

Commentary

# Contraceptive sex acceptability: a commentary, synopsis and agenda for future research<sup>☆</sup>

Jenny A. Higgins<sup>a,\*</sup>, Anne R. Davis<sup>b</sup>

<sup>a</sup>*Gender and Women's Studies, University of Wisconsin–Madison, 475 North Charter Street, 3414 Sterling Hall, Madison, WI 53706, USA*

<sup>b</sup>*Columbia University Medical Center, 630 West 168th Street, New York, NY 10032, USA*

Received 8 January 2014; revised 27 February 2014; accepted 28 February 2014

## 1. Introduction

In 2005, Severy and Newcomer argued that sexuality is a “critical issue” in contraceptive and sexually transmitted infection (STI) prevention acceptability research [1]. Yet, few studies explore current methods’ direct effects, if any, on women’s libido, enjoyment, arousal, lubrication or orgasm, let alone how such effects shape contraceptive uptake, continuation and adherence. Furthermore, researchers have thoroughly investigated contraceptive side effects such as weight gain and vaginal bleeding but rarely are such changes explored as possible sexual detractors — despite their influence on women’s bodies, desires and sexual selves. The overwhelming majority of sexual activity occurs during times when women wish to avoid pregnancy; contraception is expressly designed for non-procreative sexual activity. Investigating both negative and positive aspects of contraceptive practices represents a vital and understudied area for the contraceptive field [2].

The family planning field’s inattention to women’s sexuality, formerly termed “the pleasure deficit” [3,4], becomes more pronounced when compared to research on male-based pregnancy and STI prevention methods. Research marked by concern for men’s pleasure, libido and orgasm recognizes that methods that compromise men’s sexual well-being will limit acceptability [5–8]. For example, researchers attempt to improve condom design by developing more pleasurable latex and non-latex varieties [2]. A study

of hormonal-based contraception for men that ignored effects on erectile functioning or orgasm would be regarded as incomplete, even invalid. Neither contraceptive methods developed for women rarely receive similar sexual consideration nor do reviews of methods typically highlight their effects on women’s sexuality [9].

## 2. Ways in which contraception can affect sexual functioning and experience

Sexuality encompasses a wide range of experience, from more immediate physiological functioning and sensation to broader satisfaction with one’s sexual self and life [10]. More immediate aspects of sexual functioning include a woman’s wantedness or desire for sexual activity, her ability to begin and sustain arousal, experience sufficient lubrication, experience orgasm, enjoy the actual sensation of sexual activity and minimize sexual pain and discomfort.

Contraception may affect any of these sexual functions. Condoms and other barrier methods have direct effects on sensation and lubrication, whereas hormonal contraception could directly affect factors such as libido and orgasm as well. In a 2013 study comparing approximately 500 women using hormonal methods to a similarly sized group using non-hormonal methods of contraception exclusively, researchers found that women using hormonal methods experienced lower levels of arousal, decreased sexual pleasure, fewer orgasms and more difficulties with vaginal lubrication, even when controlling for sociodemographic characteristics such as age, relationship status, sexual exclusivity status and children in the home [11]. Any method that inhibits ovulation and the midcycle increase in

<sup>☆</sup> No conflicts of interest or funding sources need to be noted. Dr. Davis receives research support from Bayer Healthcare.

\* Corresponding author. Tel.: +1 608 890 4622.

E-mail address: jahiggins2@wisc.edu (J.A. Higgins).

cervical fluid might impact some sexual experiences in as yet unknown ways [12]. Progestin methods that strongly suppress ovarian function and reduce endogenous estradiol could impact sexual functioning by contributing to vaginal dryness, especially in peri-menopausal women. Some recent contraceptive research benefits from use of the validated Female Sexual Functioning Index (FSFI) [13], which contains domains on desire, arousal, lubrication, orgasm, pain and other sexual functions [14–17].

Contraception could also affect the sexual experience indirectly. For example, feeling more protected against pregnancy could contribute to less sexual inhibition and/or feeling sure that exogenous hormones will lower one's sex drive could diminish libido [18]. Seemingly non-sexual effects such as changes in bleeding patterns, mood [19,20], weight or breast size or tenderness could impact women's sexual functioning in specific ways. As Davis and Castaño point out [21], hormonal methods that inhibit ovulation can improve both painful gynecologic conditions (e.g., endometriosis, dysmenorrhea and ovarian cysts) and acne. Decreased pain and improved physical appearance could certainly improve sexual functioning, although positive effects remain unstudied. Some research also finds that hormonal contraceptive methods are associated with increased experiences of vulvar pain in some women [22].

