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Review article

Dual Use of Long-Acting Reversible Contraceptives and Condoms Among Adolescents

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A B S T R A C T

Unintended pregnancy and sexually transmitted infections (STI) continue to be significant public health problems, and adolescents are disproportionately affected by both. With national attention and funding directed toward adolescent pregnancy prevention, promotion of long-acting reversible contraceptive (LARC) use among adolescents is both timely and relevant. However, LARCs provide no protection against STIs, requiring dual-method use of both LARC and barrier methods, most commonly the male latex condom, to address these issues simultaneously.

Rates of both LARC and dual-method contraception are low in the United States, but have increased in recent years. Dual-method contraception is highest among younger women and adolescents with multiple or new sex partners. Consistent condom use remains a major barrier to dual-method use, as it necessitates admission of STI risk by both partners, and use is dependent upon two decision-makers rather than a single contraceptive user.

Promoting the initiation and maintenance of LARC and condom use across multiple partnered sexual encounters requires understanding of individual, dyadic, and social influences. Successful maintenance of contraceptive and STI prevention behaviors requires individualized, longitudinal reinforcement, and social supports, but can ultimately reduce the burden of unintended pregnancy and STI among adolescents.

Adolescents disproportionately bear the burden of both sexually transmitted infections (STIs) and unintended pregnancy in the United States. Though adolescent pregnancy rates are at their lowest in history, they remain significantly elevated as compared with the rest of the industrialized world [1], and are a costly public health problem. Declines in pregnancy rates are largely attributable to the development and uptake of highly effective contraceptive methods. The most commonly used contraceptives among adolescent women require daily, weekly, or monthly action on the part of the user, or require clinic attendance at regular 3-month intervals. Lapses in these time-sensitive contraceptives are a common reason for contraceptive "failures" and resultant unintended pregnancy. Long-acting reversible contraceptives (LARCs) include progestin implants, progestin intrauterine systems, and copper intrauterine devices, which provide user independent contraception for 3 to 10 years.

LARCs have high efficacy in prevention of unintended pregnancy, with perfect and typical use efficacy similar to surgical sterilization procedures, but they do not prevent STI. While professional organizations and public health campaigns are promoting LARC use among adolescents, they are simultaneously promoting condom use for STI prevention. Condoms can be promoted for both pregnancy and STI prevention, but given the high contraceptive efficacy of LARC, use of condoms in the presence of LARC necessitates admission that one is at risk for STI.

The purpose of this review is to summarize current data on LARC and condom use among adolescents. Understanding the multidimensional framework—individual, dyadic, family, and

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social—within which young people make contraceptive and STI prevention decisions is necessary to improve adolescent sexual health.

Review of Relevant Literature

Condom use

Public health emphasis on HIV/STI prevention has been effective in achieving high rates of condom use: condom use at last vaginal intercourse was reported by 80% and 70%, respectively, of a national sample of 14–17-year-old adolescent men and women [2]. Among adolescent women, condom use at first coitus is also common (50%–57%) as compared with hormonal contraception at first coitus (7%–20%) [3,4]. Condom use at first coitus is associated with higher levels of subsequent condom use and lower STI rates [5], although condom use may decrease rapidly from first to subsequent coital events [4].

Condoms reduce risk of heterosexually transmitted HIV by about 80% [6]. Reductions in risk of other STI—gonorrhea, chlamydia, genital herpes, and human papilloma virus (HPV)—are also documented [7]. Few studies of HIV/STI prevention effectiveness of condoms include substantial numbers of adolescents but condoms are associated with reduced risk of chlamydia and HPV in longitudinal studies of adolescent women [8,9]. The female condom offers similar levels of HIV/STI protection although uptake among adolescents is very low [10], with ever-use among 15–19-year-olds of 1.4% [11].

