Distribution Agreement

In presenting this thesis or dissertation as a partial fulfillment of the requirements for an advanced degree from Emory University, I hereby grant to Emory University and its agents the non-exclusive license to archive, make accessible, and display my thesis or dissertation in whole or in part in all forms of media, now or hereafter known, including display on the world wide web. I understand that I may select some access restrictions as part of the online submission of this thesis or dissertation. I retain all ownership rights to the copyright of the thesis or dissertation. I also retain the right to use in future works (such as articles or books) all or part of this thesis or dissertation.

Signature:

_____ _____

Riley J. Steiner Date

Author's Note

Chapters 2 and 3 of this dissertation entitled, "Long-Acting Reversible Contraceptive Use among Adolescents and Young Adults: Implications for Integrating Unintended Pregnancy and STI Prevention," are official work products of the CDC and are therefore in the public domain.

Long-Acting Reversible Contraceptive Use among Adolescents and Young Adults: Implications for Integrating Unintended Pregnancy and STI Prevention

By

Riley J. Steiner
Doctor of Philosophy
Behavioral Sciences and Health Education

_____

Jessica M. Sales, Ph.D.
Advisor

_____

Laura M. Gaydos, Ph.D.
Committee Member

_____

Michael R. Kramer, Ph.D.
Committee Member

_____

Karen Pazol, Ph.D., M.P.H
Committee Member

_____

Andrea Swartzendruber, Ph.D., M.P.H
Committee Member

Accepted:

_____

Lisa A. Tedesco, Ph.D.
Dean of the James T. Laney School of Graduate Studies

_____

Date

Long-Acting Reversible Contraceptive Use among Adolescents and Young Adults: Implications for Integrating Unintended Pregnancy and STI Prevention

By

Riley J. Steiner

B.A., Occidental College, 2008

M.P.H., Johns Hopkins Bloomberg School of Public Health, 2011

Advisor: Jessica M. Sales, Ph.D.

An abstract of

A dissertation submitted to the Faculty of the
James T. Laney School of Graduate Studies of Emory University

in partial fulfillment of the requirements for the degree of
Doctor of Philosophy
in Behavioral Sciences and Health Education

2018

Abstract

Long-Acting Reversible Contraceptive Use among Adolescents and Young Adults: Implications for Integrating Unintended Pregnancy and STI Prevention

By Riley J. Steiner

Preventing both unintended pregnancy and sexually transmitted infections (STIs) is important given the prevalence of these adverse outcomes, particularly among adolescents and young adults. Increasing use of long-acting reversible contraception (LARC) by young people has renewed attention to a specific challenge of integrating prevention efforts: the most effective methods for preventing pregnancy and STIs among sexually active individuals differ. Studies have shown that adolescent LARC users, as compared to users of moderately effective contraceptive methods (i.e. oral contraceptives, injectables, patch, ring), are less likely to also use condoms, a critical STI prevention strategy.

This dissertation explores the potential impact of LARC use on recommended STI/HIV-related services, including annual STI testing, and examines possible explanations for findings about condom use. Specifically, we (1) compare receipt of STI/HIV services by contraceptive type using secondary data from the 2011-2015 National Survey of Family Growth; (2) examine the extent to which online pregnancy prevention information for adolescents also addresses STI prevention through a content analysis; and (3) assess adolescent contraceptive users' condom use motivations from in-depth, individual interviews.

We found little evidence of differences in service receipt between continuing LARC users and users of moderately effective contraceptive methods that require annual clinical visits. However, prevalence of STI testing was low, regardless of contraceptive type. We identified missed opportunities for integrating online content about pregnancy and STI prevention. Moreover, websites often framed condom use with moderate or highly effective contraceptive methods as back-up pregnancy prevention, perhaps undermining STI prevention. Finally, we found that contraceptive users were particularly motivated to use condoms to be on "the safe side" for preventing pregnancy whereas LARC users were primarily motivated by STI prevention. Across contraceptive type, factors influencing condom use motivations included sexual health education, personal awareness and/or experience, and perceived consequences and risk.

Taken together, findings underscore an outstanding need for integrating unintended pregnancy and STI prevention. This research can inform specific strategies for addressing STI prevention while increasing awareness of and access to LARC, including counseling about preventive health services during LARC initiation and health promotion that emphasizes condom use with contraceptive methods specifically for STI prevention.

Long-Acting Reversible Contraceptive Use among Adolescents and Young Adults: Implications for Integrating Unintended Pregnancy and STI Prevention

By

Riley J. Steiner

B.A., Occidental College, 2008

M.P.H., Johns Hopkins Bloomberg School of Public Health, 2011

Advisor: Jessica M. Sales, Ph.D.

A dissertation submitted to the Faculty of the
James T. Laney School of Graduate Studies of Emory University

in partial fulfillment of the requirements for the degree of
Doctor of Philosophy
in Behavioral Sciences and Health Education

2018

Acknowledgements

I have many people to thank for their contributions to this dissertation and support throughout this process. Most are noted below, although acknowledgements specific to each aim are also included in subsequent chapters.

First, I would like to thank my committee chair, Dr. Jessica Sales, and committee members, Drs. Laurie Gaydos, Michael Kramer, Karen Pazol, and Andrea Swartzendruber. Their support and guidance throughout this process have been invaluable. It has been such a pleasure to work with this thoughtful group.

Many thanks to the young women who participated in my qualitative study and shared their rich experiences. I also want to acknowledge Dr. Stephanie Holt for helping me recruit participants at the adolescent medicine clinic at the Children's Hospital of Atlanta and my fabulous research assistants, Devon Johnson and Katherine Cushing, for their contributions to recruitment and analysis. I am grateful for the funding I received to support Aims 2 and 3, including the Doug Kirby Adolescent Sexual Health Research Grant from Indiana University, Professional Development Support Funds from Emory University Laney Graduate School, and Letz Funds from the Department of Behavioral Sciences and Health Education at Emory University Rollins School of Public Health.

I also want to thank Drs. Nicole Liddon and Catherine Rasberry, my colleagues at CDC's Division of Adolescent and School Health (DASH), for their contributions and ongoing support as I have balanced work and school. Particular thanks to Nicole, with whom a "hallway conversation" spurred my initial research on long-acting reversible contraception and STI prevention. Also, many thanks to DASH leadership for giving me the flexibility to pursue my doctoral studies while continuing to work at DASH.

I could not have made it through the program without the camaraderie of my BSHE colleagues, including Kathleen Krause, Ilana Raskind, and Rebecca Woodruff. Special thanks to Sasha Mital for many productive evenings at the Tap Room and our dining room tables.

Finally, I want to thank my family. To my parents for encouraging me along this path: Guay Tippett, Patrick McCormick, Henry-York Steiner, Lori Steiner, Marsha Purcell, and Bill Purcell. And to my husband, Ryan Purcell. I am so thankful for his unwavering support and endless love.

Table of Contents

Chapter One: Introduction and Literature Review 1

Introduction 2

Unintended pregnancy and STI prevention among young people 2

Long-acting reversible contraception and STI prevention 5

The current study 7

Literature Review 8

LARC use among adolescents and young adults 8

LARC use and STI-related outcomes 12

Condom use with more effective contraceptive methods 15

Gaps and opportunities 18

References 27

Chapter Two: Use of Long-Acting Reversible Contraception among Adolescent and Young Adult Women and Receipt of STI/HIV-Related Services 44

Abstract 45

Introduction 46

Methods 48

Results 52

Discussion 54

References 65

Chapter Three: Do Health Promotion Messages Integrate Unintended Pregnancy and STI Prevention? A Content Analysis of Online Information for Adolescents and Young Adults 71

Abstract 72

Introduction 73

Methods 74

Results 76

Discussion 80

References 97

Chapter Four: The Safe Side: A Qualitative Study of Condom Use by Contraceptive Type among Adolescents in Atlanta, GA 101

Abstract 102

Introduction 103

Methods 105
Results 109
Discussion 118
References 129
Chapter Five: Summary and Conclusions 134
Summary and Synthesis of Findings 135
Strengths and Limitations 139
Future Research 143
Practice Implications 146
Conclusions 148
References 151

List of Tables

Table 1.1 Impact of LARC Initiation on Condom Use 21
Table 1.2 Condom Use by Contraceptive Type 22
Table 1.3 LARC Use and Other STI-related Outcomes 24
Table 1.4 Correlates of Dual Method Use 26
Table 2.1 Sample Characteristics by Contraceptive Type 61
Table 2.2 Logistic Regression Models of STI/HIV Services by Contraceptive Type 64
Table 3.1 Search Terms 87
Table 3.2 Key Exclusions for Eligibility Criteria 88
Table 3.3 Website Characteristics 89
Table 3.4 Example of Messages about How to Simultaneously Prevent Unintended Pregnancy and STIs 94
Box 3.1 Examples f Promoting Condoms with Moderate or Highly Effective Contraceptive Methods for Pregnancy Prevention Only 95
Box 3.2 STI Prevention Strategies Promoted Within Websites 96
Table 4.1 Interview Guide Domains and Example Questions 124
Table 4.2 Sample Characteristics 125
Table 4.3 Condom Use Motivations among Participants Using Condoms with their Current Contraceptive Method 126
Table 4.4 Select Quotes Illustrating “the Safe Side” 127
Table 5.1 Unintended Pregnancy and STI/HIV Prevention Goals and Strategies 150

List of Figures

Figure 2.1 Sexual Health Services by Contraceptive Type……63

Figure 3.1 Flow Diagram for Systematically Identifying a Sample of Websites……...86

Chapter One:

Introduction and Literature Review

Introduction

Unintended pregnancy and STI prevention among young people

Unintended pregnancy and sexually transmitted infections (STIs), including HIV, disproportionately affect adolescents and young adults in the United States (U.S.). Nearly half of the 20 million new STIs reported each year occur among young people aged 15–24 years (Satterwhite et al., 2013). Additionally, young women in this age group have the highest rates of chlamydia and gonorrhea, both of which can lead to pelvic inflammatory disease and subsequent infertility, as well as increased risk of HIV infection (Centers for Disease Control and Prevention, 2017). Teen birth rates in the U.S. remain much higher than in many other Western, industrialized countries (Sedgh, Finer, Bankole, Eilers, & Singh, 2015), and although they have declined recently, more than 250,000 young women 19 years or younger gave birth in 2015 (Hamilton, Martin, & Osterman, 2016). Moreover, the percentage of pregnancies that are unintended is highest among 15-19 year olds (Finer & Zolna, 2016).

Many adolescents engage in sexual behaviors that increase their risk of HIV, other STIs, and unintended pregnancy. The 2015 Youth Risk Behavior Survey (YRBS) found that about one-third (30.1%) of U.S. high school students were currently sexually active (i.e., had sex in the past 3 months), and of sexually active students, 43.1% did not use a condom and 73.2% did not use a more effective method of contraception (i.e., intrauterine device [IUD], implant, oral contraception, injectable, patch, ring) at last sex. About 14% did not use any method to prevent pregnancy (Kann et al., 2016). The 2011-2015 National Survey of Family Growth (NSFG), which includes young people not in school, yields similar statistics. From this data, about thirty percent of both females

(30.2%) and males (28.7%) were currently sexually active. Among sexually active young women, 43.5% did not use condoms and 55.9% did not use a form of hormonal contraception (although IUDs were excluded from this estimate) at last sex. One-tenth (10.1%) used no method at all (Abma & Martinez, 2017).

Healthy People 2020 includes numerous objectives for reducing unintended pregnancy, HIV, other STIs, and related risk behavior under "family planning," "HIV," and "sexually transmitted diseases" topics (Health People 2020, n.d.). The Centers for Disease Control and Prevention (CDC) (2016) had also designated teen pregnancy and HIV prevention as two of its original six Winnable Battles, recognizing the potential for intensive focus and use of existing evidence-based intervention to have a significant impact on these public health priorities. The National Prevention Strategy articulates "reproductive and sexual health" as a single priority area that encompasses both pregnancy and disease prevention (U.S. Department of Health and Human Services, n.d.).

Although unintended pregnancy, HIV, and other STIs are distinct health outcomes, there is a compelling case for addressing them with an integrated approach. Experts have called for such integration, acknowledging that these prevention efforts are related to sexual behavior and that the most efficient and effective means to reduce them involves comprehensive delivery of prevention and care services across outcomes (Bearinger & Resnick, 2003; Cates, 1993). Sexual health offers a formalized framework for conceptualizing such integration (Satcher, Hook, & Coleman, 2015; Swartzendruber & Zenilman, 2010), and CDC and Office of Population Affairs' (OPA) Quality Family Planning Services recommendations align with a sexual health approach. These recommendations indicate that STI prevention and treatment services should be provided

as part of family planning. In particular, contraceptive services should include testing and treatment in accordance with existing guidelines and counseling about condom use with a more effective contraceptive method, which has long been recommended for heterosexual individuals not in a stable, mutually monogamous relationship (Gavin et al., 2014).

In practice, integrating unintended pregnancy and STI prevention is challenging. The social-ecological model, a seminal framework in behavioral sciences, offers a way to summarize known barriers to integration across multiple, interacting levels of influence (McLeroy, Bibeau, Steckler, & Glanz, 1988). At the policy-level, prevention efforts for unintended pregnancy, HIV, and other STIs have traditionally been categorically funded, with separate funding streams for each outcome (Bearinger & Resnick, 2003). As a result, prevention programs have largely operated as organizational silos with limited collaboration (Bearinger & Resnick, 2003). In terms of individual behavior, the most effective methods for preventing pregnancy and STIs among sexually active individuals differ, requiring use of multiple strategies for comprehensive prevention. While condoms can be highly effective at preventing pregnancy when they are used correctly and consistently (Cates & Steiner, 2002), with typical use they are associated with a 13% pregnancy rate during the first year (Sundaram et al., 2017). The need for multiple approaches to most effectively address both pregnancy and STI prevention contributes to barriers at higher levels. For instance, at the interpersonal-level, providers often do not have training to appropriately provide prevention methods for both pregnancy and STIs (Seidman, Carlson, Weber, Witt, & Kelly, 2016). Additionally, women cannot solely rely

on a female-controlled method of contraception but also often need to negotiate STI prevention strategies with male partners.

Long-acting reversible contraception and STI prevention

Recent advancements in prevention technology have renewed attention to the challenges of integrating unintended pregnancy and STI prevention. In particular, the promise of long-acting reversible contraception (LARC) for unintended pregnancy prevention, including among adolescents and young adults, has raised concerns that use of LARC methods may lead to reduced condom use (Gallo, Warner, Jamieson, & Steiner, 2011). The advent and scale-up of new prevention technologies, evolving clinical practice guidelines, or novel service delivery models specific to one outcome often raise the possibility of unintended consequences for other sexual health-related outcomes. For example, concerns have also emerged about the impact of pre-exposure prophylaxis (PrEP) for HIV prevention on prevention of other STIs (Alaei, Paynter, Juan, & Alaei, 2016). Likewise, guidelines recommending pap smears every three years instead of annually have prompted worry about fewer opportunities for receiving other recommended sexual and reproductive health services (Bogler et al., 2015). As a relatively new prevention option for adolescents, LARC use provides a timely opportunity to better understand how innovative prevention methods impact an integrated and comprehensive approach to sexual and reproductive health.

LARC methods, namely copper or levonorgestrel-release IUDs and subdermal etonogestrel implants, are highly effective contraceptive methods, with ≤1% of users experiencing pregnancy during the first year of typical use (Sundaram et al., 2017). These methods require no user effort after insertion and are considerably more effective than

contraceptive methods for which effectiveness depends on correct and consistent use. For such moderately effective methods, including injectables, oral contraceptives, the patch, and ring, between 4%–7% of users will experience pregnancy during the first year of typical use (Sundaram et al., 2017). Because incorrect and inconsistent contraceptive use accounts for about 40% of unintended pregnancies (Guttmacher Institute, 2016), and adolescents are at increased risk for contraceptive failure with these user-dependent methods (Winner et al., 2012), LARC methods are particularly appealing for preventing unintended pregnancies among adolescents.

Not surprisingly, substantial reductions in teen pregnancies (Harper et al., 2015; Ricketts, Klingler, & Schwalberg, 2014; Secura et al., 2014), as well as declines in abortion rates (Biggs, Rocca, Brindis, Hirsch, & Grossman, 2015; Peipert, Madden, Allsworth, & Secura, 2012; Ricketts et al., 2014) have been attributed to LARC use. Recognizing the potential individual and population-level benefits of LARC, the American Academy of Pediatrics, American College of Obstetricians and Gynecologists, and Society for Adolescent Health and Medicine have affirmed the safety of adolescent LARC use and recommend these methods as first-line contraceptive options for this population (American Academy of Pediatrics, 2014; American College of Obstetricians and Gynecologists, 2012; Society for Adolescent Health and Medicine, 2017). Likewise, the CDC/OPA guidelines recommend a tiered approach to contraceptive counseling that includes information about the safety and effectiveness of LARC for adolescents (Gavin et al., 2014).

