petersen KR, Ravn P. Combined oral contraceptives' influence on weight, body composition, height, and bone mineral density in girls younger than 18 years: a systematic review. Eur J Contracept Reprod Health Care 2012;17(4):245–53.
[37] Kelly S, et al. Effects of oral contraceptives containing ethinylestradiol with either drospirenone or levonorgestrel on various parameters associated with well-being in healthy women. Clin Drug Invest 2010;30(5):325–36.
[38] Brønnick MK, et al. The effects of hormonal contraceptives on the brain: a systematic review of neuroimaging studies. Front Psychol 2020;11:556577.
[39] Worly BL, Gur TL, Schaffir J. The relationship between progestin hormonal contraception and depression: a systematic review. Contraception 2018;97(6):478–89.
[40] de Wit AE, et al. Hormonal contraceptive use and depressive symptoms: systematic review and network meta-analysis of randomised trials. BJPsych Open 2021;7(4):e110.
[41] Skovlund CW, et al. Association of hormonal contraception with depression. JAMA Psychiatr 2016;73(11):1154–62.
[42] de Castro Coelho F, Barros C. The potential of hormonal contraception to influence female sexuality. Int J Reprod Med 2019;2019:9701384.
[43] Sanders SA, et al. A prospective study of the effects of oral contraceptives on sexuality and well-being and their relationship to discontinuation. Contraception 2001;64(1):51–8.
[44] Wallwiener M, et al. Effects of sex hormones in oral contraceptives on the female sexual function score: a study in German female medical students. Contraception 2010;82(2):155–9.
[45] Guida M, et al. Effects of two types of hormonal contraception–oral versus intravaginal–on the sexual life of women and their partners. Hum Reprod 2005;20(4):1100–6.
[46] Oranratanaphan S, Taneepanichskul S. A double blind randomized control trial, comparing effect of drospirenone and gestodene to sexual desire and libido. J Med Assoc Thai 2006;89(Suppl 4):S17–22.
[47] Graham CA, et al. The effects of steroidal contraceptives on the well-being and sexuality of women: a double-blind, placebo-controlled, two-centre study of combined and progestogen-only methods. Contraception 1995;52(6):363–9.
[48] Boozalis A, et al. Sexual desire and hormonal contraception. Obstet Gynecol 2016;127(3):563–72.
[49] Nelson AL. Counseling issues and management of side effects for women using depot medroxyprogesterone acetate contraception. J Reprod Med 1996;41(5 Suppl):391–400.
[50] Schaffir JA, Isley MM, Woodward M. Oral contraceptives vs injectable progestin in their effect on sexual behavior. Am J Obstet Gynecol 2010;203(6):545.e1–5.
[51] Guida M, et al. Sexual life impact evaluation of different hormonal contraceptives on the basis of their methods of administration. Arch Gynecol Obstet 2014;290(6):1239–47.
[52] Skrzypulec V, Drosdzol A. Evaluation of quality of life and sexual functioning of women using levonorgestrel-releasing intrauterine contraceptive system–Mirena. Coll Antropol 2008;32(4):1059–68.
[53] Landersoe SK, et al. Concerns on future fertility among users and past-users of combined oral contraceptives: a questionnaire survey. Eur J Contracept Reprod Health Care 2019;24(5):347–55.
[54] Chandra-Mouli V, Akwara E. Improving access to and use of contraception by adolescents: what progress has been made, what lessons have been learnt, and what are the implications for action? Best Pract Res Clin Obstet Gynaecol 2020;66:107–18.
[55] Girum T, Wasie A. Return of fertility after discontinuation of contraception: a systematic review and meta-analysis. Contraception and Reproductive Medicine 2018;3(1):9.
[56] Hassan MA, Killick SR. Is previous use of hormonal contraception associated with a detrimental effect on subsequent fecundity? Hum Reprod 2004;19(2):344–51.
[57] Davis AR, et al. Occurrence of menses or pregnancy after cessation of a continuous oral contraceptive. Fertil Steril 2008;89(5):1059–63.
[58] Levin G, et al. Pelvic inflammatory disease among users and non-users of an intrauterine device. J Obstet Gynaecol 2021;41(1):118–23.
[59] Mansour D, et al. Fertility after discontinuation of contraception: a comprehensive review of the literature. Contraception 2011;84(5):465–77.
[60] Kucera R, Ulcova-Gallova Z, Topolcan O. Effect of long-term using of hormonal contraception on anti-Müllerian hormone secretion. Gynecol Endocrinol 2016;32(5):383–5.
[61] Cordova-Gomez A, et al. Potential biomarkers to predict return to fertility after discontinuation of female contraceptives-looking to the future. Front Reprod Health 2023;5:1210083.