Many adolescents and young adults use condoms primarily as contraceptives: 78% of respondents associated condoms with pregnancy prevention as opposed to STI prevention alone (10%) [12]. Male condoms are effective contraceptives, with a perfect use failure rate of 2% in the first 12 months of use. The typical use failure rate for condoms is 17% in the first year, entirely accounted for by incorrect or inconsistent use [13]. Female condoms are slightly less effective, with first-year failure rates of 5% for perfect use and 21% for typical use [14]. Condoms are recommended as a “back-up” contraceptive during periods of hormonal method initiation, or for lapses in method use [15].

Dual-method use

The added contraceptive benefit of condoms has provided an additional strategy beyond STI prevention to promote dual-method use. Mathematical modeling has been used to estimate the effect of dual-method protection on both STI and pregnancy prevention and found that, regardless of model assumptions, both outcomes were significantly improved but at higher contraceptive cost [16]. In one prospective clinical study of 462 women with a mean age of 22 years, adherence to dual-method use among 9.3% of the participants over 12–24 months decreased both pregnancy and STI [17]. However, dual-method cost and efficacy studies have included all hormonal methods and not been LARC specific. With the high efficacy of LARC methods, the contraceptive benefit of condom use likely has lower impact on pregnancy outcomes, and condoms are relegated to an STI prevention role.

Among sexually active adolescent women, nearly 60% use highly effective contraceptives (oral contraceptives, injectables, LARC), but only 12% use condoms as well [18]. Estimates of the rates of dual-method use across sociodemographic factors and study methodology are highly consistent, ranging from 12%–23% [19–22], and increasing slightly over the past two decades [23]. Though overall rates of dual-method use are low, adolescents have higher rates of dual-method use than adults. In the 2002–2005 National Survey of Family Growth (NSFG), 23% of 18–26-year-olds used dual contraception [22]. Women ages 16–24 years are more likely to report dual-method use than women over age 35 years [19]. The decline of dual use with age is due primarily to a decrease in condom use [3].

Among LARC users, condom use is lower as compared with women using other contraceptive methods. According to NSFG 2006–2008, only 3.3% of LARC users also used condoms, as compared with 21.7% of women using oral contraceptives, 16% of transdermal contraceptive patch users, 32.6% of intravaginal contraceptive ring users, and 16.7% of women using depot medroxyprogesterone acetate (DMPA) [21]. These rates are improved from NSFG 2002 data, which showed even lower rates of condom use with oral contraceptives (15.2%–17.6%), DMPA (11.3%–14.5%), and LARCs (1.8%–1.9%) [23].

Predictors of dual-method use

Research aimed at improving our understanding of dual-method use and nonuse has largely focused on individual level predictors, because these are often considered the most conducive to interventions. Individual contraceptive attitudes and beliefs influence rates of contraceptive use among 7th–11th grade students and remain stable over 12–18 months. Data from Waves 1 and 2 of the National Study of Adolescent Health demonstrated that beliefs that positively correlated with contraceptive use included perceived benefits of sex, positive attitudes about birth control, and higher perceived risk of STI and pregnancy consequences [24].

Many predictors of dual-method use with LARCs mirror predictors of adolescent condom use. Inconsistent use and nonuse of condoms are predicted by younger age at first coitus, older partner age, history of sexual abuse, lower self-esteem, and obesity [25–28]. Longer relationship duration is also predictive of lower condom only or dual-method use, but not of overall contraceptive use, even controlling for age [22]. This finding reinforces the idea that as relationships progress in time and trust, the primary objective is contraception, rather than STI prevention. Alcohol and marijuana use are often associated with condom nonuse, but these associations weaken when analyses control for relationship variables and prior patterns of condom use [29]. Though younger women may be less efficacious at negotiating condom use, among LARC users young women have the highest rates of condom use. In a prospective study of 1,073 new users of DMPA or LARC, 15–19-year-olds were nearly twice as likely as women 20 years and older to use condoms [30]. This age differential for dual-method use is confirmed in both clinic-based and national samples of women [20,21,23,25]. In a cross-sectional analysis of 701 African-American women aged 14–20 years, dual-method use was also associated with higher self-esteem, lower impulsivity, higher partner communication self-efficacy, and lower fear of condom negotiation [25]. Confidence about using condoms without embarrassment or breaking the sexual mood was associated with higher dual-method use in a sample of 371 contraceptive users ages 18–50 years [20], as was motivation to avoid STI.