However, LARC methods do not protect against STIs, and recent studies have found that condom use is lower among adolescent LARC users compared to users of

moderately effective methods (Bastow, Sheeder, Guiahi, & Teal, 2018; Steiner, Liddon, Swartzendruber, Rasberry, & Sales, 2016; Warner et al., 2016), suggesting that LARC methods may have unique implications for STI prevention. Given the promise of LARC for preventing unintended pregnancy among adolescents, concerns about unintended consequences should not deter efforts to increase awareness of and access to LARC for adolescents and young adults. Rather, there is a need to understand the implications of LARC use among adolescents and young adults for STI prevention in order to minimize these consequences and enhance integration of unintended pregnancy and STI prevention going forward.

The current study

This study addresses the STI prevention implications of LARC use for adolescents and young adults through the following three aims:

- Aim 1: Compare self-reported receipt of STI/HIV services by contraceptive type among young women aged 15-24 years using secondary data from the 2011-2015 National Survey of Family Growth
- Aim 2: Examine the extent to which pregnancy prevention messages address STI prevention through a content analysis of U.S. public health/clinical websites for adolescents and young adults
- Aim 3: Assess adolescent contraceptive users' condom use motivations through in-depth, individual interviews with a clinic- and community-based sample 17-19 years of age in Atlanta, GA

The remainder of this chapter summarizes additional literature relevant to these aims and concludes with a comment on key gaps and opportunities. Chapters 2 through 4

presents findings from each Aim. Chapter 5 synthesizes findings across the three aims and discusses next steps for research and practice.

Literature Review

We synthesized three bodies of literature particularly salient to the current study: (1) LARC use among adolescents and young adults; (2) LARC use and STI-related outcomes; and (3) condom use with more effective contraceptive methods. Across these three domains, findings point to gaps and opportunities the current study will address.

LARC use among adolescents and young adults

To date, research on adolescent and young adult LARC use in the United States has focused on examining prevalence and trends, identifying barriers and facilitators to uptake, and evaluating interventions to increase awareness of and access to LARC for this population. We summarize findings relevant to each of these topics below.

Prevalence and trends. Data from the 2014 NSFG indicate that, among adolescent females aged 15-19 years, current use of IUDs and implants among contraceptive users is 4% and 6%, respectively (Kavanaugh & Jerman, 2018). Estimates of current LARC use among sexually active female high school students (i.e. had sex in the past three months) from the 2015 YRBS are that 4.5% used an IUD or implant for pregnancy prevention at last sex (Kann et al., 2016). Prevalence appears to be higher among adolescents receiving services at Title X family planning clinics (~7.1% in 2013), which have actively sought to reduce barriers to access (Romero et al., 2015). In general, use of LARC is higher among older adolescents (Romero et al., 2015; Smith, Harney, Singh, & Hurwitz, 2017; Steiner et al., 2016) and Hispanic and non-Hispanic white adolescents (Dehlendorf et al., 2014).

LARC use has increased among both adolescents and young adults in recent years. In 2008, only 0.3% of female contraceptive users 15-19 years old had ever used an implant compared to 6% in 2014. Likewise, LARC use increased among young adults 20-24 years of age from 6% in 2008 to 13% in 2014 for IUDs and 1% in 2008 to 6% in 2014 for implants (Kavanaugh & Jerman, 2018). A study documenting trends in LARC use specifically among nulliparous women found increases among both adolescents and young adults (Ihongbe & Masho, 2017). According to the YRBS, LARC use among sexually active high school students increased from 1.8% in 2013 to 3.3% in 2015 (the only years for which data are available) (Kann et al., 2016). Among sexually active women attending college or university, LARC use increased from 6.0% in 2011 to 7.9% in 2014 (Walsh-Buhi & Helmy, 2017). Among contraceptive seekers at Title X family planning sites, LARC use also increased—from 0.4% in 2005 to 7.1% in 2013 (Romero et al., 2015). These data are the most recent available; it is likely that such trends have continued given the professional guidelines recommending LARC for adolescents as well as concerted effort to improve access to these methods.

Barriers to access. A substantial body of literature has identified barriers to increasing awareness of and access to LARC among adolescents and young adults (Kumar & Brown, 2016; Murphy, Stoffel, Nolan, & Haider, 2016; Pritt, Norris, & Berlan, 2016). In addition to cost, availability, and confidentiality concerns that are common barriers across many sexual and reproductive health services, factors particularly unique to adolescent LARC use include low knowledge and negative attitudes among both adolescents and healthcare providers.

Adolescents' knowledge about LARC methods has been low (Bachorik et al., 2015; Hoopes et al., 2016; Teal & Romer, 2013). For example, a survey of women 10-24 years (n=129) in New York City found that only 40% had heard of contraceptive implants, and nearly half thought that these methods were not appropriate for nulliparous women (Bachorik et al., 2015). Other studies have documented similarly low levels of awareness of and misconceptions about LARC methods (Brown, Auerswald, Eyre, Deardorff, & Dehlendorf, 2013; Hall et al., 2016; Kavanaugh, Frohwirth, Jerman, Popkin, & Ethier, 2013). Young people have also expressed concerns about the safety of LARC methods, the long duration of effectiveness, pain with insertion, and possibility that others could see or feel the device (Kavanaugh et al., 2013; Payne, Sundstrom, & DeMaria, 2016; Potter, Rubin, & Sherman, 2014). A more recent qualitative study underscored these worries, although knowledge of LARC methods was relatively high (Greenberg, Jenks, Piazza, Malibiran, & Aligne, 2017). In contrast, a quantitative study found that fewer young women reported low acceptability of implants and IUDs compared to other methods, but awareness of these methods was lower (Hoopes, Teal, Akers, & Sheeder, 2017). Another recent study found that 10.4% of those initiating IUDs and 14.2% of those initiating implants had not heard of the method before their appointment (Cohen, Sheeder, Kane, & Teal, 2017).

Studies have also documented worrisome provider attitudes, such as the belief that LARC methods are inappropriate for nulliparous women (Harper et al., 2012; Harper et al., 2013; Hopkins, 2017; Tyler et al., 2012). For example, a study of providers from 2009 to 2010 (n=1,323), found that 30% of providers had misconceptions about the safety of IUDs for nulliparous women (Tyler et al., 2012). Among a cohort of pediatric

providers (n=120), 29% were concerned about infertility associated with the IUD, and 11% had similar concerns with the implant (Swanson, Gossett, & Fournier, 2013). A recent qualitative study with providers echoed these findings, although attitudes toward the implant were more favorable (Berlan, Pritt, & Norris, 2017). Additionally, some providers worry about pain with insertion (Murphy et al., 2016) and believe that adolescents are more likely to discontinue LARC (Kavanaugh et al., 2013), although LARC continuation rates are high and generally do not differ by age and parity (Abraham, Zhao, & Peipert, 2015). Finally, provider concern about lower condom use among LARC users may deter counseling about these methods, particularly in cases where providers perceive an adolescents' STI risk to be high (Kavanaugh et al., 2013; Rubin, Campos, & Markens, 2013; Rubin, Davis, & McKee, 2013)

Interventions to increase awareness and access. Systems-level interventions to address barriers to LARC use among adolescents and young adults have shown promise. The Contraceptive CHOICE project is a well-known prospective cohort study in which participants received standardized contraceptive counseling that included LARC methods offered at no cost (Peipert et al., 2012). Of the 1,404 15-19 year olds enrolled in the CHOICE project, 72% chose LARC methods (Secura et al., 2014). The Colorado Family Planning Initiative also provided LARC methods free of cost at Title X clinics; LARC use increased from 5% to 19% among 15-24 year olds (Ricketts et al., 2014). Similarly, the Iowa Initiative to Reduce Unintended Pregnancies, along with expanded eligibility for Medicaid-funded family planning services, contributed to increases in LARC use among reproductive age women and related declines in abortion (Biggs et al., 2015). A cluster randomized trial evaluating a clinic-based provider training intervention found that young

women 18-25 years attending intervention clinics were more likely to choose either LARC method compared to those visiting control clinics (Harper et al., 2015). Other potential clinic-based approaches include peer-counseling and innovative uses of technology, such as smart-phone applications (Timmons, Shakibnia, Gold, & Garbers, 2017; Wilson, Degaiffier, Ratcliffe, & Schreiber, 2016).

LARC use and STI-related outcomes

Multiple recent studies have quantitatively examined associations between LARC use and condom use among adolescent and young adult women (Bastow, Sheeder, Guiahi, & Teal, 2017; El Ayadi et al., 2016; Steiner et al., 2016; Walsh-Buhi & Helmy, 2017; Warner et al., 2016). This research builds on literature from the 1990s when Norplant, a levonorgestrel implant no longer marketed in the U.S., was introduced, as well as more recent findings about reproductive-aged women broadly. We synthesized this collective body of research, categorizing studies as: (1) assessing condom use following LARC method initiation to understand if condom use declines and/or (2) comparing condom use by contraceptive type to understand if condom use is lower among LARC method users compared to moderately effective method users. We present studies relevant to each category in Tables 1.1 and 1.2 and briefly synthesize results below. We also describe studies that considered LARC use and other STI-related outcomes, including other sexual behaviors, STI testing, and STI incidence (Table 1.3).

Impact of LARC method initiation on condom use. Six studies have examined the impact of LARC method initiation on subsequent condom use (Table 1.1). Four of these found that initiating a LARC method was associated with actual or intended declines in condom use over time (Berenson & Wiemann, 1995; Cushman et al., 1998; Darney,

Callegari, Swift, Atkinson, & Robert, 1999; Frank, Bateman, & Poindexter, 1993). A few studies specifically considered partnership status, an important dimension for understanding STI prevention implications. Cushman et al. (1998) found more pronounced declines in condom use among women with only one partner, although those with more than one partner still had significant decreases in condom use. Berenson et al. (1995) reported that low perceived STI risk based on number of partners was a common reason for decreased condom use following implant initiation. The two studies that observed no changes in condom use were conducted with reproductive-age women broadly (McNicholas, Klugman, Zhao, & Peipert, 2017; Rattray et al., 2015). One of these studies had particular methodological strengths, in that participants were randomized, minimizing confounding by indication (Gallo et al., 2011), and condom use was measured using the biomarker prostate-specific antigen (PSA), reducing potential social desirability biases (DiClemente, Swartzendruber, & Brown, 2013). However, PSA only has a 24-48 hour detection window, and significant declines were found based on self-reported condom use. Additionally, this study only followed women for 3 months so long-term impact cannot be inferred (Rattray et al., 2015).

Comparisons of condom use by contraceptive type. Fourteen studies, including thirteen published articles and one conference abstract, present data comparing condom use between LARC users and users of moderately effective methods (Table 1.2). Twelve of these studies provide some evidence that condom use is lower among LARC users compared to moderately effective method users. For example, an analysis of the 2013 national YRBS found that female high school student using LARC were nearly 60% less likely to use condoms compared to oral contraceptive users. Although this study found no

differences in condom use comparing LARC users and injectable, patch, and ring users, another study with a national sample of college students documented lower condom use among LARC users in comparison to all moderately effective method users (Walsh-Buhi & Helmy, 2017). Beyond cross-sectional analyses, a prospective study found that LARC initiators 13-24 years were less likely to use condoms compared to shorter-acting methods after six months, although both groups had similar increases in condom use among those with a new partner during follow-up (Bastow et al., 2017). A cluster randomized trial with young women 18-25 years old yielded a similar finding regarding lower condom use among LARC users compared to users of shorter-acting methods (El Ayadi et al., 2016). Differences in condom use by contraceptive type among adolescents and young adult samples align with studies of reproductive-aged women generally (Eisenberg, Allsworth, Zhao, & Peipert, 2012; Pazol, Kramer, & Hogue, 2010; Santelli et al., 1997).

LARC methods and other STI-related outcomes. Seven published articles and one conference abstract include data on associations between LARC use and other sexual behaviors (n=3), clinic visits/receipt of STI testing (n=3), and STI incidence (n=6) (Table 1.3). Findings for these outcomes have been mixed. One study (Steiner et al. 2016) found that adolescent LARC users were more likely to have multiple partners compared to oral contraceptive users, whereas another found that Norplant users were less likely to have multiple partners (Darney et al., 1999). In terms of STI testing, two studies observed no differences in testing based on contraceptive type, although one took place in the early-1990s when the healthcare context was substantially different, and the other involved home-based testing that could have minimized study differences (Polaneczky, Slap,

Forke, Rappaport, & Sondheimer, 1994; Skala, Secura, & Peipert, 2012). Another study conducted in New Zealand found some differences in chlamydia testing after year one but not year two of follow-up (Rose, Garrett, Stanley, & Pullon, 2017). Likewise, four studies found little evidence of increased STI infection associated with LARC methods (Darney et al., 1999; El Ayadi et al., 2016; Polaneczky et al., 1994; Rose et al., 2017) whereas two studies documented increased risk of acquisition (McNicholas et al., 2017; Swartzendruber & Steiner, 2016).

Condom use with more effective contraceptive methods

Research on LARC methods and condoms is a small part of a larger literature about condom use with more effective methods of contraception, a behavior commonly referred to as "dual use," "dual method use," "dual contraceptive method use," or "dual protection." This broader literature has focused on quantitatively describing prevalence and correlates, with several studies evaluating interventions. Fewer qualitative studies have been conducted (Carter et al., 2012; Lemoine, Teal, Peters, & Guiahi, 2017; Mantell, Hoffman, Exner, Stein, & Atkins, 2003; Murray et al., 2013).

Prevalence and correlates. Numerous studies report low prevalence of using condoms with more effective contraceptive methods. Across both probability and convenience samples, most estimates are less than 25% (Williams & Fortenberry, 2013). For example, according to the 2015 YRBS, only 8.8% of sexually active high school students reported using a highly or moderately effective contraceptive method and a condom at last sex (Kann et al., 2016). The most recent published estimates of condoms with a hormonal method from NSFG data are higher overall (35.0% for males; 21.7% for females) (Abma & Martinez, 2017). However, such statistics may not reflect correct and

consistent condom use—a nationally representative study of women and men aged 18-44 years found that about 40% of those reporting dual method use did not use a condom throughout intercourse (Higgins et al., 2014).

Many prevalence studies also examine correlates of this behavior. Again, the social-ecological model provides a useful framework for summarizing empirically identified determinants and has been used previously for this purpose in a published review (Bull & Shlay, 2005). The synthesis below and in Table 1.4 builds on this prior work to summarize the observational literature to date.

Most studies have focused on individual-level correlates (Williams & Fortenberry, 2013). Modifiable individual-level characteristics include perceived risk of STIs and pregnancy, self-esteem, impulsivity, partner communication self-efficacy, and fear of condom negotiation (Crosby et al., 2001; Sales, Latham, Diclemente, & Rose, 2010; Sieving, Bearinger, Resnick, Pettingell, & Skay, 2007). Non-modifiable correlates, which can inform how interventions are targeted, include age, with older adolescents less likely to be dual users than younger adolescents (Williams & Fortenberry, 2013), and race/ethnicity, with prevalence lower among black and Hispanics compared to their white peers (Kann et al., 2016; Abma & Martinez, 2017).

Because condom use occurs within relationships, studies have examined partnership factors at the interpersonal-level. For example, younger partner age and partners' positive attitudes toward condoms have been associated repeatedly with condom use with contraceptive methods (Williams & Fortenberry, 2013). Other factors include relationship duration, partner communication, and relationship conflict (Sales et al., 2010; Williams & Fortenberry, 2013). Condom use is less likely among partnerships

perceived as committed and long-term, although STI risk often remains high in such contexts (Manlove et al., 2011; Thompson et al., 2017; Walsh, Fielder, Carey, & Carey, 2014). Interpersonal characteristics beyond partners have been less studied, but general social support, perceived parental approval of condom use, parental monitoring, and provider counseling appear to be protective (Crosby et al., 2001; Cushman et al., 1998; Morroni, Heartwell, Edwards, Zieman, & Westhoff, 2014; Sales et al., 2010; Sieving et al., 2007).

Limited research has considered factors at higher levels of the social ecology, a general limitation of literature on adolescent sexual and reproductive health (Salazar et al., 2010). Teen friendly clinics are an organizational feature positively associated with dual use (Sales et al., 2010); health insurance is a societal-level factor found to facilitate dual use (Bull & Shlay, 2005; Kottke et al., 2015).

Intervention research. Overall, experimental research to increase condom use with more effective contraceptive methods is limited. A 2014 Cochrane Collaboration systematic review identified only three behavioral interventions (Lopez, Stockton, Chen, Steiner, & Gallo, 2014). Of these three and two additional interventions identified, only one has yielded sustained effects. Given that observational research has focused on the individual-level, it is unsurprising that these interventions primarily address individual-level characteristics, drawing on individual-level behavioral theories.