Changes in bleeding patterns due to contraception can also affect women's sexual expression, either positively (i.e., with a decrease in bleeding) or negatively (with an increase in bleeding or change to more unpredictable bleeding). For both personal and cultural reasons (e.g., religious proscriptions), some women avoid vaginal intercourse and to a lesser extent other genital contact when they are bleeding or spotting [23]. Such changes may reduce interest in sex and contribute to method discontinuation. On the other hand, some women may also appreciate the opportunity to refrain from partnered sexual activity at regular intervals.

Many women lose their arousal when the risk of pregnancy is present [24], especially when partners are not equally committed to pregnancy prevention [25] — although many men are also turned off by pregnancy risk [24]. The strong protection offered by highly effective methods may very well lead to improvements in sexual confidence and disinhibition (see sterilization section), though empirical data on this issue are lacking.

Weight changes should also be considered for sexual implications. Women are more likely to attribute weight gain to their contraceptive method than lifestyle factors [26], and some methods such as depot medroxyprogesterone acetate (DMPA) [27] and implants [28] have been associated with weight gain in some studies. Women who feel less comfortable in their bodies due to such weight gain can experience detractions in their ability to feel desirable and/or enjoy sex [29]. Moreover, how a woman *feels* about her weight, versus the amount of weight itself, tends to be more salient in terms of sexuality. Satisfaction with one's body is more strongly associated with sexuality-related outcomes

than actual body size [30,31]. Of course, clinicians concerned about the sexual aspects of contraception should focus on promotion of healthy body image with women in their care.

Contraception is designed for sexual activity within the context of a couple, and the male partner's sexual experience may also impact method acceptability. For example, some women dispense with male condoms in order to enhance their *partner's* pleasure and thus their own [10]. Moreover, in order to protect partners' sexual egos, some women may encourage the initiation of vaginal intercourse without a condom, only to apply one once an erection is maintained. In a randomized comparison study between ring and patch users [32], ring users were significantly more likely than patch users to say that their partner was bothered by the product during intercourse ( $p < .001$ ), even though the majority of both users said that this occurrence “never” or “rarely” happened. Partner status and relationship satisfaction can also be significantly correlated with women's reports of their sexual functioning and/or satisfaction [16].

Finally, we wish to include that users of hormonal methods in particular may be more likely to attribute any negative sexual changes to their contraceptive method rather than to their relationships, life stressors, health or other external factors. These negative (mis)attributions will nonetheless influence acceptability and use patterns. Without further study, we have no way of knowing how the various possible influences on sexual functioning may interact or overlap.

### 3. Method-specific considerations

#### 3.1. Male condoms

Population-level research indicates that at least one in four acts of sexual intercourse in the US involve the use of male condoms [33]. A significant body of empirical literature, mainly from the HIV/AIDS and STI fields, documents that many men do not like using male condoms because they curtail sexual sensation [34–38], interrupt the sexual heat of the moment [39], make erections harder to maintain or undermine other aspects of sexual functioning and enjoyment [39–42]. The Gates Foundation recently released a call for proposals regarding the development of more pleasurable and appealing male condoms [43]. The call for proposal stated, “The primary drawback from the male perspective is that condoms decrease pleasure as compared to no condom, creating a trade-off that many men find unacceptable.”

Growing research demonstrates that the ways male condoms feel sexually matter to women, too [44]. Some women dislike like the ways condoms diminish sensation [45], exacerbate vaginal dryness [29] or interrupt the sexual moment [45]. Research from both the United Kingdom [46] and the US [47] demonstrated that women were less likely to use condoms when they experienced reductions in sexual

pleasure and functioning compared to women with more positive condom experiences. Notably, women's attitudes on whether condoms affect their arousal may be even more influential on use patterns than men's attitudes. In one cross-sectional survey of 5600 adults in the US and Canada, women who reported that condoms diminished arousal were more likely than men to have had unprotected sex in the last 12 months [24].

### 3.2. Oral contraceptives

Oral contraceptives (OCs) entered the cultural marketplace 50 years ago and are hailed as a key factor in facilitating the US sexual revolution [48]. Studies have explored if, and how, OCs affect sexual desire, enjoyment and functioning, and many of these studies have been reviewed elsewhere [12,18,21,22,49,50]. Unfortunately, the sexual impact of OCs remains poorly understood. Study methodology and quality varies widely and possible pathways of action are controversial. Further, the majority of studies on pill use and sexuality have been cross-sectional in nature (for example, see Refs. [51] and [52]), an inherent limitation if one wants to understand the causal effects of the pill and changes in sexual functioning and enjoyment over time.