Women who have multiple or new partners appropriately recognize their risk for STI acquisition. The National Survey of Family Growth demonstrates an increase in condom use from

married women with one partner to women with multiple partners [23]. Cushman et al. conducted a prospective study of 1,073 new users of contraceptive implants and injectables and found that women with multiple partners in a given year had higher dual-method use than their monogamous peers. Patients with more than one partner at baseline increased dual-method use from 25% to 31% over the course of the study [30].

Although LARC use can be determined by a young woman independent of her partner, condom use, and therefore dual-method use, requires dyadic interactions that must be examined and addressed to promote dual-method use. Relationship characteristics are especially important as determinants of condom use. Young women are less likely to use condoms with "steady" or "main" partners, or with older partners [31–35]. Condom use within relationships declines rapidly, with use becoming less consistent within 3 weeks of first sex within a relationship [36]. These partner findings have generally been thought to represent a perception of decreased risk of STI with a regular trusted partner, and a younger woman's inability to negotiate condom use with an older partner. Regardless of partner age, fear of condom negotiation and poor partner communication self-efficacy predict condom nonuse [25].

Among young adults with steady partners, detailed interviews have been employed to understand decision-making around condom use or nonuse for prevention of unintended pregnancy and STI. In one study, 62% of the sample reported inconsistent use or nonuse of condoms, and rates did not differ between men and women [12]. Cognitions associated with condom nonuse showed biased evaluations of risk, endorsement of poor alternatives (e.g., withdrawal as a contraceptive method rather than condom use), focus on short-term negatives of condom use (e.g., smell) rather than long-term consequences of STI or unintended pregnancy, actively dismissing risk, and passively ignoring risk [12]. Many of these cognitions were based in a perception that intimacy with a given partner was itself protective against unwanted outcomes, and that the absence of negative outcomes at earlier points in a relationship was evidence that negative outcomes would not occur despite condom nonuse.

Until recently, there had been little exploration of the complex communication and reasoning that occurs between adolescents to determine whether a condom is or is not used for a specific sexual encounter. However, data from 1,426 adolescent participants of Waves 1 (1995) and 2 (1996) of the National Longitudinal Study of Adolescent Health showed that 45% of young men and 53% of young women discussed contraception or STIs before having first sex [37]. An extensive exploration of strategies used to obtain or avoid condom use was conducted by Tschann et al. [38]. The sample of 574 young men and women between the ages of 16 and 22 years had high condom use (50%), with 59% wanting to use condoms, 44% wanting to avoid condoms, and 18% wanting to both use and avoid during the past month. Strategies to obtain condom use included direct discussion of risk, direct request to use a condom, direct verbal or nonverbal condom communication (e.g., told partner you had a condom, applied a condom without verbal communication), and insistence on condom use. Condom avoidance strategies included emotional coercion, ignoring condom use, expressing dislike for or alternatives to condom use, or seduction (e.g., sweet-talking partner to avoid condom use.) Both young men and young women practiced condom use and avoidance strategies. The use of specific strategies was similar across genders, with young men more likely to use direct verbal and nonverbal condom communication, and to insist on condom use, while young women were more likely to ignore condom use. Exploration of condom communication strategies by both young men and young women is important given stereotypic gender role norms portraying young women as being unable to negotiate use with their male partners [39]. These norms may be associated with adverse outcomes, given that young women may underestimate their male partners' desires to use condoms [40]. Strategies to increase condom use that include "practice"—for example, role-playing—are successful in improving adolescents' skills at negotiation and communication around sexual health issues [41].