Briefly, Peipert et al. (2008) used the Transtheoretical Model to develop a tailored, multi-media intervention to accelerate movement through the stages of change among women aged 13-35 years. Intervention participants were more likely to report dual use compared to those receiving general contraceptive information and non-tailored

advice. However, these intervention effects did not translate to differences in STI incidence or pregnancy prevention due to inadequate duration of use and adherence. Another individual-level intervention with short-term effects but no long-term impact applied the Theory of Reasoned Action, Health Belief Model, and Social Cognitive Theory (SCT) (Berenson & Rahman, 2012; Roye, Perlmutter Silverman, & Krauss, 2007). A provider-delivered intervention based on principles of motivational interviewing and relapse prevention found some positive short-term effects on condom use (Exner et al., 2011). The only intervention yielding long-term improvements involved case management and youth leadership programs informed by SCT (Sieving et al., 2014). Finally, a multi-component intervention based on the Information-Motivation-Behavior theory, with a focus on increasing prevention motivations through a vignette-based multi-media platform and tailored provider counseling, is currently being evaluated (Ewing et al., 2017).

Gaps and opportunities

Taken together, the literature reviewed underscores the timeliness and importance of the current study. Although LARC use among adolescents and young adults remains low, uptake has increased and likely will continue to do so given concerted efforts to identify and address barriers to access. Understanding implications of LARC use for STI prevention prior to widespread uptake can provide a reference point for future monitoring and minimize potential STI-related adverse outcomes. In particular, prior research suggests that initiating LARC may result in declines in condom use that are more pronounced compared to moderately effective contraceptive users. Depending on the partnership characteristics of those choosing not to use condoms, this decrease in condom

use could contribute to increases in STI rates. Although LARC methods may have unique implications for STI prevention, strategies for integrating unintended pregnancy and STI prevention that emerge based on the findings from this study should also have broader implications given low prevalence of condom use with contraceptive methods in general.

The current study will address two notable gaps in the literature on LARC methods and STI-related outcomes. First, most research to date has focused on condom use as the primary STI-related outcome. However, other strategies, such as STI testing combined with mutual monogamy, HPV vaccination, and PrEP, may complement condom use. Moreover, LARC use has the potential to influence use and receipt of clinical services. Specifically, users of LARC methods, which do not require routine clinic visits for continuation, may be less likely to receive recommended services compared to users of methods that require at least annual clinical care. Aim 1 of this study examines STI testing and other indicators for receipt of preventive services by contraceptive type, specifically comparing LARC users to moderately effective method users who are presumably engaged in regular clinical care for contraceptive services.

Second, analyses of LARC methods and condom use do not explain why use may be lower among LARC users. In fact, much of the research on condom use by contraceptive type is cross-sectional, precluding casual inference. It is possible that the observed associations represent a selection effect, as LARC methods are particularly well suited for adolescents who have difficulty implementing coitally-dependent methods, such as condoms. That said, there are potential causal explanations, which center on condom use motivations. If back-up contraception is the primary motivator for using condoms with contraceptive methods, then users of highly effective LARC methods

might be less motivated to use condoms. Aim 2 assesses if and how online health promotion addresses STI prevention with pregnancy prevention, with particular attention to whether condom use with more effective contraceptive methods is promoted directly in relation to STI prevention or framed as back-up pregnancy prevention. Aim 3 of this study qualitatively describes adolescent condom use motivations, including differences by contraceptive type, to explore this hypothesis using a methodological approach underutilized in research on this topic.

Findings from the three aims should inform strategies for addressing STI prevention as part of LARC uptake. Ongoing efforts to increase awareness of and access to LARC methods offer specific opportunities for such integration. Moreover, many of these interventions are addressing systems-level barriers, providing public health professionals and clinicians the chance to move beyond individual-level approaches to increase condom use with moderately or highly effective contraceptive methods. The minimal impact of such programs highlights the need to strengthen health services and sexual health education to achieve sustained, population-level improvements in adolescent sexual and reproductive health. The current study aims to identify specific recommendations for integrating unintended pregnancy and STI prevention in health education and clinical care.

Table 1.1 Impact of LARC Initiation on Condom Use

Study	*Study Design*	*Sample & Setting*	*Key Finding(s)*
Frank et al., 1993	Cross-sectional survey	Women aged 13-45 years receiving Norplant from 33 provides in southeast Texas (n=762)	– Of the 43% who regularly used condoms in the 3 mo. prior to Norplant insertion, 48% planned to "rarely" or "never" use them in the future.
Berenson & Wiemann, 1995	Case-control study	Low-income female adolescents 11-18 years from University of Texas Medical Branch at Galveston (n=188)	– 31% of Norplant users reported that they used condoms less after initiating their contraceptive method.
Cushman et al., 1998	Cohort study	Women ≥15 years of age recruited from large hospitals in Pittsburgh, Dallas, New York City (n=1073)	– Frequency of condom use declined after initiating long-acting hormonal methods. – Declines were most likely to occur among women who said at baseline that they always use a condom (77% decreased or stopped condom use). – Declines in condom use greater for participants with only 1 partner.
Darney et al., 1999	Cohort study	3 clinic-based cohorts of urban women 13-19 years in the San Francisco area (n=399)	– A significant decrease in condom use at last sex occurred among implant users. (62% at baseline vs. 28% at 2 years). – A similar decrease in frequency of use occurred.
Rattray et al., 2015	Randomized controlled trial	Women aged 18-44 years in Jamaica, Kingston (n=414)	– PSA at each follow up visit did not differ between immediate and delayed implant insertion arms. – Change in PSA over all study visits was not different. – Frequency of self-reported condomless sex was higher in immediate insertion arm.
McNicholas et al., 2017	Cohort study	Secondary analysis of Contraceptive CHOICE[a] sample (n=2,946)	– About 70% of LARC users reported no change in condom use at 3, 6, 12-months compared to baseline

[a]The Contraceptive CHOICE project was a prospective cohort of nearly 10,000 women aged 14-45 in the St. Louis area
PSA=prostate specific antigen

Table 1.2 Condom Use by Contraceptive Type

Study	*Study Design*	*Sample & Setting*	*Key Finding(s)*
Polaneczky et al., 1994.	Cohort study	Post-partum adolescent mothers ≤17 years of age from a university hospital in Philadelphia (n=100)	– No difference in condom use between Norplant and oral contraceptives.
Berenson et al., 1995	Case-control study	Low-income adolescents 11-18 years from University of Texas Medical Branch at Galveston (n=188)	– Consistent use of condom use was lower among Norplant users compared to oral contraceptive users (15% vs. 40%, p<.0001) – More Norplant users reported that they used condoms less after initiating their contraceptive method compared to oral contraceptive users (31% vs. 23%) but this difference was ns.
Santelli et al., 1995	Cross-sectional survey	Women 17-35 years in inner-city Baltimore (n=717)	– Overall, IUD users were less likely to use condoms compared to non-contraceptors (OR=0.32, 95% CI=0.12-0.84). – Among 17-19 year olds, association between condom use and IUD could not be determined due to small cell sizes.
Cushman et al., 1998	Cohort study	Women ≥15 years of age from hospital-based family planning clinics in Pittsburg, Dallas, New York City (n=1,073)	– Implant users were less likely to use condoms than injectable users (AOR=0.67, 95% CI=0.49-0.90)
Roye, 1998	Cross-sectional survey	Hispanic and African-American females 12-21 years from a New York City clinic (n=578)	– No differences in condom use comparing Norplant users to oral contraceptive users
Darney et al., 1999	Cohort study	3 clinic-based cohorts of urban women13-19 years in the San Francisco area (n=399)	– Significant declines in condom use at last sex and frequency of use were found over time for implant users but not oral contraceptive users or users of condoms only. – Lower condom use among implant users compared to OC and condom was observed at 1 and 2 year follow-up.
Pazol et al., 2010	Cross-sectional survey	National sample of women 15-44 years (n=1,561 and 1,552, depending on contraception measured used)	– Across all sub-groups, including age, the proportion of women using condoms was higher among those using oral contraceptives vs. user-independent methods. Among 15-19 year olds, the difference was ns. – Reduced odds of condom use comparing IUD/Norplant users to OC users (OR=0.11, 95% CI=0.03-0.36)

Eisenberg et al., 2012	Cross-sectional survey	National sample of women 15-44 years (n=5,178)	– LARC methods were associated with decreased odds of condom use compared to oral contraceptives (AOR=0.30, 95% CI=0.14-0.63).
El Ayadi et al., 2016	Cluster randomized controlled trial	Sexually active women aged 18-25 years at clinics nationwide (n=1, 247)	– Users of short-acting reversible contraceptive methods (injectables, patch, ring, and pills) were more likely to be dual method users compared to LARC users, adjusting for whether participants had a primary partner (AOR=2.60, 95% CI=1.56-4.32).
Steiner et al., 2016	Cross-sectional survey	National sample of female high school students grades 9^{th}-12^{th} (n=619)	– LARC users were less likely to use condoms compared to oral contraceptive users (APR=0.42, 95% CI=0.21-0.84). – No differences in condom use between LARC and Depo-Provera, patch or ring users
Warner et al., 2016	Cross-sectional survey	State-level sample of adolescent mothers ≤ 19 years of age (n=4,995)	– Condom use was significantly lower overall among teen mothers who used LARC (23% vs. 44%) compared to moderately effective method users (AOR=0.38, 95%CI=0.29-0.51)
Bastow et al., 2017	Cohort study	Young women 13-24 years old attending an adolescent contraceptive clinic in Denver (n=1,048)	– LARC users less likely to report condom use compared to users of shorter-acting methods (AOR=0.48, 95% CI=0.31-0.74) at 6-month follow-up – LARC and shorter-acting method users that had a new partner both increased condom use by about 40%
McNicholas et al., 2017	Cohort study	Secondary analysis of Contraceptive CHOICE sample[a] (n=2,946)	– LARC users reported lower consistent condom use compared to non-LARC users at all time points – There was no differences in change in condom use at 3, 6, and 12 months (vs. baseline), comparing LARC and non-LARC users
Walsh-Buhi et al., 2017	Cross-sectional survey	National sample of young women 18-24 years attending college or university	– LARC users were less likely to use condoms compared to birth control users (AOR=0.469, 99% CI=0.37-0.60) – LARC users were less likely to use condoms compared to shot, patch, or ring users

[a]The Contraceptive CHOICE project was a prospective cohort of nearly 10,000 women aged 14-45 in the St. Louis area

ns=not significant; AOR=adjusted odds ratio; APR=adjusted prevalence ratio; CI=confidence interval; IUD=intrauterine device, LARC=long-acting reversible contraception

Table 1.3 LARC Use and Other STI-related Outcomes[a]

Study	*Study Design*	*Sample & Setting*	*Key Finding(s)*
Polaneczky et al., 1994	Cohort study	Post-partum adolescent mothers ≤17 years of age from a university hospital in Philadelphia (n=100)	– No differences in frequency of clinic visits between Norplant and oral contraceptive users – No differences in sexual activity (frequency past mo., >1 partner in past 6 mo., current relationship> 1 yr) between Norplant and oral contraceptive users – No differences in incident STIs between Norplant and oral contraceptive users
Darney et al., 1999	Cohort study	3 clinic-based cohorts of urban women13-19 years in the San Francisco area (n=399)	– Fewer Norplant users had a new partner compared to oral contraceptive users at year 1 – No differences in STI infections at two years follow-up comparing Norplant users and oral contraceptive users
Skala et al., 2012	Cohort study	Secondary analysis of Contraceptive CHOICE[b] sample 14-25 years of age (n=2,607)	– No differences in past year STI testing between LARC and non-LARC contraceptive users
El Ayadi et al. 2016	Cluster randomized controlled trial	Sexually active women aged 18-25 years at clinics nationwide (n=1, 247)	– No differences in STI incidence comparing intervention and control clinics
Steiner et al., 2016	Cross-sectional survey	National sample of female high school students grades 9^{th}-12^{th} (n=619)	– LARC users were more likely to have more sexual partners (both recent and lifetime) compared to both oral contraceptive, and Depo-Provera, patch or ring users. – No differences in age of sexual initiation or use of alcohol or drugs at last sex.
Swartzendruber et al., 2016	Cohort study	African American women aged 18-24 years participated in an HIV prevention trial in Atlanta (n=560)	– LARC users were more likely than moderately effective method users (patch, pill, ring, shot) to acquire an STI (AOR=2.9, 95% CI=1.5-5.8)
McNicholas et al., 2017	Cohort study	Secondary analysis of Contraceptive CHOICE[b] sample (n=2,694)	– LARC users were more likely than non-LARC contraceptive users to acquire an STI in the 12 months following initiation (AOR=2.0, 95% CI=1.07-3.72)

Rose et al., 2017	Retrospective cohort study	Women initiating post-abortion contraception at a New Zealand hospital abortion clinic (n=6,160)	– In year one, women initiating cooper IUD had higher rates of testing compared to oral contraceptive users (RR=1.2, 95% CI=1.06-1.35); implant users had lower testing rates (RR=0.84, 0.72-0.99) – No differences in testing in year 2 following initation – No difference in chlamydia diagnosis rate comparing LARC users to oral contraceptive users

[a]Including STI testing, STI incidence and sexual behaviors other than condom use; [b]The Contraceptive CHOICE project was a prospective cohort of nearly 10,000 women aged 14-45 in the St. Louis area

mo=month; yr=year; AOR=adjusted odds ratio; CI=confidence interval; LARC=long-acting reversible contraception

Table 1.4 Correlates of Dual Method Use

Social-Ecological Level	*Correlates*
Individual	*Non-modifiable factors:* Age, race/ethnicity *Beliefs and perceptions:* Perceived risk, impulsivity, self-esteem, self-efficacy, fear of condom negotiation
Interpersonal	*Partner factors:* Age, attitude toward condoms, communication, duration of relationship, level of intimacy *Parent factors:* Monitoring, approval of condom use *Provider factors:* Counseling
Organizational	Teen-friendly clinics
Community	No factors identified
Societal	Health insurance

References

Abma, J. C., & Martinez, G. M. (2017). Sexual activity and contraceptive use among teenagers in the United States, 2011-2015. *National Health Statistics Reports,* (104), 1-23.

Abraham, M., Zhao, Q., & Peipert, J. F. (2015). Young age, nulliparity, and continuation of long-acting reversible contraceptive methods. *Obstetrics and Gynecology, 126*(4), 823-829. doi:10.1097/AOG.0000000000001036

Alaei, K., Paynter, C. A., Juan, S. C., & Alaei, A. (2016). Using PrEP, losing condoms? PrEP promotion may undermine safe sex. *AIDS.* doi:10.1097/QAD.0000000000001262

American Academy of Pediatrics, Committee on Adolescence. (2014). Contraception for adolescents. *Pediatrics, 134*(4), e1244-1256. doi:10.1542/peds.2014-2299

American College of Obstetricians and Gynecologists, Committee on Adolescent Health Care, Long-Acting Reversible Contraception Working Group. (2012). Committee opinion no. 539: Adolescents and long-acting reversible contraception: Implants and intrauterine devices. *Obstetrics and Gynecology,120*(4), 983–988. doi: 10.1097/AOG.0b013e3182723b7d

Bachorik, A., Friedman, J., Fox, A., Nucci, A. T., Horowitz, C. R., & Diaz, A. (2015). Adolescent and young adult women's knowledge of and attitudes toward etonogestrel implants. *Journal of Pediatric and Adolescent Gynecology*, *28*(4), 229-233. doi:10.1016/j.jpag.2014.08.002

Bastow, B., Sheeder, J., Guiahi, M., & Teal, S. (2018). Condom use in adolescents and young women following initiation of long- or short-acting contraceptive methods. *Contraception, 97*(1), 70-75. doi:10.1016/j.contraception.2017.10.002

Bearinger, L. H., & Resnick, M. D. (2003). Dual method use in adolescents: A review and framework for research on use of STD and pregnancy protection. *Journal of Adolescent Health, 32*(5), 340-349.

Berenson, A. B., & Rahman, M. (2012). A randomized controlled study of two educational interventions on adherence with oral contraceptives and condoms. *Contraception, 86*(6), 716-724. doi:10.1016/j.contraception.2012.06.007

Berenson, A. B., & Wiemann, C. M. (1995). Use of levonorgestrel implants versus oral contraceptives in adolescence: A case-control study. *American Journal of Obstetrics and Gynecology, 172*(4 Pt 1), 1128-1135; discussion 1135-1127.

Berlan, E. D., Pritt, N. M., & Norris, A. H. (2017). Pediatricians' attitudes and beliefs about long-acting reversible contraceptives influence counseling. *Journal of Pediatric and Adolescent Gynecology, 30*(1), 47-52. doi:10.1016/j.jpag.2016.09.001

Biggs, M. A., Rocca, C. H., Brindis, C. D., Hirsch, H., & Grossman, D. (2015). Did increasing use of highly effective contraception contribute to declining abortions in Iowa? *Contraception, 91*(2), 167-173. doi:10.1016/j.contraception.2014.10.009

Bogler, T., Farber, A., Stall, N., Wijayasinghe, S., Slater, M., Guiang, C., & Glazier, R. H. (2015). Missed connections: Unintended consequences of updated cervical cancer screening guidelines on screening rates for sexually transmitted infections. *Canadian Family Physician, 61*(10), e459-466.