Most research on OCs and sexuality examines libido [17,21,50]. OCs with estrogen reduce total and free testosterone, and decreased androgens are cited as a plausible biological mechanism for reduced libido in OC users [53]. A role for androgens is also suggested by studies showing transdermal androgens in various doses have improved sexual desire, arousal, orgasm and other sexuality effects in women presenting with libido and arousal problems [54]. Researchers have explored the supplemental use of dehydroepiandrosterone to ameliorate the decline of adrenal and ovarian androgens during combined OC (COC) use [55,56]. However, the role of androgens themselves in women's sexuality remains unclear. Results from androgen replacement studies should be interpreted in the context of known poor correlations of serum androgens and measures of women's sexual function [12,57–60].

Both 2004 and 2012 reviews assessed studies of OCs and libido and found reports of both increased and decreased libido with pill use [21,22]. Both reviews also noted the lack of high-quality studies of this topic. A few randomized, placebo-controlled studies examined libido in OC users, but few meet current standards for high-quality reporting of randomized clinical trials (CONSORT guidelines [61]), and results of these studies are mixed. A well-conducted trial demonstrated a decrease in libido in COC users compared to placebo in a sample of women in Scotland (higher baseline libido) but not in a sample of women in the Philippines (lower baseline libido) [62]. Another prospective study followed new OC users for one year ( $n=100$ ) [63]. Among those 47% who discontinued OCs over the course of the study, decreased sexual thoughts and decreased psychosexual arousability were the strongest

predictors of discontinuation. This study, like many other published observational studies, could not establish if OCs definitively *caused* the lower libido; however, it does highlight the importance of lowered libido to this sample of women and its effect on discontinuation.

Overall, while OC use does appear to be associated with diminished sexual desire in some women, it appears as if women experience positive effects, negative effects as well as no effect on libido during OC use. Additional well-designed studies are needed to establish the independent, causal effects of OCs themselves. A significant body of research suggests that women's sexual desire is impacted by many factors, including *being* desired [64]. Basson has suggested that women's sexual response is more *cyclical* than *linear* in nature, in which desire may responsively follow arousal rather than spontaneously preceding arousal [65]. The independent effects related to OCs should be weighed in the context of women's relationships, health, pregnancy plans and comparison to other methods. Strong effects related to other factors may overwhelm changes related to OC use.

### 3.3. Other hormonal methods

In comparison to OCs, comparatively few studies describe how rings, patches, injectables and implants affect women's sexual functioning. A 2013 Cochrane review of the patch and ring [66] only identified two published studies with mixed results that referred to any aspect of sexual functioning [67,68]; one found improvements in sexual functioning among ring users [67] while the other found increased reports of vaginal dryness and loss of desire [68]. Potential mechanisms for OC-mediated sexual effects (i.e., physiological and psychological) are likely similar for other hormonal methods that combine estrogen and progestin. One study of new ring and patch users (all recent COC users) compared women's FSFI scores at baseline and at 3 months [16]. Overall FSFI scores declined more in the ring group than the patch group; however, not only were declines small (less than 1 point on a 36-point scale), but they did not deter women's greater satisfaction overall with the ring compared to the patch.

The ring is unique as the only hormonal vaginal contraceptive. Data from clinical trials show most couples find it comfortable during sexual activity; for those who find it uncomfortable, the ring can be removed and replaced a few hours later without risking pregnancy. Women may hesitate to place a vaginal ring due to concerns about correct placement or discomfort; however, even women who do not use tampons or masturbate find the ring comfortable once placed [69]. Severy and Spieler suggest that contact between the penis, the ring and the vagina or cervix may serve as a sexual stimulus to some couples [2].

One particular note should be made about sexual functioning and DMPA or Depo. DMPA has been used in recent decades as "therapeutic sex drive reduction" to

suppress sex drive in male sex offenders [70]. The treatment dose for sex offenders is considerably larger than standard contraceptive formulations (300–400 mg every 10 days versus 150 mg every 12 weeks) [70]; effects on sexual suppression in women are unknown. One study of DMPA users found evidence of decreased libido in approximately 1 in 4 users (23%) returning for their second shot after 3 months [71]. In contrast, a study of Chinese women found that injectables were not significantly related to sexual functioning or overall quality of life [72].

### 3.4. Intrauterine contraception

The high efficacy of intrauterine contraception (IUC) is also likely to influence sexual enjoyment, but few studies document this or other sexual changes with IUC. Indeed, we wonder if strong user satisfaction with this method [73–75] is influenced at least in part by its facilitation of enjoyable sex, but few studies ask specifically about *sexual* satisfaction with this method when assessing acceptability. Two studies reported sexual functioning improvements in women using this method [76,77], while other investigations have found no sexual changes, positive or negative, with IUC use [44,72,78,79].

As with any contraceptive method, IUC's non-contraceptive effects should be explored for possible sexual consequences. Women who experience reductions in bleeding may sustain enhanced sexual functioning as a result and many women report a substantial reduction in menstrual bleeding as a major benefit of using the levonorgestrel intrauterine device [80]. In turn, women who experience increased bleeding or cramping or unscheduled bleeding while using IUC may experience diminished interest in sex or may experience more discomfort when engaging in sexual activity.