[62] Halpern V, et al. Clinical trial to evaluate pharmacokinetics and pharmacodynamics of medroxyprogesterone acetate after subcutaneous administration of Depo-Provera. Fertil Steril 2021;115(4):1035–43.
[63] Jain J, et al. Pharmacokinetics, ovulation suppression and return to ovulation following a lower dose subcutaneous formulation of Depo-Provera®. Contraception 2004;70(1):11–8.
[64] Glasier A. Implantable contraceptives for women: effectiveness, discontinuation rates, return of fertility, and outcome of pregnancies. Contraception 2002;65(1):29–37.
[65] Affandi B. Pregnancy after removal of etonogestrel implant contraceptive (Implanon®). Medical Journal of Indonesia 1999;8:62.
[66] Doll H, Vessey M, Painter R. Return of fertility in nulliparous women after discontinuation of the intrauterine device: comparison with women discontinuing other methods of contraception. Br J Obstet Gynaecol 2001;108(3):304–14.
[67] Delbarge W, et al. Return to fertility in nulliparous and parous women after removal of the GyneFix intrauterine contraceptive system. Eur J Contracept Reprod Health Care 2002;7(1):24–30.
[68] Bernardi LA, et al. Duration, recency, and type of hormonal contraceptive use and antimüllerian hormone levels. Fertil Steril 2021;116(1):208–17.
[69] Hassan MAM, Killick SR. Is previous use of hormonal contraception associated with a detrimental effect on subsequent fecundity? Hum Reprod 2004;19(2):344–51.
[70] Barnhart KT, Schreiber CA. Return to fertility following discontinuation of oral contraceptives. Fertil Steril 2009;91(3):659–63.
[71] Cronin M, Schellschmidt I, Dinger J. Rate of pregnancy after using drospirenone and other progestin-containing oral contraceptives. Obstet Gynecol 2009;114(3):616–22.
[72] Letourneau JM, et al. Long-term hormonal contraceptive use is associated with a reversible suppression of antral follicle count and a break from hormonal contraception may improve oocyte yield. J Assist Reprod Genet 2017;34(9):1137–44.
[73] Devcich DA, Pedersen IK, Petrie KJ. You eat what you are: modern health worries and the acceptance of natural and synthetic additives in functional foods. Appetite 2007;48(3):333–7.
[74] Kuhl H. Pharmacology of estrogens and progestogens: influence of different routes of administration. Climacteric 2005;8(sup1):3–63.
[75] Fruzzetti F, Fidecicchi T, Gambacciani M. Oestrogens in oral contraception: considerations for tailoring prescription to women's needs. Eur J Contracept Reprod Health Care 2024;29(3):93–102.
[76] Zoely: a new combined oral contraceptive. Drug Ther Bull 2014;52(8):90–3.
[77] Lee A, Syed YY. Estetrol/drospirenone: a review in oral contraception. Drugs 2022;82(10):1117–25.
[78] Gérard C, Foidart JM. Estetrol: from preclinical to clinical pharmacology and advances in the understanding of the molecular mechanism of action. Drugs R 2023;23(2):77–92.
[79] Fiala C, et al. Women's preferences for menstrual bleeding frequency in 12 European countries: the Inconvenience Due to Women's Monthly Bleeding (ISY) survey. Eur J Contracept Reprod Health Care 2017;22(4):268–73.

[80] Newton VL, Hoggart L. Hormonal contraception and regulation of menstruation: a study of young women's attitudes towards 'having a period'. J Fam Plann Reprod Health Care 2015;41(3):210–5.
[81] Graham CA, et al. Women's experiences with tailored use of a combined oral contraceptive: a qualitative study. Hum Reprod 2013;28(6):1620–5.
[82] Villavicencio J, Allen RH. Unscheduled bleeding and contraceptive choice: increasing satisfaction and continuation rates. Open Access J Contracept 2016;7:43–52.
[83] Hubacher D, et al. Menstrual pattern changes from levonorgestrel subdermal implants and DMPA: systematic review and evidence-based comparisons. Contraception 2009;80(2):113–8.
[84] Moray KV, et al. A systematic review on clinical effectiveness, side-effect profile and meta-analysis on continuation rate of etonogestrel contraceptive implant. Reprod Health 2021;18(1):4.
[85] Maldonado LY, et al. Menstrual bleeding and spotting with the Levonorgestrel Intrauterine System (52 mg) during the first-year after insertion: a systematic review and meta-analysis. Am J Obstet Gynecol 2020;222(5):451–468.e9.
[86] Kamani M, Akgor U, Gültekin M. Review of the literature on combined oral contraceptives and cancer. Ecancermedicalscience 2022;16:1416.
[87] Mørch LS, et al. Contemporary hormonal contraception and the risk of breast cancer. N Engl J Med 2017;377(23):2228–39.