Brown, M. K., Auerswald, C., Eyre, S. L., Deardorff, J., & Dehlendorf, C. (2013). Identifying counseling needs of nulliparous adolescent intrauterine contraceptive users: A qualitative approach. *Journal of Adolescent Health, 52*(3), 293-300. doi:10.1016/j.jadohealth.2012.07.004

Bull, S. S., & Shlay, J. C. (2005). Promoting "dual protection" from pregnancy and sexually transmitted disease: A social ecological approach. *Health Promotion Practice, 6*(1), 72-80. doi:10.1177/1524839903259308

Carter, M. W., Hock-Long, L., Kraft, J. M., Henry-Moss, D., Hatfield-Timajchy, K., & Singer, M. (2012). Strategies for managing the dual risk of sexually transmitted infections and unintended pregnancy among Puerto Rican and African American young adults. *American Journal of Public Health, 102*(3), 449-456. doi:10.2105/AJPH.2011.300461

Cates, W., Jr. (1993). Sexually transmitted diseases and family planning. Strange or natural bedfellows, revisited. *Sexually Transmitted Diseases, 20*(3), 174-178.

Cates, W., Jr., & Steiner, M. J. (2002). Dual protection against unintended pregnancy and sexually transmitted infections: What is the best contraceptive approach? *Sexually Transmitted Diseases, 29*(3), 168-174.

Centers for Disease Control and Prevention. (2016). CDC Winnable Battles: Final Report Retrieved from https://www.cdc.gov/winnablebattles/report/docs/winnable-battles-final-report.pdf

Centers for Disease Control and Prevention. (2017). Sexually Transmitted Disease Surveillance, 2016. Retrieved from https://www.cdc.gov/std/stats16/CDC_2016_STDS_Report-for508WebSep21_2017_1644.pdf

Cohen, R., Sheeder, J., Kane, M., & Teal, S. B. (2017). Factors associated with contraceptive method choice and initiation in adolescents and young women. *Journal of Adolescent Health, 61*(4), 454-460. doi:10.1016/j.jadohealth.2017.04.008

Crosby, R. A., DiClemente, R. J., Wingood, G. M., Sionean, C., Cobb, B. K., Harrington, K., . . . Oh, M. K. (2001). Correlates of using dual methods for sexually transmitted diseases and pregnancy prevention among high-risk African-American female teens. *Journal of Adolescent Health, 28*(5), 410-414.

Cushman, L. F., Romero, D., Kalmuss, D., Davidson, A. R., Heartwell, S., & Rulin, M. (1998). Condom use among women choosing long-term hormonal contraception. *Family Planning Perspectives, 30*(5), 240-243.

Darney, P. D., Callegari, L. S., Swift, A., Atkinson, E. S., & Robert, A. M. (1999). Condom practices of urban teens using norplant contraceptive implants, oral contraceptives, and condoms for contraception. *American Journal of Obstetrics and Gynecology, 180*(4), 929-937.

Dehlendorf, C., Park, S. Y., Emeremni, C. A., Comer, D., Vincett, K., & Borrero, S. (2014). Racial/ethnic disparities in contraceptive use: Variation by age and women's reproductive experiences. *American Journal of Obstetrics and Gynecology, 210*(6), 526 e521-529. doi:10.1016/j.ajog.2014.01.037

DiClemente, R. J., Swartzendruber, A. L., & Brown, J. L. (2013). Improving the validity of self-reported sexual behavior: No easy answers. *Sexually Transmitted Diseases, 40*(2), 111-112. doi:10.1097/OLQ.0b013e3182838474

Eisenberg, D. L., Allsworth, J. E., Zhao, Q., & Peipert, J. F. (2012). Correlates of dual-method contraceptive use: An analysis of the National Survey of Family Growth (2006-2008). *Infectious Diseases in Obstetrics and Gynecology, 2012*, 717163. doi:10.1155/2012/717163

El Ayadi, A. M., Rocca, C. H., Kohn, J. E., Velazquez, D., Blum, M., Newmann, S. J., & Harper, C. C. (2016). The impact of an IUD and implant intervention on dual method use among young women: Results from a cluster randomized trial. *Preventive Medicine*. doi:10.1016/j.ypmed.2016.10.015

Ewing, A. C., Kottke, M. J., Kraft, J. M., Sales, J. M., Brown, J. L., Goedken, P., . . . Kourtis, A. P. (2017). 2GETHER - the dual protection project: Design and rationale of a randomized controlled trial to increase dual protection strategy selection and adherence among African American adolescent females. *Contemporary Clinical Trials, 54*, 1-7. doi:10.1016/j.cct.2016.12.014

Exner, T. M., Mantell, J. E., Hoffman, S., Adams-Skinner, J., Stein, Z. A., & Leu, C. S. (2011). Project REACH: A provider-delivered dual protection intervention for women using family planning services in New York City. *AIDS Care, 23*(4), 467-475. doi:10.1080/09540121.2010.516335

Finer, L. B., & Zolna, M. R. (2016). Declines in unintended pregnancy in the United States, 2008-2011. *New England Journal of Medicine, 374*(9), 843-852. doi:10.1056/NEJMsa1506575

Frank, M. L., Bateman, L., & Poindexter, A. N. (1993). Planned condom use by women with norplant implants. *Advances in Contraception, 9*(3), 227-232.

Gallo, M. F., Warner, L., Jamieson, D. J., & Steiner, M. J. (2011). Do women using long-acting reversible contraception reduce condom use? A novel study design incorporating semen biomarkers. *Infectious Diseases in Obstetrics and Gynecology, 2011*, 107140. doi:10.1155/2011/107140

Gavin, L., Moskosky, S., Carter, M., Curtis, K., Glass, E., Godfrey, E., . . . Zapata, L. (2014). Providing quality family planning services: Recommendations of CDC and the U.S. Office of Population Affairs. *Morbidity and Mortality Weekly Report: Recommendations and Reports, 63*(RR-04), 1-54.

Greenberg, K. B., Jenks, S. C., Piazza, N., Malibiran, B. R., & Aligne, C. A. (2017). A snapshot of urban adolescent women's contraceptive knowledge at the onset of a community long-acting reversible contraceptive promotion initiative. *Journal of Pediatric and Adolescent Gynecology, 30*(4), 474-478. doi:10.1016/j.jpag.2017.01.003

Guttmacher Institute. (2016). Unintended pregnancy in the United States. Retrieved from https://www.guttmacher.org/sites/default/files/pdfs/pubs/FB-Unintended-Pregnancy-US.pdf

Hall, K. S., Ela, E., Zochowski, M. K., Caldwell, A., Moniz, M., McAndrew, L., . . . Ernst, S. (2016). "I don't know enough to feel comfortable using them:" Women's knowledge of and perceived barriers to long-acting reversible contraceptives on a college campus. *Contraception, 93*(6), 556-564. doi:10.1016/j.contraception.2016.02.007

Hamilton, B. E., Martin, J. A., & Osterman, M. J. (2016). Births: Preliminary data for 2015. *National Vital Statistics Reports, 65*(3), 1-15.

Harper, C. C., Henderson, J. T., Raine, T. R., Goodman, S., Darney, P. D., Thompson, K. M., . . . Speidel, J. J. (2012). Evidence-based IUD practice: Family physicians and obstetrician-gynecologists. *Family Medicine, 44*(9), 637-645.

Harper, C. C., Rocca, C. H., Thompson, K. M., Morfesis, J., Goodman, S., Darney, P. D., . . . Speidel, J. J. (2015). Reductions in pregnancy rates in the USA with long-acting reversible contraception: A cluster randomised trial. *Lancet*. doi:10.1016/S0140-6736(14)62460-0

Harper, C. C., Stratton, L., Raine, T. R., Thompson, K., Henderson, J. T., Blum, M., . . . Speidel, J. J. (2013). Counseling and provision of long-acting reversible contraception in the US: National survey of nurse practitioners. *Preventive Medicine, 57*(6), 883-888. doi:10.1016/j.ypmed.2013.10.005

Healthy People 2020. (n.d.). 2020 Topics and Objectives – Objectives A–Z Retrieved from https://www.healthypeople.gov/2020/topics-objectives

Higgins, J. A., Smith, N. K., Sanders, S. A., Schick, V., Herbenick, D., Reece, M., . . . Fortenberry, J. D. (2014). Dual method use at last sexual encounter: A nationally representative, episode-level analysis of US men and women. *Contraception, 90*(4), 399-406. doi:10.1016/j.contraception.2014.06.003

Hoopes, A. J., Ahrens, K. R., Gilmore, K., Cady, J., Haaland, W. L., Amies Oelschlager, A. M., & Prager, S. (2016). Knowledge and acceptability of long-acting reversible contraception among adolescent women receiving school-based primary care services. *Journal of Primary Care & Community Health, 7*(3), 165-170. doi:10.1177/2150131916641095

Hoopes, A. J., Teal, S., Akers, A. Y., & Sheeder, J. (2017). Low acceptability of certain contraceptive methods among young women. *Journal of Pediatric and Adolescent Gynecology*. doi:10.1016/j.jpag.2017.11.008

Hopkins, B. (2017). Barriers to health care providers' provision of long-acting reversible contraception to adolescent and nulliparous young women. *Nursing for Women's Health, 21*(2), 122-128. doi:10.1016/j.nwh.2017.02.007

Ihongbe, T. O., & Masho, S. W. (2017). Changes in the use of long-acting reversible contraceptive methods among U.S. nulliparous women: Results from the 2006-2010, 2011-2013, and 2013-2015 National Survey of Family Growth. *Journal of Women's Health*. In press. doi:10.1089/jwh.2017.6609

Kann, L., McManus, T., Harris, W. A., Shanklin, S. L., Flint, K. H., Hawkins, J., . . . Zaza, S. (2016). Youth Risk Behavior Surveillance - United States, 2015. *Morbidity and Mortality Weekly Report: Surveillance Summaries, 65*(6), 1-174. doi:10.15585/mmwr.ss6506a1

Kavanaugh, M. L., Frohwirth, L., Jerman, J., Popkin, R., & Ethier, K. (2013). Long-acting reversible contraception for adolescents and young adults: Patient and provider perspectives. *Journal of Pediatric and Adolescent Gynecology*, *26*(2), 86-95. doi:10.1016/j.jpag.2012.10.006

Kavanaugh, M. L., & Jerman, J. (2018). Contraceptive method use in the United States: trends and characteristics between 2008, 2012 and 2014. *Contraception*, *97*(1), 14-21. doi:10.1016/j.contraception.2017.10.003

Kottke, M., Whiteman, M. K., Kraft, J. M., Goedken, P., Wiener, J., Kourtis, A. P., & DiClemente, R. (2015). Use of dual methods for protection from unintended

pregnancy and sexually transmitted diseases in adolescent African American women. *Journal of Pediatric and Adolescent Gynecology, 28*(6), 543-548. doi:10.1016/j.jpag.2015.04.008

Kumar, N., & Brown, J. D. (2016). Access barriers to long-acting reversible contraceptives for adolescents. *Journal of Adolescent Health, 59*(3), 248-253. doi:10.1016/j.jadohealth.2016.03.039

Lemoine, J., Teal, S. B., Peters, M., & Guiahi, M. (2017). Motivating factors for dual-method contraceptive use among adolescents and young women: A qualitative investigation. *Contraception, 96*(5), 352-356. doi:10.1016/j.contraception.2017.06.011

Lopez, L. M., Stockton, L. L., Chen, M., Steiner, M. J., & Gallo, M. F. (2014). Behavioral interventions for improving dual-method contraceptive use. *Cochrane Database of Systematic Reviews, 3*, CD010915. doi:10.1002/14651858.CD010915.pub2

Manlove, J., Welti, K., Barry, M., Peterson, K., Schelar, E., & Wildsmith, E. (2011). Relationship characteristics and contraceptive use among young adults. *Perspectives on Sexual and Reproductive Health, 43*(2), 119-128. doi:10.1363/4311911

Mantell, J. E., Hoffman, S., Exner, T. M., Stein, Z. A., & Atkins, K. (2003). Family planning providers' perspectives on dual protection. *Perspectives on Sexual and Reproductive Health, 35*(2), 71-78.

McLeroy, K. R., Bibeau, D., Steckler, A., & Glanz, K. (1988). An ecological perspective on health promotion programs. *Health Education Quarterly, 15*(4), 351-377.

McNicholas, C. P., Klugman, J. B., Zhao, Q., & Peipert, J. F. (2017). Condom use and incident sexually transmitted infection after initiation of long-acting reversible contraception. *American Journal of Obstetrics and Gynecology*. doi:10.1016/j.ajog.2017.09.009

Morroni, C., Heartwell, S., Edwards, S., Zieman, M., & Westhoff, C. (2014). The impact of oral contraceptive initiation on young women's condom use in 3 American cities: Missed opportunities for intervention. *PloS One, 9*(7), e101804. doi:10.1371/journal.pone.0101804

Murphy, M. K., Stoffel, C., Nolan, M., & Haider, S. (2016). Interdependent barriers to providing adolescents with long-acting reversible contraception: Qualitative insights from providers. *Journal of Pediatric and Adolescent Gynecology, 29*(5), 436-442. doi:10.1016/j.jpag.2016.01.125

Murray, C. C., Hatfield-Timajchy, K., Kraft, J. M., Bergdall, A. R., Habel, M. A., Kottke, M., & Diclemente, R. J. (2013). In their own words: Romantic relationships and the sexual health of young african american women. *Public Health Reports, 128 Suppl 1*, 33-42.

Payne, J. B., Sundstrom, B., & DeMaria, A. L. (2016). A qualitative study of young women's beliefs about intrauterine devices: Fear of infertility. *Journal of Midwifery & Women's Health, 61*(4), 482-488. doi:10.1111/jmwh.12425

Pazol, K., Kramer, M. R., & Hogue, C. J. (2010). Condoms for dual protection: Patterns of use with highly effective contraceptive methods. *Public Health Reports, 125*(2), 208-217.

Peipert, J. F., Madden, T., Allsworth, J. E., & Secura, G. M. (2012). Preventing unintended pregnancies by providing no-cost contraception. *Obstetrics and Gynecology, 120*(6), 1291-1297. doi:http://10.1097/AOG.0b013e318273eb56

Peipert, J. F., Redding, C. A., Blume, J. D., Allsworth, J. E., Matteson, K. A., Lozowski, F., . . . Rossi, J. S. (2008). Tailored intervention to increase dual-contraceptive method use: A randomized trial to reduce unintended pregnancies and sexually transmitted infections. *American Journal of Obstetrics and Gynecology, 198*(6), 630 e631-638. doi:10.1016/j.ajog.2008.01.038

Polaneczky, M., Slap, G., Forke, C., Rappaport, A., & Sondheimer, S. (1994). The use of levonorgestrel implants (norplant) for contraception in adolescent mothers. *New England Journal of Medicine, 331*(18), 1201-1206. doi:10.1056/NEJM199411033311806

Potter, J., Rubin, S. E., & Sherman, P. (2014). Fear of intrauterine contraception among adolescents in New York City. *Contraception, 89*(5), 446-450. doi:10.1016/j.contraception.2014.01.011

Pritt, N. M., Norris, A. H., & Berlan, E. (2016). Barriers and facilitators to adolescents' use of long acting reversible contraceptives. *Journal of Pediatric and Adolescent Gynecology*. doi:10.1016/j.jpag.2016.07.002

Rattray, C., Wiener, J., Legardy-Williams, J., Costenbader, E., Pazol, K., Medley-Singh, N., . . . Kourtis, A. P. (2015). Effects of initiating a contraceptive implant on subsequent condom use: A randomized controlled trial. *Contraception*. doi:10.1016/j.contraception.2015.06.009

Ricketts, S., Klingler, G., & Schwalberg, R. (2014). Game change in Colorado: Widespread use of long-acting reversible contraceptives and rapid decline in births among young, low-income women. *Perspecives on Sexual and Reproductive Health, 46*(3), 125-132. doi:10.1363/46e1714

Romero, L., Pazol, K., Warner, L., Gavin, L., Moskosky, S., Besera, G., . . . Barfield, W. (2015). Vital signs: Trends in use of long-acting reversible contraception among teens aged 15-19 years seeking contraceptive services-United States, 2005-2013. *Morbidity and Mortality Weekly Report, 64*(13), 363-369.