### 3.5. Sterilization

Female and male sterilization account for a large share of the US and global method mix. The bulk of studies on the sexual acceptability of vasectomy were conducted several decades ago, with most studies showing high sexual satisfaction among both sterilized men and their partners [81,82], but with others raising questions about the possible adverse sexual [83] and psychological [84] effects on men. A 2010 population-based study in Australia ( $N=3390$ ) found that sexual problems were equally common in vasectomized and non-vasectomized men [85].

A large, prospective US study examined women's sexual experience after female sterilization. Results showed that >80% of the 4576 women participants reported no consistent change in either sexual interest or pleasure after interval tubal sterilization [86]. Among those respondents who *did* report consistent change, positive changes were 10–15 times as common as negative changes in sexual interest or pleasure. A 2010 nationally representative study of tubal ligation among a smaller cohort of Australian women ( $N=447$ ) found a similar relationship and also

highlighted a number of possible sexual benefits to sterilization, perhaps due to the study's wider measurement of sexual effects [87]. Sterilized women were significantly more likely to experience extremely high levels of sexual satisfaction, relationship satisfaction and sexual pleasure — perhaps due in part to diminished concern about unintended pregnancy. These two studies should be reassuring for clinicians, women and their partners.

## 4. Conclusions and implications

This commentary underscores the need for high-quality research on the sexual effects and related acceptability of contraceptive methods, with equal concern for women's *and* men's sexual functioning [6]. Reason for optimism exists: a growing body of recent research considers sexual aspects of various contraceptive methods for women. It would be unwise to base understandings of the sexual side effects of contraception to any one of the abovementioned studies alone, given differences and limitations in study design, study population and method composition or mechanism [18,21]. One consistent finding of *variability* does emerge — women clearly vary in their sexual responses during contraceptive use, and we understand little about the reasons for this variability.

Though such variability may be daunting for researchers, we nonetheless argue that contraceptive studies should systematically collect data on sexuality and sexual functioning. The abovementioned FSFI could be helpful in capturing domains relating to arousal, lubrication, orgasm, satisfaction, relationship closeness and pain<sup>1</sup> [13]. Another possible measure is the Sexual Functioning Questionnaire (SFQ), which was designed to assess changes in sexual function after a medical treatment or condition [88] and thus may be well suited to assess effects of a contraceptive “treatment.” Several SFQ items gather more subjective data on how the respondent thinks the method may have affected her sexual functioning (for example, “what impact has your [contraceptive method] had on your sex life?”). Even if a contraceptive method isn't “truly” or solely responsible for sexual detractions, respondents' feelings about such detractions will shape use patterns and thus must be better understood. Along these lines, researchers should recognize that women may be more likely to attribute negative sexual changes to their contraceptive method rather than their relationships, mood, health, life stressors or other external factors. These negative (mis)attributions, whether causal or not, will nonetheless influence acceptability and use patterns. At the very least, studies of methods' potential effects on sexuality should control for relationship duration, age,

<sup>1</sup> The “satisfaction” domain of the FSFI measures overall satisfaction with the sexual relationship, not satisfaction of the sexual experiences occurring in the past 4 weeks as the other domains measure. Thus, this particular part of the index might not be suitable for measures of contraception.

mental health factors and associated pharmaceuticals in use and other known correlates of sexual satisfaction.

We also encourage an approach that taps into the sexual-improvement potential in contraceptive counseling, programming and marketing [3,89–91]. What if clinicians and contraceptive marketers were to tout the potential sexual benefits of methods? Existing contraceptive advertisements portray women as empowered medical consumers but not as sexual agents. Ads promote convenience, efficacy and non-contraceptive benefits (e.g., menstrual timing and regulation, acne improvement) but not their potential catalysis of pleasurable, worry-free sex. It strikes us as odd that our culture uses sexual and erotic images to sell many consumer goods — but not to sell contraception, which is designed expressly for sexual activity.

Along these lines, sexual and reproductive health clients could be well served by investigations of the feasibility and benefits of eroticizing of contraceptives. This trend can be seen globally in pleasure-centered sexual health promotion efforts, including the eroticization of safer-sex campaigns [91,92] (see also [thepleasureproject.org](http://thepleasureproject.org)). The contraceptive field should follow suit.

### Acknowledgments

During preparation of this manuscript, Dr. Higgins was supported by an NIH K12 award (K12HD055894) from the Eunice Kennedy Shriver National Institute of Child Health and Development. With permission from the editors, some material for this review comes from Chapter 1, “Sexuality and Contraception,” from *Contraceptive Technology, 20th Edition*, Hatcher et al., editors [93]. The authors wish to thank Cynthia Graham for her review of this material and insightful comments. Anne Cooper and Samantha Scholer provided sparkling research assistance.