[88] Torres-de la Roche LA, et al. Hormonal contraception and the risk of breast cancer in women of reproductive age: a meta-analysis. Cancers 2023;15(23).
[89] Fitzpatrick D, et al. Combined and progestagen-only hormonal contraceptives and breast cancer risk: a UK nested case–control study and meta-analysis. PLoS Med 2023;20(3):e1004188.
[90] Kluttig A, Schmidt-Pokrzywniak A. Established and suspected risk factors in breast cancer aetiology. Breast Care 2009;4(2):82–7.
[91] Jevtic M, et al. Dietary influence on breast cancer. J buon 2010;15(3):455–61.
[92] Iversen L, et al. Association between contemporary hormonal contraception and ovarian cancer in women of reproductive age in Denmark: prospective, nationwide cohort study. Bmj 2018;362:k3609.
[93] Beral V, et al. Ovarian cancer and oral contraceptives: collaborative reanalysis of data from 45 epidemiological studies including 23,257 women with ovarian cancer and 87,303 controls. Lancet 2008;371(9609):303–14.
[94] Bosetti C, et al. Long-term effects of oral contraceptives on ovarian cancer risk. Int J Cancer 2002;102(3):262–5.
[95] Faber MT, et al. Oral contraceptive use and impact of cumulative intake of estrogen and progestin on risk of ovarian cancer. Cancer Causes Control 2013;24(12):2197–206.
[96] Jareid M, et al. Levonorgestrel-releasing intrauterine system use is associated with a decreased risk of ovarian and endometrial cancer, without increased risk of breast cancer. Results from the NOWAC Study. Gynecol Oncol 2018;149(1):127–32.
[97] Soini T, et al. Impact of levonorgestrel-releasing intrauterine system use on the cancer risk of the ovary and fallopian tube. Acta Oncol 2016;55(11):1281–4.
[98] Balayla J, et al. Ever-use of the intra-uterine device and the risk of ovarian cancer. J Obstet Gynaecol 2021;41(6):848–53.
[99] Chesang JJ, et al. Association of partner vasectomy, depot medroxyprogesterone acetate and intrauterine contraceptive devices with ovarian cancer. Ann Epidemiol 2021;60:15–20.
[100] D'Alessandro G, et al. Systematic review and meta-analysis on the impact of the levonorgestrel-releasing intrauterine system in reducing risk of ovarian cancer. Int J Gynaecol Obstet 2022;156(3):418–24.
[101] Minalt N, et al. Association between intrauterine device use and endometrial, cervical, and ovarian cancer: an expert review. Am J Obstet Gynecol 2023;229(2):93–100.
[102] Endometrial cancer and oral contraceptives: an individual participant meta-analysis of 27 276 women with endometrial cancer from 36 epidemiological studies. Lancet Oncol 2015;16(9):1061–70.
[103] Burchardt NA, et al. Oral contraceptive use by formulation and endometrial cancer risk among women born in 1947-1964: the Nurses' Health Study II, a prospective cohort study. Eur J Epidemiol 2021;36(8):827–39.
[104] Maxwell GL, et al. Progestin and estrogen potency of combination oral contraceptives and endometrial cancer risk. Gynecol Oncol 2006;103(2):535–40.
[105] Kietpeerakool C, et al. Depot medroxyprogesterone acetate and endometrial cancer: a multicenter case–control study. Int J Gynecol Obstet 2023;163(1):96–102.
[106] Wei H, et al. Levonorgestrel-releasing intrauterine system-based therapies for early-stage endometrial cancer: a systematic review and meta-analysis. J Gynecol Oncol 2023;34(2):e36.
[107] Suzuki Y, et al. Systemic progestins and progestin-releasing intrauterine device therapy for premenopausal patients with endometrial intraepithelial neoplasia. Obstet Gynecol 2023;141(5):979–87.
[108] Cerhan J, et al. Cancer epidemiology and prevention. New York, NY, USA: Oxford University Press; 2017.
[109] Iversen L, et al. Contemporary hormonal contraception and cervical cancer in women of reproductive age. Int J Cancer 2021;149(4):769–77.
[110] Smith JS, et al. Cervical cancer and use of hormonal contraceptives: a systematic review. Lancet 2003;361(9364):1159–67.
[111] Appleby P, et al. Cervical cancer and hormonal contraceptives: collaborative reanalysis of individual data for 16,573 women with cervical cancer and 35,509 women without cervical cancer from 24 epidemiological studies. Lancet 2007;370(9599):1609–21.
[112] Loopik DL, et al. Oral contraceptive and intrauterine device use and the risk of cervical intraepithelial neoplasia grade III or worse: a population-based study. European Journal of Cancer 2020;124:102–9.
[113] Jans L, et al. Prevalence of high-risk HPV and cervical dysplasia in IUD users and controls: a cross sectional study. Eur J Contracept Reprod Health Care 2024:1–6.