Rose, S. B., Garrett, S. M., Stanley, J., & Pullon, S. R. H. (2017). Chlamydia testing and diagnosis following initiation of long-acting reversible contraception: A retrospective cohort study. *Australian and New Zealand Journal of Obstetrics and Gynaecology*. doi:10.1111/ajo.12685

Roye, C., Perlmutter Silverman, P., & Krauss, B. (2007). A brief, low-cost, theory-based intervention to promote dual method use by black and latina female adolescents: A randomized clinical trial. *Health Education and Behavior, 34*(4), 608-621. doi:10.1177/1090198105284840

Rubin, S. E., Campos, G., & Markens, S. (2013). Primary care physicians' concerns may affect adolescents' access to intrauterine contraception. *Journal of Primary Care & Community Health, 4*(3), 216-219. doi:10.1177/2150131912465314

Rubin, S. E., Davis, K., & McKee, M. D. (2013). New York City physicians' views of providing long-acting reversible contraception to adolescents. *Annals of Family Medicine, 11*(2), 130-136. doi:10.1370/afm.1450

Salazar, L. F., Bradley, E. L., Younge, S. N., Daluga, N. A., Crosby, R. A., Lang, D. L., & DiClemente, R. J. (2010). Applying ecological perspectives to adolescent sexual health in the United States: Rhetoric or reality? *Health Education Research, 25*(4), 552-562. doi:10.1093/her/cyp065

Sales, J. M., Latham, T. P., Diclemente, R. J., & Rose, E. (2010). Differences between dual-method and non-dual-method protection use in a sample of young African American women residing in the southeastern United States. *Archives of Pediatrics and Adolescent Medicine, 164*(12), 1125-1131. doi:10.1001/archpediatrics.2010.230

Santelli, J. S., Warren, C. W., Lowry, R., Sogolow, E., Collins, J., Kann, L., . . . Celentano, D. D. (1997). The use of condoms with other contraceptive methods among young men and women. *Family Planning Perspectives, 29*(6), 261-267.

Satcher, D., Hook, E. W., 3rd, & Coleman, E. (2015). Sexual health in America: Improving patient care and public health. *JAMA, 314*(8), 765-766. doi:10.1001/jama.2015.6831

Satterwhite, C. L., Torrone, E., Meites, E., Dunne, E. F., Mahajan, R., Ocfemia, M. C., . . . Weinstock, H. (2013). Sexually transmitted infections among US women and men: Prevalence and incidence estimates, 2008. *Sexually Transmitted Diseases, 40*(3), 187-193. doi:10.1097/OLQ.0b013e318286bb53

Secura, G. M., Madden, T., McNicholas, C., Mullersman, J., Buckel, C. M., Zhao, Q., & Peipert, J. F. (2014). Provision of no-cost, long-acting contraception and teenage pregnancy. *New England Journal of Medicine, 371*(14), 1316-1323. doi:10.1056/NEJMoa1400506

Sedgh, G., Finer, L. B., Bankole, A., Eilers, M. A., & Singh, S. (2015). Adolescent pregnancy, birth, and abortion rates across countries: Levels and recent trends. *Journal of Adolescent Health, 56*(2), 223-230. doi:10.1016/j.jadohealth.2014.09.007

Seidman, D., Carlson, K., Weber, S., Witt, J., & Kelly, P. J. (2016). United States family planning providers' knowledge of and attitudes towards preexposure prophylaxis for hiv prevention: A national survey. *Contraception, 93*(5), 463-469. doi:10.1016/j.contraception.2015.12.018

Sieving, R. E., Bearinger, L. H., Resnick, M. D., Pettingell, S., & Skay, C. (2007). Adolescent dual method use: Relevant attitudes, normative beliefs and self-efficacy. *Journal of Adolescent Health, 40*(3), 275 e215-222. doi:10.1016/j.jadohealth.2006.10.003

Sieving, R. E., McRee, A. L., Secor-Turner, M., Garwick, A. W., Bearinger, L. H., Beckman, K. J., . . . Resnick, M. D. (2014). Prime Time: Long-term sexual health outcomes of a clinic-linked intervention. *Perspectives on Sexual and Reproductive Health, 46*(2), 91-100. doi:10.1363/46e0914

Skala, S. L., Secura, G. M., & Peipert, J. F. (2012). Factors associated with screening for sexually transmitted infections. *American Journal of Obstetrics and Gynecology, 206*(4), 324 e321-326. doi:10.1016/j.ajog.2012.02.020

Smith, A. J. B., Harney, K. F., Singh, T., & Hurwitz, A. G. (2017). Provider and health system factors associated with usage of long-acting reversible contraception in adolescents. *Journal of Pediatric and Adolescent Gynecology, 30*(6), 609-614. doi:10.1016/j.jpag.2017.05.001

Society for Adolescent Health and Medicine. (2017). Improving knowledge about, access to, and utilization of long-acting reversible contraception among adolescents and young adults. *Journal of Adolescent Health, 60*(4), 472-474. doi:10.1016/j.jadohealth.2017.01.010

Steiner, R. J., Liddon, N., Swartzendruber, A. L., Rasberry, C. N., & Sales, J. M. (2016). Long-acting reversible contraception and condom use among female US high school students: Implications for sexually transmitted infection prevention. *JAMA Pediatrics, 170*(5), 428-434. doi:10.1001/jamapediatrics.2016.0007

Sundaram, A., Vaughan, B., Kost, K., Bankole, A., Finer, L., Singh, S., & Trussell, J. (2017). Contraceptive failure in the United States: Estimates from the 2006-2010 National Survey of Family Growth. *Perspectives on Sexual and Reproductive Health, 49*(1), 7-16. doi:10.1363/psrh.12017

Swanson, K. J., Gossett, D. R., & Fournier, M. (2013). Pediatricians' beliefs and prescribing patterns of adolescent contraception: A provider survey. *Journal of Pediatric and Adolescent Gynecology, 26*(6), 340-345. doi:10.1016/j.jpag.2013.06.012

Swartzendruber, A., & Steiner, R.J. (2016). *Long-acting reversible contraception use and sexually transmitted infection acquistion during 12 months of follow-up among young african american women.* Paper presented at the STD Prevention Conference, Atlanta, GA.

Swartzendruber, A., & Zenilman, J. M. (2010). A national strategy to improve sexual health. *JAMA, 304*(9), 1005-1006. doi:10.1001/jama.2010.1252

Teal, S. B., & Romer, S. E. (2013). Awareness of long-acting reversible contraception among teens and young adults. *Journal of Adolescent Health, 52*(4 Suppl), S35-39. doi:10.1016/j.jadohealth.2013.01.013

Thompson, E. L., Vamos, C. A., Griner, S. B., Logan, R., Vazquez-Otero, C., & Daley, E. M. (2017). Sexually transmitted infection prevention with long-acting reversible contraception: Factors associated with dual use. *Sexually Transmitted Diseases, 44*(7), 423-427. doi:10.1097/OLQ.0000000000000620

Timmons, S. E., Shakibnia, E. B., Gold, M. A., & Garbers, S. (2017). MyLARC: A theory-based interactive smartphone app to support adolescents' use of long-acting reversible contraception. *Journal of Pediatric and Adolescent Gynecology*. doi:10.1016/j.jpag.2017.11.005

Tyler, C. P., Whiteman, M. K., Zapata, L. B., Curtis, K. M., Hillis, S. D., & Marchbanks, P. A. (2012). Health care provider attitudes and practices related to intrauterine devices for nulliparous women. *Obstetrics and Gynecology, 119*(4), 762-771. doi:10.1097/AOG.0b013e31824aca39

U.S. Department of Health and Human Services. (n.d.). National Prevention Strategy, Reproductive and Sexual Health. Retrieved from http://www.surgeongeneral.gov/priorities/prevention/strategy/reproductive-and-sexual-health.html

Walsh, J. L., Fielder, R. L., Carey, K. B., & Carey, M. P. (2014). Dual method use among a sample of first-year college women. *Perspectivs on Sexual and Reproductive Health, 46*(2), 73-81. doi:10.1363/46e1014

Walsh-Buhi, E. R., & Helmy, H. L. (2017). Trends in long-acting reversible contraceptive (LARC) use, LARC use predictors, and dual-method use among a national sample of college women. *Journal of American College Health,* 0. doi:10.1080/07448481.2017.1399397

Warner, L., Williams, L., Le, B., Smith, R., Pazol, K., Harrison, L., Kourtis, A., & Barfield,W. (2016). *Dual use of condoms with long-acting reversible contraception (LARC) versus moderately effective methods among teen mother participating in the pregnancy risk assessment monitoring system (PRAMS).* Paper presented at the STD Prevention Conference, Atlanta, GA.

Williams, R. L., & Fortenberry, J. D. (2013). Dual use of long-acting reversible contraceptives and condoms among adolescents. *Journal of Adolescent Health, 52*(4 Suppl), S29-34. doi:10.1016/j.jadohealth.2013.02.002

Wilson, S. F., Degaiffier, N., Ratcliffe, S. J., & Schreiber, C. A. (2016). Peer counselling for the promotion of long-acting, reversible contraception among teens: A randomised, controlled trial. *European Journal of Contraception and Reproductive Health Care,* 1-8. doi:10.1080/13625187.2016.1214698

Winner, B., Peipert, J. F., Zhao, Q., Buckel, C., Madden, T., Allsworth, J. E., & Secura, G. M. (2012). Effectiveness of long-acting reversible contraception. *New England Journal of Medicine, 366*(21), 1998-2007. doi:10.1056/NEJMoa1110855

Chapter Two:

Use of Long-Acting Reversible Contraception among Adolescent and Young Adult Women and Receipt of STI/HIV-Related Services

Abstract

Purpose: Long-acting reversible contraceptive (LARC) methods do not require annual clinic visits for continuation, potentially impacting receipt of recommended sexually transmitted infection (STI)/HIV services for young women. We assess service receipt among new and continuing LARC users versus moderately and less effective method users and non-contraceptors.

Methods: Using 2011-2015 National Survey of Family Growth data from sexually active women aged 15-24 (n=2,018), we conducted logistic comparisons of chlamydia, any STI and HIV testing, and sexual risk assessment in the past year by current contraceptive type.

Results: Less than half of respondents were tested for chlamydia (40.9%), any STI (47.3%), or HIV (25.9%); 66.5% had their sexual risk assessed. Differences in service receipt between new and continuing LARC users as compared to moderately effective method users were not detected in multivariable models, except that continuing LARC users were less likely to be tested for HIV (aPR=0.52, 95% CI=0.32-0.85). New, but not continuing, LARC users were more likely than less effective method users (aPR=1.35, 95% CI=1.03-1.76) and non-contraceptors (aPR=1.43, 95% CI=1.11-1.85) to have their sexual risk assessed, although both groups were more likely than non-contraceptors to be tested for chlamydia (new: aPR=1.52, 95% CI=1.08-2.15; continuing: aPR=1.69, 95% CI=1.24-2.29).

Conclusions: We found little evidence that LARC use was associated with lower prevalence of STI testing. However, new, but not continuing, LARC users, as compared to those not using a method requiring a clinic visit, were more likely to have had their risk assessed, suggesting that initiating LARC may offer an opportunity to receive services that does not persist as LARC use continues.

Introduction

Unintended pregnancy, HIV, and other sexually transmitted infections (STIs) are distinct but interrelated health concerns. Given that each occur in the context of sexual behavior, many have argued for an integrated prevention approach (Bearinger & Resnick, 2003; Cates, 1993). National guidelines for providing quality family planning services recommend comprehensive delivery of sexual and reproductive health (SRH) prevention and care services, including STI/HIV testing and counseling (Gavin et al., 2014). Integration is especially salient for adolescent and young adult women: nearly half of the 20 million new STIs reported each year, including HIV, are among young people aged 15–24 years, and the proportion of pregnancies that are unintended is higher among adolescents (75%) and young adults (59%) compared to older women (31-42%) (Finer & Zolna, 2016; Satterwhite et al., 2013).

Increasing use of long-acting reversible contraceptive (LARC) methods (Abama & Martinez, 2017; Pazol, Daniels, Romero, Warner, & Barfield, 2016) namely intrauterine devices (IUDs) and implants, has renewed attention to the challenge of integrating unintended pregnancy and STI prevention, particularly among young people. Professional medical organizations recommend LARC methods as a highly effective pregnancy prevention option for all women of reproductive age, including adolescents (American Academy of Pediatrics, 2014; American College of Obstetricians and Gynecologists, 2012; Society for Adolescent Health and Medicine, 2017). Yet because they confer no STI/HIV prevention benefits, family planning guidelines suggest LARC users should also use condoms if they are not in a mutually monogamous relationship (Gavin et al., 2014). However, recent evidence shows condom use is low among

adolescent LARC users and suggests they may be less likely to use condoms than users of moderately effective methods (e.g., birth control pills, injectables, patch and ring) (Steiner, Liddon, Swartzendruber, Rasberry, & Sales, 2016; Warner et al., 2016).

The implications of LARC use for STI/HIV prevention may also extend beyond condom use to health services. Specifically, LARC users may be less likely to receive recommended STI/HIV-related services, given the long-acting nature of these methods and young women's care seeking patterns and preferences. Whereas moderately effective methods must be refilled or administered by a provider at least annually, LARC methods remain effective for up to 3-10 years, depending on the method, and require less clinical interaction for continuation. Fewer family planning visits may mean fewer opportunities for testing, given that 75% of women receiving STI-related services report receiving them from obstetricians/gynecologists or family planning providers (Hall, Patton, Crissman, Zochowski, & Dalton, 2015). Moreover, many women intend to be tested for STIs at family planning clinics (Crissman et al., 2016), which are the only source of care for a substantial proportion of women (Frost, Gold, & Bucek, 2012).

Limited research has explored associations between LARC use and receipt of health services. Although two prior studies examined use of clinical services, including STI testing, among young female LARC users, neither was conducted in the context of the current healthcare system—one took place in the early-1990s and the other used home-based STI testing as part of study follow-up (Polaneczky, Slap, Forke, Rappaport, & Sondheimer, 1994; Skala, Secura, & Peipert, 2012). Using nationally representative data, we assess whether sexually active adolescent and young adult LARC users are less likely to receive STI/HIV services compared to users of moderately effective

contraceptive methods that typically involve annual clinic visits. Given that new LARC users are inherently interacting with the healthcare system at the time of insertion, we distinguish new and continuing LARC users. We also compare new and continuing LARC users to users of less effective methods that do not require regular clinical interactions for continuation and non-contraceptors. A more nuanced understanding of whether LARC use is related to receipt of STI/HIV services can inform strategies for integrating STI/HIV prevention with efforts to increase awareness of and access to LARC methods.

Methods

Data source and procedures. We used data from the 2011-2015 National Survey of Family Growth (NSFG) implemented by the National Center for Health Statistics at the Centers for Disease Control and Prevention (CDC). Details of the survey methodology are documented elsewhere (Centers for Disease and Control Preventin, 2014). Briefly, this continuously administered survey (with interviews conducted over 48 weeks each year) employs a multi-stage probability design that yields a nationally representative sample of women and men aged 15-44 years in the U.S. household population. Computer assisted personal interviews (CAPI) are used to collect self-reported information about family life, marriage and divorce, pregnancy, fertility, contraceptive use, health behaviors and outcomes. Additional sexual health-related indicators are assessed via audio-computer assisted self-interviews (ACASI).

Study sample. For this analysis, the sample was restricted to sexually active female adolescents (15-19 years) and young adult women (20-24 years) at risk for unintended pregnancy (n=2,018). Participants were considered to be sexually active and

at risk for unintended pregnancy if they had vaginal sex with at least one male sex partner in the prior year and were not currently pregnant, seeking pregnancy, postpartum (completed pregnancy ≤2.5 months before interview), infecund, or using sterilization as their current method of contraception.

Measures. The independent variable of interest was type of contraceptive method currently used. We first used a recoded variable to determine the most effective method used during the month of the interview (if any), based on estimates of contraceptive effectiveness with typical use (Sundaram et al., 2017). For users of highly effective LARC methods, we then used a calendar history of contraceptive use to assess whether the method was initiated within or prior to the past 12 months. The final categorical indicator distinguished (1) new LARC users (initiated ≤12 months prior); (2) continuing LARC users (initiated > 12 months prior); (3) current users of moderately effective methods, including oral contraceptives, Depo-Provera, the patch, and ring; (4) current users of less effective methods, including condoms, diaphragm, withdrawal, morning-after pill, foam, sponge, suppository, jelly or cream, periodic abstinence, or other method (not specified); and 4) non-contraceptors.

Outcomes included dichotomous variables for chlamydia testing, any STI testing, HIV testing, and STI-related risk assessment in the past year, given existing recommendations for these services. The U.S. Preventive Services Task Force, CDC, and American College of Obstetricians and Gynecologists (ACOG) recommend annual chlamydia and gonorrhea screening for all sexually active women <25 years of age, and routine HIV screening starting at age 15, with recommended screening intervals for HIV varying based on risk (Lee et al., 2016). The American Academy of Pediatrics also

recommends risk assessment for sexually active individuals based on condom use, partner characteristics, participation in transactional sex, and prior STI treatment as part of quality, annual preventive care visits for young people (Hagan, Shaw, & Duncan, 2017).