Reflecting the body of evidence on condom use, dual-method use decreases with longer relationship duration, higher level of intimacy, discussing marriage or cohabitation [22], or being married [21,23]. Secure relationship style also decreases dual-method use as does nonfearful relationship style [25]. In the National Longitudinal Survey of Youth, negative relationship attributes, including relationship conflict and power asymmetry reduced dual-method and any contraceptive use among sexually active 18–26-year-olds [22], potentially due to decreased ability to negotiate condom or other contraceptive use.

Individual and dyadic contraceptive use decisions are made within family, peer, and social contexts. Among 55 adolescent women ages 14–21 years using DMPA, the decisions to initiate and continue DMPA were influenced not only by sex partners, but also by family and friends, and relative influences changed over the 6-month study period as the social context changed [42]. Dual-method use among adolescents has also been shown to be influenced by contextual factors, increasing with higher social support [25], perceived paternal approval of birth control, and perceived maternal approval of birth control or disapproval of sex [24]. The influence of these parental predictors differed between younger and older adolescents, and between males and females. These contexts are largely unexplored in LARC specific studies, and understanding their influence will be essential to promoting increased dual-method use with LARC users.

Promotion of dual-method use

Interventions to promote dual-method use among young women have shown efficacy in uptake of dual-method initiation, but not in continued use. Peipert et al. implemented audio computer-assisted self-interviews (ACASI) among 542 women ages 13–35 years. Participants were randomized to two arms: (1) standard care with ACASI delivering general information on contraception (control group); or (2) intervention with ACASI delivering individualized contraceptive messages and counseling. The individualized counseling was designed using the Transtheoretical Model of behavior change, and was personalized to a given study participant based on her baseline behavioral data. Participants returned for assessment of contraceptive behaviors at 6 and 12 months. Self-reported dual-method use was predicted by higher education, lower substance use, and hormonal contraception or condom use at baseline. The intervention group had higher initiation of dual-method use at 6-month follow-up, but effects were not sustained at 12 months and beyond. There was no difference in clinical outcomes of STI or unintended pregnancy between the control and intervention groups [17]. Focusing entirely on younger women (15–21 years), Roye et al. had similar results. Four hundred young women using

highly effective hormonal contraception were randomized to usual care (control), individualized counseling, a video about condom-use beliefs and barriers, or video and counseling (intervention). At 3 months, the intervention group was 2.5 times more likely to have used a condom in addition to their contraceptive, but there was no effect at 12 months [43]. Among LARC initiators, receiving explicit counseling about STI prevention with condoms while using LARC predicted the addition or continuation of condom use with LARC [30]. However, this study had limited follow-up, and clinical outcomes of STI and pregnancy were not assessed.

While LARC method use is determined primarily by the female partner, consistent condom use necessitates special attention be given to promotion of condom use among young women and young men. Having a male partner with a positive attitude about condoms is one of the strongest predictors of dual-method use [23]. Young men benefit from hands-on experience with condoms before initiation of partnered sexual activity. Touching, smelling, trying on, and removing condoms is a developmentally appropriate way to encourage adolescent men to experience condoms before having to negotiate their use with a sex partner [38].

Sexual health education programs in schools, community organizations, and clinical venues also are ideally poised to promote early condom exposure to adolescent men and women. School-based sex education that includes specific condom education is associated with higher likelihood of STI testing, but lower likelihood of STI diagnosis [44]. Importantly, most parents are supportive of condom education in schools, with use of actual condom use demonstration as part of the curriculum [45]. However, explicit focus on dual LARC/condom use is uncommon in school-based sex education curricula.