[114] Castellsagué X, et al. Intrauterine device use, cervical infection with human papillomavirus, and risk of cervical cancer: a pooled analysis of 26 epidemiological studies. Lancet Oncol 2011;12(11):1023–31.
[115] Cortessis VK, et al. Intrauterine device use and cervical cancer risk: a systematic review and meta-analysis. Obstet Gynecol 2017;130(6):1226–36.
[116] World Health Organization. Sexually transmitted infections. Key facts. 2024 [cited 23/05/24; Available from: https://www.who.int/news-room/fact-sheets/detail/sexually-transmitted-infections-(stis.
[117] Akter T, Festin M, Dawson A. Hormonal contraceptive use and the risk of sexually transmitted infections: a systematic review and meta-analysis. Sci Rep 2022;12(1):20325.
[118] Morrison CS, et al. Hormonal contraception and the risk of HIV acquisition: an individual participant data meta-analysis. PLoS Med 2015;12(1):e1001778.
[119] Evidence for Contraceptive Options and HIV Outcomes (ECHO) Trial Consortium. HIV incidence among women using intramuscular depot medroxyprogesterone acetate, a copper intrauterine device, or a levonorgestrel implant for contraception: a randomised, multicentre, open-label trial. Lancet 2019;394(10195):303–13.
[120] World Health Organization. WHO revises recommendations on hormonal contraceptive use for women at high HIV risk [cited 10/04/2024; Available from: https://www.who.int/news/item/29-08-2019-who-revises-recommendations-on-hormonal-contraceptive-use-for-women-at-high-hiv-risk; 2019.
[121] Heinemann LA, Dinger JC. Range of published estimates of venous thromboembolism incidence in young women. Contraception 2007;75(5):328–36.
[122] American College of Obstetricians and Gynecologists. ACOG Committee Opinion Number 540: risk of venous thromboembolism among users of drospirenone-containing oral contraceptive pills. Obstet Gynecol 2012;120(5):1239–42.
[123] Dragoman MV, et al. A systematic review and meta-analysis of venous thrombosis risk among users of combined oral contraception. Int J Gynecol Obstet 2018;141(3):287–94.
[124] Martin RM, Hilton SR, Kerry SM. The impact of the October 1995 'pill scare' on oral contraceptive use in the United Kingdom: analysis of a general practice automated database. Fam Pract 1997;14(4):279–84.
[125] Oedingen C, Scholz S, Razum O. Systematic review and meta-analysis of the association of combined oral contraceptives on the risk of venous thromboembolism: the role of the progestogen type and estrogen dose. Thromb Res 2018;165:68–78.
[126] Tepper NK, et al. Progestin-only contraception and thromboembolism: a systematic review. Contraception 2016;94(6):678–700.
[127] Bergendal A, et al. Association of venous thromboembolism with hormonal contraception and thrombophilic genotypes. Obstet Gynecol 2014;124(3):600–9.

[128] van Hylckama Vlieg A, Helmerhorst FM, Rosendaal FR. The risk of deep venous thrombosis associated with injectable depot-medroxyprogesterone acetate contraceptives or a levonorgestrel intrauterine device. Arterioscler Thromb Vasc Biol 2010;30(11):2297–300.
[129] Halpern V, et al. Strategies to improve adherence and acceptability of hormonal methods of contraception. Cochrane Database Syst Rev 2013;(10):Cd004317.
[130] Donnelly KZ, Foster TC, Thompson R. What matters most? The content and concordance of patients' and providers' information priorities for contraceptive decision making. Contraception 2014;90(3):280–7.
[131] Goldhammer DL, et al. What do young Australian women want (when talking to doctors about contraception)? BMC Fam Pract 2017;18(1):35.
[132] Polis CB, Hussain R, Berry A. There might be blood: a scoping review on women's responses to contraceptive-induced menstrual bleeding changes. Reprod Health 2018;15(1):114.
[133] Wellings K, et al. Attitudes towards long-acting reversible methods of contraception in general practice in the UK. Contraception 2007;76(3):208–14.
[134] Hamani Y, et al. Misconceptions about oral contraception pills among adolescents and physicians. Hum Reprod 2007;22(12):3078–83.
[135] Daniele MAS, et al. Provider and lay perspectives on intra-uterine contraception: a global review. Reprod Health 2017;14(1):119.
[136] Russo JA, Miller E, Gold MA. Myths and misconceptions about long-acting reversible contraception (LARC). J Adolesc Health 2013;52(4, Supplement):S14–21.
[137] Szarewski A, Mansour D. Social consequences. The 'pill scare': the responses of authorities, doctors and patients using oral contraception. Hum Reprod Update 1999;5(6):627–32.