Outcomes were measured using both the ACASI and CAPI components of the survey. STI testing was based on two ACASI items—one that assessed receipt of chlamydia testing in the past year specifically, and another that asked about past year testing for other STIs "like gonorrhea, herpes, or syphilis." We used the chlamydia testing item as one outcome variable and also created a second composite outcome variable based on both items for any STI testing, as adolescents may not accurately report receipt of specific STI tests (Goodman, Black, Perasud, & Delnevo, 2012). HIV testing in the past year (outside of blood donation) was based on CAPI items about ever being tested and the date of the last (or most recent) test. Finally, a proxy for STI-related risk assessment was based on four dichotomous ACASI items that assessed whether a doctor or health care provider asked about condom use, number of partners, type of sex (vaginal, oral, or anal), and sex of sex partners during the past year. These risk assessment items were added to the female survey beginning in 2013-2015. Participants answering "yes" to any of these items were coded as having had their STI/HIV-related risk assessed.

Socio-demographic covariates included: age in years; race/ethnicity (non-Hispanic black, non-Hispanic white, Hispanic, other/multi-racial); mother's highest level of education (< high school, high school or equivalent, some college+); and current insurance status, coded as private, public (Medicaid, Medicare, CHIP, other government health care), and other or uninsured (single-service plan, Indian Health Service, not

covered). Additional covariates included: past year live birth (yes vs. no), given recommendations related to postpartum LARC insertion as well as STI/HIV testing recommendations specific to pregnant women (American College of Obstetricians and Gynecologists, 2016; Lee et al., 2016); number of sexual partners (1 vs. 2+), given the possibility of risk-based service delivery despite guidelines for screening regardless of risk; and usual source of care (no usual source, family planning or community health clinic, private practice or other), which is associated with contraceptive type and receipt of preventive services (Blewett, Johnson, Lee, & Scal, 2008; Groskaufmanis & Masho, 2016).

Analyses. We conducted all analyses using SAS-Callable SUDAAN version 9.3 (RTI International, Research Triangle Park, North Carolina) to account for the complex sampling design and yield nationally representative estimates. To describe the analytic sample, we examined characteristics for respondents in each contraceptive category and used chi-square statistics to test for overall differences between groups. Our primary analyses compared prevalence of receiving each service among new and continuing LARC users as compared to respondents in each of the other contraceptive categories. Bivariate chi-square statistics were used to identify overall differences. We conducted unadjusted and adjusted comparisons using logistic regression, with separate models for each outcome. For each logistic model, we compared new LARC users and continuing LARC users to 1) moderately effective method users; 2) less effective method users; and 3) non-contraceptors. We report prevalence ratios because the prevalence of each outcome in this analysis is more than 10%, so odds ratios may overestimate differences in prevalence (Zhang & Yu, 1998). Multivariable models controlled for all covariates

previously described given theoretical justification and the absence of multicollinearity. For STI and HIV testing outcomes, we also included an indicator distinguishing participants from 2011-2013 and 2013-2015 to adjust for potential temporal effects. For the sexual risk assessment outcome assessed only in 2013-2015, listwise deletion removed incomplete cases from 2011-2013. We tested whether associations varied based on number of partners yet interaction analyses were not significant so the results are not stratified by this factor.

Results

Among sexually active young women at risk for unintended pregnancy, use of moderately effective methods was most common (43.5%), followed by use of less effective methods (24.3%) and then non-use of contraception (20.9%). LARC use was less common; 4.4% had initiated a LARC method in the past year and 6.9% were continuing users, for a total of 11.3% (Table 2.1). Overall, mean age of respondents was 20.7 years and the majority were non-Hispanic white (54.6%), had a mother with some college education or higher (55.4%), were privately insured (55.3%), and had a private usual source of care (67.7%). Nearly three-quarters (72.8%) had only one sex partner in the prior year; less than one-tenth (7.5%) had a live birth in the past year.

Respondents in each contraceptive use category differed by socio-demographic factors (Table 2.1). Continuing LARC users had the highest proportion of young women who were Hispanic (33.8%) and uninsured (26.0%) and lowest proportion who had mothers with at least some college education (46.3%). New LARC users had the highest proportion of publically insured participants (46.8%). Moderately effective method users were predominately non-Hispanic white (64.0%), had a mother with some college

education or higher (62.8%), were privately insured (67.3%), and used a private clinic or some type of facility that was not a family planning or community health clinic (75.0%) as their usual source of care. About one-quarter of less effective method users (24.7%) and non-contraceptors (25.7%) did not have a usual source of care. Across the contraceptive methods, most respondents had only one partner in the prior year. Nearly two-fifths of new LARC users (36.7%) had a live birth in the past year compared to less than one-tenth of moderately (6.0%) and less effective method users (7.4%) and non-contraceptors (7.1%).

Receipt of most sexual health-related services was low (Figure 2.1). Overall, only 40.9% of all respondents reported being tested for chlamydia, 47.3% had any STI test, and 25.9% had an HIV test in the prior year. About two-thirds (66.5%) received any sexual risk assessment. Receipt of each service varied across the categories of contraceptive method users ($p<.05$ for each service) and was generally highest among new LARC users and moderately effective method users, and lowest among less effective method users and non-contraceptors.

Unadjusted and adjusted analyses are presented in Table 2.2. Despite the pattern across most outcomes for continuing LARC users to have lower receipt of services than moderately effective method users, we detected few differences. In unadjusted models, continuing LARC users were less likely than moderately effective method users to receive HIV testing and sexual risk assessment, but in multivariable models only the association with HIV testing remained (aPR=0.52, 95% CI=0.32-0.85). Conversely, new, but not continuing, LARC users were more likely than less effective method users to be tested for chlamydia and have their sexual risk assessed, although only the association

with sexual risk assessment remained in multivariable analyses (aPR=1.35, 95%CI=1.03-1.76). Similarly, new, but not continuing, LARC users were more likely than non-contraceptors to have received sexual risk assessment (aPR=1.43, 95% CI=1.11-1.85). However, both new and continuing LARC users were more likely than non-contraceptors to be tested for chlamydia (new: aPR=1.52, 95%CI=1.08-2.15; continuing: aPR=1.69, 95%CI=1.24-2.29).

Discussion

Prior research suggests that condom use may be lower among adolescents using LARC methods as compared to oral contraceptives (Steiner et al., 2016). Given the possibility that LARC use could also affect receipt of STI/HIV services, we used nationally representative data to consider associations between contraceptive method type and receipt of STI/HIV-related services among sexually active adolescents and young women. Receipt of STI/HIV-related services for both new and continuing LARC users was largely similar to receipt of these services among adolescents and young women using moderately effective contraceptive methods that typically involve annual clinic visits. Compared to less effective method users that do not require routine visits and non-contraceptors, there were some differences. New, but not continuing, LARC users were more likely than less effective method users and non-contraceptors to have their sexual risk assessed, although both groups were more likely than non-contraceptors, to be tested for chlamydia.

Overall, self-reported receipt of STI/HIV services appears sub-optimal given recommendations for annual STI screening and sexual risk assessment and routine HIV testing among young women (Hagan et al., 2017; Lee et al., 2016). Prevalence was low

even among new LARC and moderately effective method users, suggesting a missed opportunity for providing STI services to sexually active young women who presumably are accessing care for contraception. A study using 2002 NSFG data reached a similar conclusion, as only 35% of young women who had received a contraceptive service in the past year also received any STI-related service (Farr, Kraft, Warner, Anderson, & Jamieson, 2009).

We found little evidence that LARC users as compared to moderately effective method users were less likely to receive STI testing or sexual risk assessment. These results align with the studies previously mentioned that considered associations between contraceptive type and service utilization/receipt. One study from the 1990s found no difference in frequency of clinic visits between a small sample of implant and oral contraceptive users (Polaneczky et al., 1994). A more recent analysis of data from the Contraceptive CHOICE Project found that receipt of STI screening among sexually active young women did not differ between LARC users and non-LARC users, although the authors acknowledge that the availability of home-based testing in the study could have minimized differences (Skala et al., 2012). Future monitoring will be important if LARC use continues to increase among young women. Our finding that continuing LARC users were less likely than moderately effective method users to have received HIV testing in the past year is of some concern, although given that screening for HIV is not necessarily recommended annually (Lee et al., 2016), it is possible that HIV testing was not indicated. Larger samples of LARC users may reveal differences in the receipt of other STI/HIV services that warrant attention.

Differences between new and continuing LARC users and individuals who were not using a method requiring a clinic visit also revealed a pattern that may warrant attention. Both new and continuing LARC users were more likely than non-contraceptors to have had chlamydia testing. However, only new LARC users were more likely than non-contraceptors to be tested for any STI and more likely than both non-contraceptors and less effective method users to have received sexual risk assessment. We did not detect differences in any STI testing and sexual risk assessment among continuing LARC users relative to less effective method users or non-contraceptors. These findings suggest that initiating LARC, like returning to a clinic for annual prescription renewal, may offer an opportunity to receive STI-related services yet this potential benefit may not persist as LARC use continues.

Several more general yet notable findings regarding adolescent and young adult use of LARC emerged from our analysis. As documented previously (Pazol et al., 2016), LARC use among adolescents and young women is still low, reinforcing the importance of efforts to increase awareness of and access to these highly effective contraceptive methods (e.g., provider training, provision at no cost) (Harper et al., 2015; Secura et al., 2014). Additionally, we found the sociodemographic profile of young LARC users aligns with prior research, in that LARC use was more common among Hispanic women and those who are publically insured or uninsured (Kavanaugh, Jerman, & Finer, 2015; Daniels, Dougherty, Jones, & Mosher, 2015). The latter finding may reflect receipt of contraceptive care at Title-X clinics where concerted efforts to reduce barriers to LARC have been made (Romero et al., 2015). We also found that nearly one-third of new LARC users had a live birth in the past year compared to only 7.5% of young sexually active

women overall, likely reflecting postpartum LARC insertion to avoid rapid repeat pregnancy and highlighting the importance of initiatives to reduce barriers to accessing LARC immediately postpartum (American Congress of Obstetricians and Gynecologists, 2017; Association of State and Territorial Health Officials, n.d.) Finally, it is promising that we observed no differences in STI testing (or other services) between new LARC users and moderately effective method users who likely accessed care in the prior year. Recommendations from ACOG and CDC advise providers to insert IUDs without routine STI screening prior (American College of Obstetricians and Gynecologists, 2017; Curtis et al., 2016) and increased likelihood of testing among new LARC users relative to other contraceptive users accessing care would suggest poor adherence to these guidelines.

This study has limitations and strengths. Because LARC use remains low among young women, we may have had insufficient power to detect differences. Nonetheless, this study highlights the importance of this issue and provides a starting point for future monitoring. With larger samples of LARC users, it may be feasible to explore nuances of the associations, including effect modification by usual source of care and sexual risk. Research to understand whether continuing LARC use is associated with decreased likelihood of any clinical visit, a measure not currently assessed by NSFG, would also be useful. The data are also self-reported, and adolescents' knowledge of STI testing history may be limited or they may be unwilling to disclose, although measurement via ACASI may minimize social desirability bias and improve validity of these measures (Beauclair et al., 2013). Because the data are cross-sectional we cannot make causal inference about the impact of LARC use on receipt of services. Additionally, the cross-sectional design, along with our reliance on current contraceptive use, did not allow us to account for

method switching; current users of less effective methods or no method may have been using methods that require clinic visits within the prior year. That said, we were able to use the calendar history of contraceptive use to distinguish new and continuing LARC users, which was particularly important for addressing our research question. Additionally, the data are from a nationally representative sample; the findings are thus generalizable to sexually active U.S. adolescent and young adult women 15-24 years at risk for unintended pregnancy.

As LARC use increases among adolescents and young women, it will be important to monitor receipt of STI/HIV services. Further, studies that examine incident STI diagnoses by contraceptive type are needed to fully understand the broader impact of LARC use. The current study and these future directions address STI/HIV-related outcomes in addition to condom use, which has typically been the focus of research on contraceptive use and STI prevention. In general, a broader set of outcomes, including STI/HIV-related services, should be considered when exploring the STI prevention implications of other innovations related to increasing access to contraception (e.g., provision of oral contraception without a prescription).

Examining potential unintended consequences of providing LARC should not deter public health and clinical efforts to increase access to these highly effective methods. Understanding how LARC and STI/HIV service use are related can potentially inform practice strategies to prevent or minimize any adverse effects. Although we did not see differences in STI testing and risk assessment between continuing LARC and moderately effective method users, it may still be useful to address the need for routine

preventive care, including STI/HIV services, in counseling and health education about LARC, whether clinic-based or via broader health promotion efforts.

More broadly, low receipt of services overall suggests a need to integrate STI/HIV prevention with efforts to provide quality family planning services. Provider training related to effective implementation of relevant clinical guidelines may be particularly useful. Beyond training, systems-level innovations will likely be important given limited time and competing priorities during family planning and health maintenance visits. A multi-component intervention involving patient education and provider training to integrate unintended pregnancy and STI prevention is currently being evaluated and could serve as a programmatic model if effective (Ewing et al., 2017). Electronic medical record reminders have also been shown to facilitate integrated delivery of family planning and STI services (Shlay et al., 2013). Implementing such strategies to provide comprehensive service delivery could help ensure that the advent and implementation of new prevention approaches for one outcome, in this case LARC methods for pregnancy prevention, promote overall sexual and reproductive health.

Acknowledgments

We would like to thank Gladys Martinez, PhD, with the National Center for Health Statistics at the Centers for Disease Control and Prevention, for providing technical assistance.

Table 2.1 Sample Characteristics by Contraceptive Type

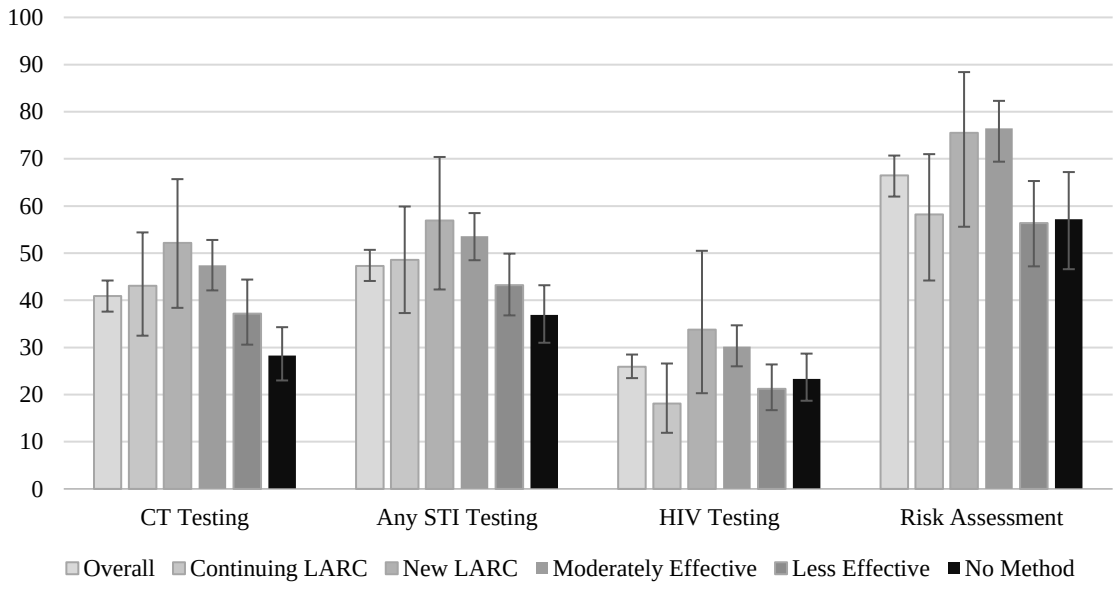
	Overall (n=2,018)	*Continuing LARC (n=155)*	*New LARC (n=95)*	*Moderately Effective (n=798)*	*Less Effective (n=489)*	*No contraception (n=480)*	*P-value*[a]
		% (95% CI)	% (95% CI)	% (95% CI)	% (95% CI)	% (95% CI)	
Total		6.9 (5.5-8.5)	4.4 (3.3-5.9)	43.5 (40.4-46.7)	24.3 (21.6-27.2)	20.9 (18.6-23.5)	
Age (mean, SE)	20.7 (0.1)	21.9 (0.2)	21.0 (0.2)	20.7 (0.1)	20.8 (0.2)	19.9 (0.2)	p<.001
Race/ ethnicity							p<.001
White[b]	54.6 (50.6-58.5)	46.4 (37.1-55.9)	52.4 (38.3-66.2)	64.0 (58.5-69.1)	50.3 (43.3-57.3)	43.4 (36.6-50.5)	
Black[b]	14.9 (12.7-17.3)	12.2 (6.7-21.1)	19.3 (11.6-30.4)	11.9 (9.1-15.3)	16.5 (12.9-21.0)	19.1 (14.8-24.2)	
Hispanic	21.4 (18.4-24.6)	33.8 (24.6-44.4)	18.4 (9.7-32.4)	14.9 (11.2-19.6)	23.3 (18.3-29.2)	29.0 (22.6-36.2)	
Other[c]	9.2 (6.7-12.5)	7.6 (3.6-15.4)	9.8 (4.0-22.2)	9.2 (6.3-13.4)	9.9 (6.1-15.7)	8.6 (5.3-13.6)	
Mother's level of education							p=.015
< High school	16.5 (14.1-19.2)	19.0 (12.4-27.9)	12.6 (7.1-21.5)	11.9 (9.1-15.3)	22.3 (16.5-29.4)	19.4 (14.6-25.3)	
High school or equivalent	28.1 (25.3-31.2)	34.7 (25.2-45.6)	31.0 (18.2-47.6)	25.4 (21.2-30.0)	29.0 (22.9-36.0)	30.1 (24.5-36.4)	
Some college or higher	55.4 (51.9-58.8)	46.3 (36.0-56.9)	56.4 (41.6-70.1)	62.8 (57.8-67.4)	48.7 (41.6-55.9)	50.5 (43.3-57.6)	
Insurance status							p<.001
No insurance	17.6 (14.8-20.8)	26.0 (17.1-37.4)	15.4 (7.9-27.8)	10.1 (7.9-13.0)	23.9 (18.6-30.3)	23.4 (17.2-31.0)	
Public	27.1 (23.7-30.9)	29.7 (23.1-37.2)	46.8 (31.9-62.3)	22.5 (18.3-27.4)	28.1 (22.8-34.0)	30.6 (25.3-36.4)	
Private	55.3 (51.3-59.2)	44.3 (33.8-55.3)	37.8 (24.8-52.8)	67.3 (62.0-72.2)	47.9 (41.3-54.7)	46.1 (39.6-52.7)	
Usual source of care							p=.002
No usual source	19.7 (17.3-22.4)	20.4 (12.2-32.2)	15.8 (8.3-28.0)	14.4 (11.2-18.3)	24.7 (19.4-30.8)	25.7 (20.5-31.8)	
Usual source FP/community health clinic	12.5 (10.4-14.9)	18.7 (10.3-31.5)	13.6 (8.1-21.7)	10.6 (7.4-15.0)	12.6 (9.5-16.4)	14.1 (11.1-17.9)	
Usual source of care private clinic or other	67.7 (64.4-70.9)	60.9 (49.2-71.4)	70.7 (58.9-80.3)	75.0 (70.3-79.3)	62.7 (56.8-68.3)	60.1 (53.8-66.1)	