### References

- [1] Severy LJ, Newcomer S. Critical issues in contraceptive and STI acceptability research. *J Soc Issues* 2005;61(1):45-65.
- [2] Severy LJ, Spieler J. New methods of family planning: implications for intimate behavior. *J Sex Res* 2000;37(3):258-65.
- [3] Higgins JA, Hirsch JS. The pleasure deficit: revisiting the “sexuality connection” in reproductive health. *Perspect Sex Reprod Health* 2007;39(4):240-7.
- [4] Harvey PD. The importance of pleasure. *Perspect Sex Reprod Health* 2008;40(1):59.
- [5] Solomon H, Yount KM, Mbizvo MT. ‘A shot of his own’: the acceptability of a male hormonal contraceptive in Indonesia. *Cult Health Sex* 2007;9(1):1-14.
- [6] Oudshoorn N. *The male pill: a biography of a technology in the making*. Durham, NC: Duke University Press; 2003.
- [7] WHO. *Hormonal contraception for men: acceptability and effects on sexuality*. World Health Organization Task Force on Psychosocial Research in Family Planning, Special Programme of Research, Development and Research Training in Human Reproduction. *Stud Fam Plann* 1982;13(11):328-42.
- [8] Meriggiola MC, Cerpolini S, Bremner WJ, Mbizvo MT, Vogelsong KM, Martorana G, et al. Acceptability of an injectable male contraceptive regimen of norethisterone enanthate and testosterone undecanoate for men. *Hum Reprod* 2006;21(8):2033-40.
- [9] Krychman M, Kellogg Spadt S, Burrows LJ, Johnson-Agbakwu C, Goldstein I, Goldstein A. Commentary on the supplement American journal of obstetrics and gynecology: a hormonal contraceptive update: a decade of innovation and transformation. *J Sex Med* 2012;9(8):2196-7.
- [10] Higgins JA, Hirsch JS. Pleasure and power: incorporating sexuality and inequality into research on contraceptive use and unintended pregnancy. *Am J Public Health* 2008;98(10):1803-13.
- [11] Smith NK, Jozkowski KN, Sanders SA. Hormonal contraception and female pain, orgasm and sexual pleasure. *J Sex Med* 2013.
- [12] Stuckey BG. Female sexual function and dysfunction in the reproductive years: the influence of endogenous and exogenous sex hormones. *J Sex Med* 2008;5(10):2282-90.
- [13] Rosen R, Brown C, Heiman J, Leiblum S, Meston C, Shabsigh R, et al. The Female Sexual Function Index (FSFI): a multidimensional self-report instrument for the assessment of female sexual function. *J Sex Marital Ther* 2000;26(2):191-208.
- [14] Skrzypulec V, Drosdzol A. Evaluation of the quality of life and sexual functioning of women using a 30-microg ethinyloestradiol and 3-mg drospirenone combined oral contraceptive. *Eur J Contracept Reprod Health Care* 2008;13(1):49-57.
- [15] Strufaldi R, Pompei LM, Steiner ML, Cunha EP, Ferreira JA, Peixoto S, et al. Effects of two combined hormonal contraceptives with the same composition and different doses on female sexual function and plasma androgen levels. *Contraception* 2010;82(2):147-54.
- [16] Gracia CR, Sammel MD, Charlesworth S, Lin H, Barnhart KT, Creinin MD. Sexual function in first-time contraceptive ring and contraceptive patch users. *Fertil Steril* 2010;93(1):21-8.
- [17] Schaffir JA, Isley MM, Woodward M. Oral contraceptives vs injectable progestin in their effect on sexual behavior. *Am J Obstet Gynecol* 2010;203(6):545e1-5.
- [18] Schaffir J. Hormonal contraception and sexual desire: a critical review. *J Sex Marital Ther* 2006;32(4):305-14.
- [19] Gingnell M, Engman J, Frick A, Moby L, Wikstrom J, Fredrikson M, et al. Oral contraceptive use changes brain activity and mood in women with previous negative affect on the pill — a double-blinded, placebo-controlled randomized trial of a levonorgestrel-containing combined oral contraceptive. *Psychoneuroendocrinology* 2013;38(7):1133-44.
- [20] Fortenberry JD, Hensel DJ. The association of sexual interest and sexual behaviors among adolescent women: a daily diary perspective. *Horm Behav* 2011;59(5):739-44.
- [21] Davis AR, Castaño PM. Oral contraceptives and libido in women. *Annu Rev Sex Res* 2004;15:297-320.
- [22] Burrows LJ, Basha M, Goldstein AT. The effects of hormonal contraceptives on female sexuality: a review. *J Sex Med* 2012;9(9):2213-23.
- [23] Davis AR, Nowygrod S, Shabsigh R, Westhoff C. The influence of vaginal bleeding on the sexual behavior of urban, Hispanic women and men. *Contraception* 2002;65(5):351-5.
- [24] Higgins JA, Tanner AE, Janssen E. Arousal loss related to safer sex and risk of pregnancy: implications for women’s and men’s sexual health. *Perspect Sex Reprod Health* 2009;41(3):150-7.
- [25] Graham CA, Sanders SA, Milhausen RR, McBride KR. Turning on and turning off: a focus group study of the factors that affect women’s sexual arousal. *Arch Sex Behav* 2004;33(6):527-38.
- [26] London RS. A comparison of levonorgestrel implants with depo-medroxyprogesterone acetate injections for contraception. *J SOGC*. 1993;15(8):925–8, 32.
- [27] Bahamondes L, Trevisan M, Andrade L, Marchi NM, Castro S, Diaz J, et al. The effect upon the human vaginal histology of the long-term use of the injectable contraceptive Depo-Provera. *Contraception* 2000;62(1):23-7.
- [28] Blumenthal PD, Gemzell-Danielsson K, Marintcheva-Petrova M. Tolerability and clinical safety of Implanon. *Eur J Contracept Reprod Health Care* 2008;13(Suppl 1):29-36.