Provision of condoms in a variety of settings has been a common public health approach to encourage and facilitate condom use in multiple high-risk populations, including adolescents. Provision of free condoms to adolescents may be associated with more positive condom attitudes, more consistent condom use, and higher condom use self-efficacy [46], but studies of condom provision have not been designed to rigorously assess other sources of condom influence such as sex partners, schools, peers, family, and media. Free condom provision is an important strategy to overcome the embarrassment around purchasing condoms. Despite the evidence for condom provision, only 5% of high schools in the United States provide condoms for students [47]. Condom purchase embarrassment exceeds condom use embarrassment, and is a significant deterrent to condom use in a variety of sociopolitical climates [48]. Although not demonstrated by existing studies, LARC users may require special encouragement to use these sources of condoms, since LARC use itself is private and relatively free of the social scrutiny and stigma that may be associated with obtaining condoms.

One of the largest barriers to healthy condom use faced by adolescents comes from clinicians. Adolescents often perceive that confidential services are unavailable from clinicians and pharmacists, and many such healthcare providers feel inadequately trained in issues of adolescent confidentiality and consent [49]. Many providers review adolescents' sexual and reproductive histories and at least discuss condoms, but fewer than 30% prescribe or provide condoms, and fewer than 20% teach correct condom use [50]. This is clearly an area where clinicians could influence adolescents' sexual health behaviors. Clinicians who are specifically trained to work with teenagers or have "teen friendly" clinics may be more adept at promoting dual-method use. In one study of 701 young women receiving contraceptive services, 28.4% of patients receiving care at an adolescent clinic reported dual-method contraceptive use—a 2-3-fold higher rate than at other sites of care [25].

New issues in dual-method use

The potential of effective, woman-controlled alternatives to male condoms for STI/HIV prevention expands and complicates issues around approaches to dual contraception/disease prevention. Identification of an effective—but noncontraceptive—STI/HIV microbicide would mean that dual contraception/disease prevention methods would still be needed [51]. Though early clinical trials of intravaginal microbicides were disappointing in terms of HIV prevention [52], recent demonstration of substantial reductions in HIV infection rates among users of intravaginal tenofovir gel makes dual LARC/disease prevention a distinct possibility in the near future [53]. Adolescent women are potential microbicide users, although issues of partner acceptability, cost, smell, and texture are important [54]. Moreover, clinical trials of alternative microbicide delivery such as intravaginal rings are beginning in the near future [55]. Uptake of contraceptive intravaginal rings by adolescent women is low, but some young women would find rings acceptable for STI/HIV prevention [56].

A final issue for consideration is a reminder that many sexually active adolescents engage in sexual behaviors in addition to penile-vaginal intercourse. For example, more than 4% of a national sample of 14–17-year-old adolescent women reported anal intercourse in the past year, although rarely with a condom [57]. Anal intercourse is obviously without pregnancy risk but has substantial STI/HIV risk. Condoms—and potentially rectal microbicides—would be important prevention methods for young women whose sexual repertoire included both vaginal and anal sex [58].

Discussion

Pregnancy and STI prevention efforts remain appropriately focused on adolescents in an effort to decrease health disparities between adolescents and adults with regards to the burden of these two adverse health consequences. Disparities between negative outcomes of adolescent and adult sexual behaviors are often attributed to adolescent developmental paradigms that highlight the impulsive nature of adolescents, and their lack of perception of personal risk or of long-term consequences. Contemporary perspectives suggest the need for marked revisions in traditional understandings of adolescent sexual impulsivity and risk-taking [59]. Newer perspectives suggest that impulsivity *declines* linearly from childhood into adolescence, with curvilinear increases in reward-seeking behavior [60]. Individual differences in neural substrates, coupled with hormonal factors, such as timing of puberty, and social factors, such as parental control, may interact to influence the likelihood of sexual activity [61]. However, the potential influences of adolescent brain development on patterns of condom and contraceptive use have not been studied. The developmental effects on dual-method use and nonuse should not be overstated, as similar patterns of nonuse are also seen among adults. In focus groups of African-American men and women, there is

a pervasive belief—regardless of other contraceptive use—that sex partners should always use condoms [62]. However, this belief does not translate into practice. Although adults recognize the need for dual protection, they simultaneous expect conflict with their sex partner due to high levels of distrust regarding sexual fidelity if condom use is requested [61], thereby decreasing condom use and increasing STI risk.