Number of partners, past 12 mo.							p=0.577
1 partner	72.8 (69.8-75.6)	74.0 (58.9-85.0)	79.4 (62.0-90.1)	73.5 (68.8-77.8)	69.7 (64.3-74.5)	73.0 (66.4-78.8)	
2+ partners	27.2 (24.4-30.2)	26.0 (15.0-41.1)	20.6 (9.9-38.0)	26.5 (22.2-31.2)	30.3 (25.5-35.7)	27.0 (21.2-33.6)	
Live birth, past year							p<.001
Yes	7.5 (5.9-9.4)	0.0 (N/A)	36.7 (22.8-53.2)	6.0 (4.2-8.4)	7.4 (5.2-10.4)	7.1 (4.5-11.2)	
No	92.5 (90.6-94.1)	100.0 (N/A)	63.3 (46.8-77.2)	94.0 (91.6-95.8)	92.6 (89.6-94.8)	92.9 (88.8-95.5)	

n=unweighted number; %=weighted percentages; LARC=long-acting reversible contraception; CI=confidence interval; SE=standard error FP=family planning mo=months;

[a]Overall chi-square; [b]non-Hispanic, single race; [c]Includes non-Hispanic other and those reporting multiple race categories

Figure 2.1 Sexual Health Services by Contraceptive Type



CT=Chlamydia; STI=Sexually Transmitted Infection; LARC=Long-acting Reversible Contraception

Table 2.2 Logistic Regression Models of STI/HIV Services by Contraceptive Type

	Chlamydia Testing		*Any STI Testing*		*HIV Testing*		*Sexual Risk Assessment (2013-2015 only)*	
	PR (95% CI)[a]	aPR (95% CI)[b]	PR (95% CI)[c]	aPR (95% CI)[d]	PR (95% CI)[e]	aPR (95% CI)[f]	PR (95% CI)[g]	aPR (95% CI)[h]
LARC vs. Moderately effective								
Continuing LARC	0.91 (0.68-1.21)	0.88 (0.65-1.20)	0.91 (0.70-1.17)	0.84 (0.64-1.12)	**0.60 (0.39-0.93)**	**0.52 (0.32-0.85)**	**0.76 (0.60-0.97)**	0.78 (0.61-1.01)
New LARC	1.10 (0.82-1.47)	0.98(0.73-1.30)	1.06 (0.81-1.39)	0.89 (0.67-1.20)	1.12 (0.69-1.82)	0.88 (0.50-1.54)	0.99 (0.79-1.24)	1.01 (0.80-1.26)
LARC vs. Less effective								
Continuing LARC	1.16 (0.85-1.57)	1.17 (0.87-1.59)	1.12 (0.85-1.48)	1.11 (0.83-1.48)	0.86 (0.54-1.36)	0.84 (0.50-1.40)	1.03 (0.76-1.40)	1.05 (0.78-1.41)
New LARC	**1.40 (1.04-1.90)**	1.30 (0.95-1.79)	1.32 (0.99-1.75)	1.18 (0.86-1.61)	1.60 (0.96-2.64)	1.41 (0.81-2.46)	**1.34 (1.01-1.78)**	**1.35 (1.03-1.76)**
LARC vs. No contraception								
Continuing LARC	**1.52 (1.09-2.12)**	**1.52 (1.08-2.15)**	1.32 (0.99-1.74)	1.29 (0.95-1.75)	0.78 (0.48-1.25)	0.77 (0.45-1.31)	1.02 (0.74-1.41)	1.11 (0.80-1.55)
New LARC	**1.84 (1.34-2.53)**	**1.69 (1.24-2.29)**	**1.54 (1.16-2.06)**	1.37 (1.00-1.87)	1.45 (0.86-2.43)	1.30 (0.73-2.32)	**1.32 (1.02-1.72)**	**1.43 (1.11-1.85)**

Adjusted models include age, race/ethnicity, insurance status, mother's highest level of education, usual source of care, live birth in the past year, number of partners, and data collection period.

Bold findings indicate confidence interval does not overlap with 1.

PR= prevalence ratio; aPR=adjusted prevalence ratio CI=confidence interval; LARC=long-acting reversible contraception

[a]n=2,005; [b]n=1,976; [c]n=2,007; [d]n=1,978; [e]n=2,017; [f]n=1,988; [g]n=971; [h]n=950

References

Abma, J. C., & Martinez, G. M. (2017). Sexual activity and contraceptive use among teenagers in the United States, 2011-2015. *National Health Statistics Report* (104), 1-23.

American Academy of Pediatrics, Committee on Adolescence. (2014). Contraception for adolescents. *Pediatrics, 134*(4), e1244-1256. doi:10.1542/peds.2014-2299

American College of Obstetricians and Gynecologists, Committee on Practice Bulletins --Gynecology, Long-Acting Reversible Contraception Workgroup. (2017). ACOG Practice Bulletin No. 186: Long-acting reversible contraception: Implants and intrauterine devices. *Obstetrics and Gynecology, 130*(5), e251-e269. doi: 10.1097/AOG.0000000000002400.

American Congress of Obstetricians and Gynecologists. (2017). Medicaid Reimbursement for Postpartum LARC by State. Retrieved from https://www.acog.org/About-ACOG/ACOG-Departments/Long-Acting-Reversible-Contraception/Immediate-Postpartum-LARC-Medicaid-Reimbursement

American College of Obstetricians and Gynecologists, Committee on Adolescent Health Care, Long-Acting Reversible Contraception Working Group. (2012). Committee opinion no. 539: Adolescents and long-acting reversible contraception: Implants and intrauterine devices. *Obstetrics and Gynecology,120*(4), 983–988. doi: 10.1097/AOG.0b013e3182723b7d

American College of Obstetricians and Gynecologists, Committee on Obstetric Practice. (2016). Committee Opinion No. 670: Immediate Postpartum Long-Acting

Reversible Contraception. *Obstetrics and Gynecology, 128*(2), e32-37. doi:10.1097/AOG.0000000000001587

Association of State and Territorial Health Officials. (n.d.). Increasing access to contraception: LARC immediately postpartum learning community. Retrieved from http://www.astho.org/Programs/Maternal-and-Child-Health/ Increasing Access-to-Contraception/

Bearinger, L. H., & Resnick, M. D. (2003). Dual method use in adolescents: A review and framework for research on use of STD and pregnancy protection. *Journal of Adolescent Health, 32*(5), 340-349.

Beauclair, R., Meng, F., Deprez, N., Temmerman, M., Welte, A., Hens, N., & Delva, W. (2013). Evaluating audio computer assisted self-interviews in urban South African communities: Evidence for good suitability and reduced social desirability bias of a cross-sectional survey on sexual behaviour. *BMC Medical Research Methodology, 13*, 11. doi:10.1186/1471-2288-13-11

Blewett, L. A., Johnson, P. J., Lee, B., & Scal, P. B. (2008). When a usual source of care and usual provider matter: Adult prevention and screening services. *Journal of General Internal Medicine, 23*(9), 1354-1360. doi:10.1007/s11606-008-0659-0

Cates, W., Jr. (1993). Sexually transmitted diseases and family planning. Strange or natural bedfellows, revisited. *Sexually Transmitted Diseases, 20*(3), 174-178.

Centers for Disease Control and Prevention. (2014). Public use data file documentation, 2011-2013 National Survey of Family Growth: User's Guide. Retrieved from http://www.cdc.gov/nchs/data/nsfg/NSFG_2011-2013_UserGuide_MainText.pdf

Crissman, H. P., Hall, K. S., Patton, E. W., Zochowski, M. K., Davis, M. M., & Dalton, V. K. (2016). U.S. women's intended sources for reproductive health care. *Journal of Women's Health, 25*(1), 91-98. doi:10.1089/jwh.2014.5116

Curtis, K. M., Jatlaoui, T. C., Tepper, N. K., Zapata, L. B., Horton, L. G., Jamieson, D. J., & Whiteman, M. K. (2016). U.S. selected practice recommendations for contraceptive use, 2016. *Morbidity and Mortality Weekly Report: Recommendations and Reports, 65*(4), 1-66. doi:10.15585/mmwr.rr6504a1

Ewing, A. C., Kottke, M. J., Kraft, J. M., Sales, J. M., Brown, J. L., Goedken, P., . . . Kourtis, A. P. (2017). 2GETHER - The Dual Protection Project: Design and rationale of a randomized controlled trial to increase dual protection strategy selection and adherence among African American adolescent females. *Contemporary Clinical Trials, 54*, 1-7. doi:10.1016/j.cct.2016.12.014

Farr, S. L., Kraft, J. M., Warner, L., Anderson, J. E., & Jamieson, D. J. (2009). The integration of STD/HIV services with contraceptive services for young women in the United States. *American Journal of Obstetrics and Gynecology, 201*(2), 142 e141-148. doi:10.1016/j.ajog.2009.04.018

Finer, L. B., & Zolna, M. R. (2016). Declines in unintended pregnancy in the United States, 2008-2011. *New England Journal of Medicine, 374*(9), 843-852. doi:10.1056/NEJMsa1506575

Frost, J. J., Gold, R. B., & Bucek, A. (2012). Specialized family planning clinics in the United States: Why women choose them and their role in meeting women's health care needs. *Women's Health Issues, 22*(6), e519-525. doi:10.1016/j.whi.2012.09.002

Gavin, L., Moskosky, S., Carter, M., Curtis, K., Glass, E., Godfrey, E., . . . Zapata, L. (2014). Providing quality family planning services: Recommendations of CDC and the U.S. Office of Population Affairs. *Morbidity and Mortality Weekly Report: Recommendations and Reports, 63*(RR-04), 1-54.

Goodman K., Black C., Perasud P., Delnevo C. (2012). *Patient knowledge of sexually transmitted disease (STD) testing in an urban clinic: A comparison of patient perceived testing and actual tests performed*. Poster session presented at the STD Prevention Conference, Minneapolis, MN.

Groskaufmanis, L., & Masho, S. W. (2016). Source of care and variation in long-acting reversible contraception use. *Fertility and Sterility, 105*(2), 401-409. doi:10.1016/j.fertnstert.2015.10.022

Hall, K. S., Patton, E. W., Crissman, H. P., Zochowski, M. K., & Dalton, V. K. (2015). A population-based study of US women's preferred versus usual sources of reproductive health care. *American Journal of Obstetrics and Gynecology, 213*(3), 352 e351-314. doi:10.1016/j.ajog.2015.04.025

Hagan J.F., Shaw J.S., Duncan P.M., eds. (2017). *Bright Futures: Guidelines for Health Supervision of Infants,Children, and Adolescents*. 4th ed. Elk Grove Village, IL: American Academy of Pediatrics.

Harper, C. C., Rocca, C. H., Thompson, K. M., Morfesis, J., Goodman, S., Darney, P. D., . . . Speidel, J. J. (2015). Reductions in pregnancy rates in the USA with long-acting reversible contraception: A cluster randomised trial. *Lancet, 386*(9993), 562-568. doi:10.1016/S0140-6736(14)62460-0

Lee, K. C., Ngo-Metzger, Q., Wolff, T., Chowdhury, J., LeFevre, M. L., & Meyers, D. S. (2016). Sexually transmitted infections: Recommendations from the U.S. Preventive Services Task Force. *American Family Physician, 94*(11), 907-915.

Pazol, K., Daniels, K., Romero, L., Warner, L., & Barfield, W. (2016). Trends in long-acting reversible contraception use in adolescents and young adults: New estimates accounting for sexual experience. *Journal of Adolescent Health, 59*(4), 438-442. doi:10.1016/j.jadohealth.2016.05.018

Polaneczky, M., Slap, G., Forke, C., Rappaport, A., & Sondheimer, S. (1994). The use of levonorgestrel implants (Norplant) for contraception in adolescent mothers. *New England Journal of Medicine, 331*(18), 1201-1206. doi:10.1056/NEJM199411033311806

Satterwhite, C. L., Torrone, E., Meites, E., Dunne, E. F., Mahajan, R., Ocfemia, M. C., . . . Weinstock, H. (2013). Sexually transmitted infections among US women and men: prevalence and incidence estimates, 2008. *Sexually Transmitted Diseases, 40*(3), 187-193. doi:10.1097/OLQ.0b013e318286bb53

Secura, G. M., Madden, T., McNicholas, C., Mullersman, J., Buckel, C. M., Zhao, Q., & Peipert, J. F. (2014). Provision of no-cost, long-acting contraception and teenage pregnancy. *New England Journal of Medicine, 371*(14), 1316-1323. doi:10.1056/NEJMoa1400506

Shlay, J. C., McEwen, D., Bell, D., Maravi, M., Rinehart, D., Fang, H., . . . Dreisbach, S. (2013). Integration of family planning services into a sexually transmitted disease clinic setting. *Sexually Transmitted Diseases, 40*(8), 669-674. doi:10.1097/OLQ.0b013e318294ff6a

Skala, S. L., Secura, G. M., & Peipert, J. F. (2012). Factors associated with screening for sexually transmitted infections. *American Journal of Obstetrics and Gynecology, 206*(4), 324 e321-326. doi:10.1016/j.ajog.2012.02.020

Society for Adolescent Health and Medicine. (2017). Improving knowledge about, access to, and utilization of long-acting reversible contraception among adolescents and young adults. *Journal of Adolescent Health, 60*(4), 472-474. doi:10.1016/j.jadohealth.2017.01.010

Steiner, R. J., Liddon, N., Swartzendruber, A. L., Rasberry, C. N., & Sales, J. M. (2016). Long-acting reversible contraception and condom use among female US high school students: Implications for sexually transmitted infection prevention. *JAMA Pediatrics, 170*(5), 428-434. doi:10.1001/jamapediatrics.2016.0007

Sundaram, A., Vaughan, B., Kost, K., Bankole, A., Finer, L., Singh, S., & Trussell, J. (2017). Contraceptive failure in the United States: Estimates from the 2006-2010 National Survey of Family Growth. *Perspectives on Sexual and Reproductive Health, 49*(1), 7-16. doi:10.1363/psrh.12017

Warner, L., Williams, L., Le, B., Smith, R., Pazol, K., Harrison, L., Kourtis, A., & Barfield, W. (2016). *Dual use of condoms with long-acting reversible contraception (LARC) versus moderately effective methods among teen mother participating in the pregnancy risk assessment monitoring system (PRAMS).* Paper presented at the STD Prevention Conference, Atlanta, GA

Zhang, J., & Yu, K. F. (1998). What's the relative risk? A method of correcting the odds ratio in cohort studies of common outcomes. *JAMA, 280*(19), 1690-1691.

Chapter Three:

Do Health Promotion Messages Integrate Unintended Pregnancy and STI Prevention?