- [29] Higgins JA, Hirsch JS. Pleasure, power, and inequality: incorporating sexuality into research on contraceptive use. *Am J Public Health* 2008;98(10):1803-13.
- [30] Satinsky S, Reece M, Dennis B, Sanders S, Bardzell S. An assessment of body appreciation and its relationship to sexual function in women. *Body Image* 2012;9(1):137-44.
- [31] Weaver AD, Byers ES. The relationships among body image, body mass index, exercise, and sexual functioning in heterosexual women. *Psychol Women Quart* 2006;30(4):333-9.
- [32] Creinin MD, Meyn LA, Borgatta L, Barnhart K, Jensen J, Burke AE, et al. Multicenter comparison of the contraceptive ring and patch: a randomized controlled trial. *Obstet Gynecol* 2008;111(2 Pt 1):267-77.
- [33] Reece M, Herbenick D, Schick V, Sanders SA, Dodge B, Fortenberry JD. Condom use rates in a national probability sample of males and females ages 14 to 94 in the United States. *J Sex Med* 2010;7(Suppl 5):266-76.
- [34] Chapman S, Hodgson J. Showers in raincoats: attitudinal barriers to condom use in high-risk heterosexuals. *Community Health Stud* 1988;12(1):97-105.
- [35] Chapman S, Stoker L, Ward M, Porritt D, Fahey P. Discriminant attitudes and beliefs about condoms in young, multi-partner heterosexuals. *Int J STD AIDS* 1990;1(6):422-8.
- [36] Browne J, Minichiello V. The condom: why more people don't put it on. *Sociol Health Illn* 1994;16(2):229-51.
- [37] Siegel K, Gibson WC. Barriers to the modification of sexual-behavior among heterosexuals at risk for acquired immunodeficiency syndrome. *N Y State J Med* 1988;88(2):66-70.
- [38] Ross MW. Attitudes toward condoms and condom use — a review. *Int J STD AIDS* 1992;3(1):10-6.
- [39] Flood M. Lust, trust and latex: why young heterosexual men do not use condoms. *Cult Health Sex* 2003;5(4):353-69.
- [40] Khan SI, Hudson-Rodd N, Saggars S, Bhuiyan MI, Bhuiya A. Safer sex or pleasurable sex? Rethinking condom use in the AIDS era. *Sex Health* 2004;1(4):217-25.
- [41] Thomsen S, Stalker M, Toroitich-Ruto C. Fifty ways to leave your rubber: how men in Mombasa rationalise unsafe sex. *Sex Transm Infect* 2004;80(6):430-4.
- [42] Crosby RA, Graham CA, Yarber WL, Sanders SA. If the condom fits, wear it: a qualitative study of young African-American men. *Sex Transm Infect* 2004;80(4):306-9.
- [43] Grand Challenges in Global Health. Develop the Next Generation of Condoms (<http://www.grandchallenges.org/Explorations/Topics/Pages/NextGenerationCondomRound1.aspx>). 2013 [July 1, 2013].
- [44] Martin-Loeches M, Orti RM, Monfort M, Ortega E, Rius J. A comparative analysis of the modification of sexual desire of users of oral hormonal contraceptives and intrauterine contraceptive devices. *Eur J Contracept Reprod Health Care* 2003;8(3):129-34.
- [45] Williamson LM, Buston K, Sweeting H. Young women and limits to the normalisation of condom use: a qualitative study. *AIDS Care* 2009;21(5):561-6.
- [46] Holland J, Ramazanoglu C, Sharpe S, Thomson R. The male in the head: young people, heterosexuality and power. London: Turfnell Press; 1998.
- [47] Ehrhardt A, Exner TM, Hoffman S, Silberman I, Yingling S, Adams-Skinner J, et al. HIV/STD risk and sexual strategies among women family planning clients in New York: Project FIO. *AIDS Care* 2002;6(1):1-12.
- [48] Gibbs N. The pill at 50: sex, freedom and paradox. <http://www.time.com/time/health/article/0,8599,1983712,00.html#ixzz0mnCmwRoc>. Time Magazine [serial on the Internet]. 2010.
- [49] Nappi RE, Albani F, Tonani S, Santamaria V, Pisani C, Terreno E, et al. Psychosexual well-being in women using oral contraceptives containing drospirenone. *Funct Neurol* 2009;24(2):71-5.
- [50] Pastor Z, Holla K, Chmel R. The influence of combined oral contraceptives on female sexual desire: a systematic review. *Eur J Contracept Reprod Health Care* 2013;18(1):27-43.