The risk of transmitting a bacterial cervical infection is higher than the chance of producing a unintended pregnancy during a random act of unprotected sex during a menstrual cycle [16]. In the presence of LARC use, risk of unintended pregnancy is all but nullified, but the risk of STI transmission remains high. Use of barrier methods for prevention of STI in the presence of LARC is an effective option, but given the impediments to use described and the dyadic nature of condom use, other STI prevention efforts including pre-exposure prophylaxis (PrEP) in the form of intravaginal microbicides may offer an alternative to condom use.

Summary and Implications

Optimizing both pregnancy and STI prevention among adolescents remains a public health priority, and requires significant effort to increase use of LARC and use of STI prevention measures. Though the lower rates of condom use among LARC users warrants additional attention, it should not lessen the importance of promoting LARC use. Winner et al. conducted a prospective, longitudinal study of 7,486 women aged 14–45 years using contraceptive pills, patch, intravaginal ring, injection, and LARC [63]. The contraceptive failure rate for pill, patch, and ring users was 4.55 per 100 woman-years, and was twice as high for women under the age of 21 years as compared with those 21 years and older. The LARC failure rate was only .27 per 100 woman-years, and there was no difference by age [63]. Given the ability of LARC to nullify the age disparity in unintended pregnancy, promotion of LARC remains an important public health strategy, despite the need for increased condom use among LARC users at risk for STI.

Much of the data presented here does not fully account for why the United States lags behind most developed nations in these adverse reproductive health outcomes. While in the United States and Canada use of oral contraception is associated with decreased condom use, in France, condom use among single women is not influenced by hormonal methods, and HIV interventions to promote condom use do not decrease continuation of hormonal methods [16]. This suggests that our larger societal approach to sex, contraception, and condom use are substantively different. Likely contributing is our healthcare payment system, which leaves many adolescents and young adults uninsured. Though not likely to have a direct effect on condom use as condoms are rarely covered under insurance plans, insurance coverage could increase hormonal contraceptive or LARC use among existing condom users, thus increasing dual-method use. In the 2006–2008 National Survey of Family Growth, dual-method use was less likely if there was any period of being uninsured in the past year (5.6%) as compared with being continuously insured (8%) [21].

While advocating for adolescent reproductive health at the population level, we must continue to explore ways to address reproductive health in individual encounters. Though contraceptive and condom-use beliefs among adolescents are relatively stable over time, the behavior of using dual methods is not, and interventions to increase dual-method use have short-term effects. This may be due to changing relationship factors such as increased trust and social contextual influences. It is also important to recognize that dual-method use may not be an appropriate recommendation for all adolescents. For example, in the context of a mutually monogamous relationship, it may be appropriate for young dyads to negotiate a period of dual-method use, followed by STI testing prior to discontinuing STI prevention methods, with an explicit agreement to use condoms with any extra-relationship partners—a model that is accepted and frequently practiced in long-term adult relationships. Because adolescent relationships undergo status changes at rapid intervals that predict sexual and contraceptive behaviors [42], this treatment plan would require frequent follow-up, reassessment, and revision, as do all contraceptive and STI prevention efforts.

Dual-method interventions must be longitudinal and individualized at each encounter to account for these changes. Cates proposes testable hypotheses for increasing dual-method use: (1) promoting condoms for prevention of pregnancy in addition to STI will result in greater condom use; and (2) providing an array of contraceptive choices will increase adherence and decrease pregnancy and STI rates [16]. We additionally propose that; (3) integrating dyadic and social contextual factors into individualized counseling will increase dual-method use, where appropriate; and (4) interventions that promote culture change to provide affordable contraception, continuous insurance coverage, and developmentally appropriate sexual health and healthy relationship education will improve these reproductive health outcomes.

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