- [51] Wallwiener CW, Wallwiener LM, Seeger H, Muck AO, Bitzer J, Wallwiener M. Prevalence of sexual dysfunction and impact of contraception in female German medical students. *J Sex Med*.
- [52] Davison SL, Bell RJ, LaChina M, Holden SL, Davis SR. Sexual function in well women: stratification by sexual satisfaction, hormone use, and menopause status. *J Sex Med* 2008;5(5):1214-22.
- [53] Zimmerman Y, Eijkemans MJ, Coelingh Bennink HJ, Blankenstein MA, Fauser BC. The effect of combined oral contraception on testosterone levels in healthy women: a systematic review and meta-analysis. *Hum Reprod Update* 2014;20(1):76-105.
- [54] Davis SR. Androgen therapy in women, beyond libido. *Climacteric* 2013;16(Suppl 1):18-24.
- [55] Zimmerman Y, Coelingh Bennink HJ, Wouters W, Ebes F, Fauser BC. The pharmacokinetics and pharmacodynamics of dehydroepiandrosterone during use of an ethinylestradiol- and drospirenone-containing oral contraceptive. *Eur J Contracept Reprod Health Care* 2013;18(6):489-500.
- [56] Zimmerman Y, Wouters W, Coelingh Bennink HJ. The bioequivalence of the contraceptive steroids ethinylestradiol and drospirenone is not affected by co-administration of dehydroepiandrosterone. *Eur J Contracept Reprod Health Care* 2013;18(3):206-14.
- [57] Basson R. Hormones and sexuality: current complexities and future directions. *Maturitas* 2007;57(1):66-70.
- [58] Davis SR, Davison SL, Donath S, Bell RJ. Circulating androgen levels and self-reported sexual function in women. *JAMA* 2005;294(1):91-6.
- [59] Santoro N, Torrens J, Crawford S, Allsworth JE, Finkelstein JS, Gold EB, et al. Correlates of circulating androgens in mid-life women: the study of women's health across the nation. *J Clin Endocrinol Metab* 2005;90(8):4836-45.
- [60] Graham CA, Bancroft J, Doll HA, Greco T, Tanner A. Does oral contraceptive-induced reduction in free testosterone adversely affect the sexuality or mood of women? *Psychoneuroendocrinology* 2007;32(3):246-55.
- [61] Moher D, Schulz KF, Altman DG. The CONSORT statement: revised recommendations for improving the quality of reports of parallel-group randomised trials. *Lancet* 2001;357(9263):1191-4.
- [62] Graham CA, Ramos R, Bancroft J, Maglaya C, Farley TM. 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.
- [63] Sanders SA, Graham CA, Bass JL, Bancroft J. 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.
- [64] Meana M. Elucidating women's (hetero)sexual desire: definitional challenges and content expansion. *J Sex Res* 2010;47(2):104-22.
- [65] Basson R. Women's sexual dysfunction: revised and expanded definitions. *CMAJ* 2005;172(10):1327-33.
- [66] Lopez LM, Grimes DA, Gallo MF, Stockton LL, Schulz KF. Skin patch and vaginal ring versus combined oral contraceptives for contraception. *Cochrane Database Syst Rev* 2013;4 CD003552.
- [67] Guida M, Di Spiezio Sardo A, Bramante S, Sparice S, Acunzo G, Tommaselli GA, 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.
- [68] Sabatini R, Cagiano R. Comparison profiles of cycle control, side effects and sexual satisfaction of three hormonal contraceptives. *Contraception* 2006;74(3):220-3.
- [69] Schafer JE, Osborne LM, Davis AR, Westhoff C. Acceptability and satisfaction using Quick Start with the contraceptive vaginal ring versus an oral contraceptive. *Contraception* 2006;73(5):488-92.
- [70] Freund K. Therapeutic sex drive reduction. *Acta Psychiatr Scand Suppl* 1980;287:5-38.
- [71] Tinkle M, Reifsnider E, Ransom SP. Why women quit using Depo-Provera: a quality assurance problem. *AWHONN Lifelines* 2001;5(6):37-41.
- [72] Li RH, Lo SS, Teh DK, Tong NC, Tsui MH, Cheung KB, et al. Impact of common contraceptive methods on quality of life and sexual

- function in Hong Kong Chinese women. *Contraception* 2004;70(6):474-82.
- [73] Romer T, Linsberger D. User satisfaction with a levonorgestrel-releasing intrauterine system (LNG-IUS): data from an international survey. *Eur J Contracept Reprod Health Care* 2009;14(6):391-8.
- [74] Lyus R, Lohr P, Prager S. Use of the Mirena LNG-IUS and Paragard CuT380A intrauterine devices in nulliparous women. *Contraception* 2010;81(5):367-71.
- [75] Hubacher D. Copper intrauterine device use by nulliparous women: review of side effects. *Contraception* 2007;75(6 Suppl):S8–11.
- [76] 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.
- [77] Gorgen H, Api M, Akca A, Cetin A. Use of the Levonorgestrel-IUS in the treatment of menorrhagia: assessment of quality of life in Turkish users. *Arch Gynecol Obstet* 2009;279(6):835-40.
- [78] Ewies AA. Levonorgestrel-releasing intrauterine system — the discontinuing story. *Gynecol Endocrinol* 2009;25(10):668-73.
- [79] Suhonen S, Haukkamaa M, Jakobsson T, Rauramo I. Clinical performance of a levonorgestrel-releasing intrauterine system and oral contraceptives in young nulliparous women: a comparative study. *Contraception* 2004;69(5):407-12.
- [80] Varney SJ, Guest JF. Relative cost effectiveness of Depo-Provera, Implanon, and Mirena in reversible long-term hormonal contraception in the UK. *Pharmacoeconomics* 2004;22(17):1141-51.
- [81] Ferber AS, Tietze C, Lewit S. Men with vasectomies — a study of medical sexual and psychosocial changes. *Psychosom Med* 1967;29(4):354.
- [82] Freund M, Davis JE. Follow-up study of effects of vasectomy on sexual behavior. *J Sex Res* 1973;9(3):241-68.
- [83] Rodgers DA, Ziegler FJ, Altrocchi J, Levy N. A longitudinal study of the psycho-social effects of vasectomy. *J Marriage Fam* 1965;27(1):59-64.
- [84] Wiest WM, Janke LD. Methodological critique of research on psychological effects of vasectomy. *Psychosom Med* 1974;36(5):438-49.
- [85] Smith A, Lyons A, Ferris J, Richters J, Pitts M, Shelley J. Are sexual problems more common in men who have had a vasectomy? A population-based study of Australian men. *J Sex Med* 2010;7(2):736-42.
- [86] Costello C, Hillis SD, Marchbanks PA, Jamieson DJ, Peterson HB, Group USCRoSW. The effect of interval tubal sterilization on sexual interest and pleasure. *Obstet Gynecol* 2002;100(3):511-7.
- [87] Smith A, Lyons A, Ferris J, Richters J, Pitts M, Shelley J. Are sexual problems more common in women who have had a tubal ligation? A population-based study of Australian women. *BJOG* 2010;117(4):463-8.
- [88] Syrjala KL, Roth-Roemer SL, Abrams JR, Scanlan JM, Chapko MK, Visser S, et al. Prevalence and predictors of sexual dysfunction in long-term survivors of marrow transplantation. *J Clin Oncol* 1998;16(9):3148-57.
- [89] Higgins JA. Sex as “risk of conception”?: sexual frames within the family planning field. In: Aggleton P, & Parker RG, editors. *Routledge handbooks of sexuality, health and rights*. New York: Routledge; 2010. p. 153-63.
- [90] Philpott A, Knerr W, Maher D. Promoting protection and pleasure: amplifying the effectiveness of barriers against sexually transmitted infections and pregnancy. *Lancet* 2006;368(9551):2028-31.
- [91] Philpott A, Knerr W, Boydell V. Pleasure and prevention: when good sex is safer sex. *Reprod Health Matters* 2006;14(28):23-31.
- [92] Scott-Sheldon LA, Johnson BT. Eroticizing creates safer sex: a research synthesis. *J Primary Prevent* 2006;27(6):619-40.
- [93] Hatcher RA. *Contraceptive technology*. 20th rev. ed. New York, NY: Ardent Media; 2011.