A Content Analysis of Online Information for Adolescents and Young Adults

Abstract

Purpose: Recently there have been calls to strengthen integration of unintended pregnancy and sexually transmitted infection (STI) prevention messages, particularly given increasing use of long-acting reversible contraception, which does not protect against STI. To assess the extent to which public health/clinical messages about unintended pregnancy prevention also address STI prevention, we conducted a content analysis of web-based health promotion information for young people.

Methods: Websites identified through a systematic Google search were eligible for inclusion if they were operated by a United States-based organization with a mission related to public health/clinical services and the URL included: 1) original content; 2) about sexual and reproductive health; 3) explicitly for adolescents and/or young adults. Using defined protocols, URLs were screened and content was selected and analyzed thematically.

Results: Most of the 32 eligible websites presented information about pregnancy and STI prevention separately. Concurrent discussion of the two topics was often limited to statements about (1) strategies that can prevent both outcomes (abstinence, condoms only, condoms plus moderately effective contraceptive methods) and (2) contraceptive methods that confer no STI protection. We also identified framing of condom use with moderate or highly effective contraceptive method for back-up pregnancy prevention, perhaps undermining STI prevention. STI prevention methods in addition to condoms, such as STI/HIV testing, vaccination, or pre-exposure or post-exposure prophylaxis, were typically not addressed with pregnancy prevention information.

Conclusions: There may be missed opportunities for promoting STI prevention online in the context of increasing awareness of and access to a full range of contraceptive methods.

Introduction

Integrating unintended pregnancy and sexually transmitted infection (STI) prevention has been a long-standing public health challenge. These outcomes have traditionally been addressed through distinct funding streams and vertically-oriented programs in the United States. At the individual-level, the most effective pregnancy prevention methods confer no STI protection, so use of condoms, a fundamental STI prevention strategy, with a more effective contraception is recommended for at-risk individuals (Bearinger & Resnick, 2003). Despite such complexity, the need for integration remains given the burden of both unintended pregnancy and STIs, particularly among adolescents and young adults ages 15-24 years who account for about half of all annual STIs and unintended pregnancies (Finer & Zolna, 2016; Satterwhite et al., 2013).

Increasing use of long-acting reversible contraception (LARC) among adolescents and young adults has renewed attention to the importance of addressing STI prevention and pregnancy prevention together. Recent studies suggest that condom use with LARC methods is low among adolescents—an issue also documented with moderately effective contraceptive methods (e.g., oral contraceptives, patch, injectable, or ring) (Williams & Fortenberry, 2013). However, adolescent LARC users may be even less likely to use condoms and more likely to have multiple partners compared to moderately effective method users (Steiner, Liddon, Swartzendruber, Rasberry, & Sales, 2016). Such findings have spurred calls for strengthening health education and clinic-based counseling to address both pregnancy and STI prevention (Potter & Soren, 2016; Steiner, Liddon, Swartzendruber, Pazol, & Sales, 2018).

National recommendations for quality family planning services emphasize counseling about STI prevention, including condom use, as a routine part of contraceptive care (Gavin et al., 2014). However, the extent to which public health and clinical messages address both prevention goals simultaneously remains unclear. Empirically assessing current messages is a key first step toward improving them, and online health information for adolescents and young adults provides a practical opportunity for such assessment. Over 60% of adolescents 15-18 years of age have looked up health information on the internet, and about one-quarter (28%) of women aged 15-19 years obtained information about sexual and reproductive health online (Kaiser Family Foundation, 2014). Moreover, online information has the potential to change health behavior (Korda & Itani, 2013).

We conducted a content analysis of web-based health promotion information for young people to assess how messages about pregnancy prevention also address STI prevention. Three questions guided our analysis: (1) *To what extent and how are unintended pregnancy and STI prevention discussed simultaneously?* (2) *How is condom use framed in relation to both pregnancy and STI prevention?* (3) *What STI prevention strategies are promoted in addition to condoms?*

Methods

Sample identification. To identify websites, we used systematic procedures adapted from previously published web content analyses (Borzekowski, Schenk, Wilson, & Peebles, 2010; Harris, Byrd, Engel, Weeks, & Ahlers-Schmidt, 2016; Marques et al., 2015). Figure 3.1 presents the search process. First, we conducted a systematic search using Google, the most popular search engine worldwide (Search Enginge Land, n.d.).

We searched keyword combinations related to adolescents and sexual and reproductive health (Table 3.1). We followed procedures to limit personalized results, including turning off location services and using an "incognito" browser. Two coders independently reviewed unique URLs from the first five pages (~50 links) of each keyword search (Minzer-Conzetti et al., 2007; Rahnavardi et al., 2008). A website was eligible for inclusion if it was operated by an organization in the United States with a mission to promote health and/or provide clinical services and the URL reviewed included: 1) original content; 2) about sexual and reproductive health; 3) explicitly for adolescents and/or young adults (Table 3.2). Four adolescent sexual and reproductive health experts reviewed the list of included websites and suggested additional websites, which were added if they met the above criteria.

Content selection and management. Sexual and reproductive health content for teens was selected using defined protocols. We excluded videos, clinic locator information, birth control reminders, blogs, quizzes and non-English-language content. For websites that addressed broader health topics and/or audiences, only sexual and reproductive health for teens was selected either from (1) defined sub-sections about "sexual health" or "sexual and reproductive health" and/or "for teens" or (2) by reviewing the entire website to identify information for teens about pregnancy, STIs, sexual development, sexuality, or relationships. For the latter approach, a second author verified content selection. We created PDFs of selected content from each website using PDFmyurl.com. PDFs ranged from six to 3,094 pages (Median=120 pages).

Coding and analysis. We uploaded PDFs to MAXQDA version 12.3 (VERBI Software, Berlin, Germany) for coding and qualitative analysis. Images were not coded.

We developed a preliminary codebook with deductive codes based on the research questions (e.g., birth control, condoms, abstinence), and two coders independently reviewed a subset of websites (n=6) to identify inductive codes and refine the codebook. These same coders double coded another eight websites (25%) to ensure consistent application of codes. Intercoder reliability, determined by percentage agreement, was 89%. One author coded the remaining websites, and content was analyzed thematically (Hsieh & Shannon, 2005).

Results

Website characteristics. We identified 32 eligible websites operated by a variety of organizations with a mission related to public health/clinical services, including non-profit advocacy/education organizations (n=14), health clinics/systems (n=10), government health agencies (n=3), academic institutions (n=2), professional medical organizations (n=2) and a for-profit company (n=1). Information about each website is provided in Table 3.3. About half (52%, n=17) focused specifically on sexual and reproductive health. The majority (59%, n=19) provided content only for adolescents and/or young adults, whereas some also addressed a broader audience.

To what extent and how are unintended pregnancy and STI prevention discussed simultaneously? Websites generally presented pregnancy and STI prevention information separately. In fact, 14 websites (44%) were organized, in part, by separate sections about types of birth control and STIs. Within this structure, concurrent discussion of the two topics was often limited to discrete statements (1) outlining strategies that can simultaneously prevent both outcomes and (2) emphasizing that certain contraceptive

methods confer no STI protection. This information was most often found with birth control content.

Strategies to prevent both unintended pregnancy and STIs. Twenty-nine (91%) websites promoted strategies to simultaneously prevent both pregnancy and STIs (Table 3.4). These included abstinence, condoms only, and condoms with moderately or highly effective contraceptive methods. Across the twenty-nine websites, there were more than 400 instances of promoting such strategies. Many websites promoted both single and multiple method approaches to reducing both risks. Occasionally, it was unclear whether condom use was recommended in addition to another contraceptive method or as a single method, for example: “Depo-Provera® injections do not protect against sexually transmitted infections. So you need to use a condom.” Such statements could be interpreted as promoting condom use over more effective methods of contraception.

Most contraceptive methods do not prevent STIs. It was common for websites to mention that certain contraceptive methods do not prevent STIs, sometimes describing this as a disadvantage of the method. However, only about half of such statements also included information about STI prevention strategies; this was particularly inconsistent within websites with sub-sections for types of birth control. For example, one website promoted condom use in conjunction with oral contraceptives but did not do so for other types of hormonal birth control, including IUDs and implants. Moreover, a statement about withdrawal conferring no STI protection suggested using another method, “like the IUD, implant, ring, patch, shot, or pill if you’re using withdrawal as your primary method” but none of these suggested methods prevent STIs. Promoting two methods of

pregnancy prevention reflects an emphasis on back-up pregnancy prevention described below.

How is condom use framed in relation to pregnancy and STI prevention? Thirty-one (97%) websites addressed condom use. Websites with sections about birth control included male and female condoms as contraception, in which case effectiveness was usually described in relation to pregnancy prevention only; STI prevention was often noted as an added benefit of the method. Information about types of STIs generally included condoms as a prevention strategy. Distinct descriptions of condom use in relation to each prevention goal further illustrate how typical website structure—separate sections for birth control and STIs—may limit integrated messaging. Additionally, common messages about condom use with moderate or highly effective contraceptive methods (1) for back-up pregnancy prevention and/or (2) without explicit reference to STI prevention may also undermine integration.

Condom use framed as back-up pregnancy prevention. Half of websites (n=16) included statements promoting condom use with moderate or highly effective methods in terms of back-up pregnancy prevention only (Box 3.1). Emphasizing condom use with another method for back-up pregnancy prevention has the potential to discourage condom use with methods that are highly effective. According to one website: "[…] especially where user error is a non-issue, like with an IUD or an implant -- the difference [in effectiveness] is so slight that backing up is just overkill". A majority of recommendations for temporary use of back-up contraception after starting a method or when taking medications that could decrease contraceptive effectiveness cited condoms as an example. Statements encouraging consistent condom use for STI prevention

accompanied this information in just a few cases, which actually created conflicting messages about the recommended length and purpose of using condoms with contraceptive methods.

Unclear framing of condoms with moderately effective methods for STI prevention. Information intended to promote condoms with moderately effective methods for STI prevention may not clearly emphasize this prevention goal. Of the 26 websites with such statements, 10 (38.4%) had at least one that encouraged condom use with contraception for additional protection against pregnancy as well as STI prevention (Table 3.4). Such framing along with (1) the promotion of condoms with moderately effective methods for back-up contraception only, as described above; and (2) descriptions of condoms for STI prevention as contraception (e.g., "latex or polyurethane condoms are the only *method of birth control* that can protect against the HIV virus and AIDS" [italics added]) may overly emphasize condom use for pregnancy prevention. Moreover, most websites had information about condoms with moderately effective methods that failed to promote condom use directly in relation to STI prevention, even though implied. For example, the statement "Combining condoms with hormonal birth control—such as the pill, ring, or shot—is a very effective way to prevent against both pregnancy and STDs" does not explicitly state that condoms are recommended specifically for preventing STIs.

What STI prevention strategies are promoted in addition to condoms? Most websites mentioned a variety of prevention options in addition to condoms, although biomedical HIV prevention strategies were limited (Box 3.2). However, these strategies were often not addressed in combination with pregnancy prevention information.

A variety of STI prevention strategies were frequently promoted except for biomedical HIV prevention. Nearly all websites encouraged STI/HIV testing, although it was not typically framed as a prevention option. Content about hepatitis B (HBV) and human papillomavirus (HPV) generally included vaccination as prevention strategy. In contrast, only five websites (15.6%) explicitly mentioned pre-exposure prophylaxis (PrEP) and post-exposure prophylaxis (PEP) and just two (6.3%) described treatment as HIV prevention.

Few STI prevention strategies beyond condoms were promoted with contraceptive methods. Notably, information simultaneously addressing pregnancy and STI prevention generally did not address the range of STI prevention strategies reflected in Box 3.2. In a few cases, STI/HIV testing was promoted with contraceptive methods, typically as an alternative to condoms even though testing and mutual monogamy may not always be a realistic strategy for adolescents. Moreover, one website encouraged testing without emphasizing mutual monogamy and another described a complex testing-based strategy that might be difficult for young people to understand and implement: “six months of safer sex, six months of sexual monogamy, and then TWO full STI screenings for each partner—once at the start of that six months, once at the end—before ditching latex barriers.” Information about emergency contraception (EC), particularly in the context of condom errors, offers a logical opportunity for promoting STI testing with contraception yet this was not routine. Relatedly, only two websites mentioned PEP with EC.

Discussion

To inform specific recommendations for strengthening health promotion messages intended to address both pregnancy and STI prevention, we conducted a

systematic assessment of online web content about sexual and reproductive health for adolescents. We found that many sites are organized by separate sections about birth control and STIs, which may hinder integration of pregnancy and STI prevention content. Pregnancy and STI prevention were primarily addressed through discrete messages about how to prevent both outcomes. It is promising that such statements were prevalent. However, we also identified notable limitations aligning with conceptual concerns previously raised (Steiner et al., 2018), including missed opportunities, inconsistent messaging, and potentially problematic framing.

Perhaps the most obvious missed opportunity is the frequent absence of information about how to prevent STIs when noting that certain contraceptive methods confer no STI protection. This would be straightforward to address by adding information about STI prevention methods, ideally including a range of options. Although many STI prevention approaches were promoted, a comprehensive set of strategies was not typically included with pregnancy prevention information. In particular, the lack of information about STI testing and PEP when promoting EC in the context of condom failure was notable. Additionally, absence of information about PrEP and treatment as prevention when discussing HIV prevention emerged as another missed opportunity.

In terms of inconsistent messaging, different strategies for simultaneous prevention of unplanned pregnancy and STIs were often promoted within a single website, including abstinence, condoms only, and condoms plus moderate or highly effective contraceptive methods. Offering a full range of prevention options is consistent with contraceptive counseling guidelines (Gavin et al., 2014), and there is no single, ideal approach (Cates & Steiner, 2002; O'Leary, 2011). However, inconsistent messaging may

make it difficult for youth to select and implement the best approach for their unique circumstances. A more in-depth discussion of ways to prevent both outcomes, including benefits and limitations of different strategies and a comprehensive menu of STI and pregnancy prevention strategies seems warranted.

Finally, framing use of condoms with moderately or highly effective contraceptive methods in terms of back-up pregnancy prevention combined with the absence of explicit statements about condom use for STI prevention could be problematic. Studies suggest that pregnancy prevention is the primary motivator for condom use, even when using a moderate or highly effective method of contraception (Cooper, Agocha, & Powers, 1999; Lemoine, Teal, Peters, & Guiahi, 2017). Although messages about condoms as contraception or back-up contraception may resonate with young people, promoting condom use with moderate or highly effective contraceptive methods directly in relation to STI prevention will help emphasize the importance of this prevention goal.

This study has limitations. For one, although our methods were systematic, our search strategy yielded a sample of health promotion messages. To keep the review manageable, search procedures were not exhaustive and certain types of content were excluded. Additionally, given our interest in public health and clinical messages, we conducted a controlled search using keywords rather than mimicking adolescent search behavior, which generally involves searching questions or phrases (Buhi, Daley, Fuhrmann, & Smith, 2009). The content analyzed in this study may, therefore, not be the content adolescents frequently view, which includes websites such as Wikipedia that were not eligible for inclusion in our study (Buhi et al., 2009). Relatedly, we did not

analyze video content which is a format commonly accessed by youth (Boyar, 2011). It is also possible that our content selection process, although standardized, did not capture all relevant content on included websites.

Future research could assess such broader content and formats as well as information from other sources of health education including sexual health education curricula, providers, and parents. To that end, analysis of content for parents and providers might indicate whether these audiences are receiving comprehensive information to share with adolescents. Another important next step is to determine adolescents' interpretation of online information and how such messages influence knowledge, attitudes, and behavior. We know framing of health messages is important in this regard (Gallagher & Updegraff, 2012), yet empirical testing could inform specific changes to health promotion content.

Specifically, future research should explore how to structure online information to facilitate integration of pregnancy and STI prevention information. Frameworks aligned with the concept of sexual health may offer a useful strategy for doing so (Steiner et al., 2017; Swartzendruber & Zenilman, 2010; Tharp et al., 2013). For example, organizing content according to aspects of a healthy relationship, such as decision-making about sexual activity and conversations with partners about pregnancy and STI prevention, may be one approach. At minimum, adding website sections about simultaneously addressing unintended pregnancy and STI prevention would allow for a more comprehensive presentation of prevention strategies while also raising the visibility of this issue. Such structural changes in combination with improving discrete messages incorporated

throughout websites offer opportunities to strengthen integration of online pregnancy and STI prevention information for adolescents and young adults.

Acknowledgements

We would like to thank Eric Buhi, Rachel Kachur, and Ty Collins for thoughtful discussions on the search strategy, and Deb Levine, Melissa Kottke, Fred Wyand, and Maria Trent for providing input on the included websites. We also appreciate Retze Fabre with pdfmyurl.com for providing technical assistance on data management and Jaimie Shing for her research assistant support. This work was supported by Professional Development Support Funds from Emory University Laney Graduate School and Letz Funds from the Department of Behavioral Sciences and Health Education at Emory University Rollins School of Public Health.

Figure 3.1 Flow Diagram for Systematically Identifying a Sample of Websites

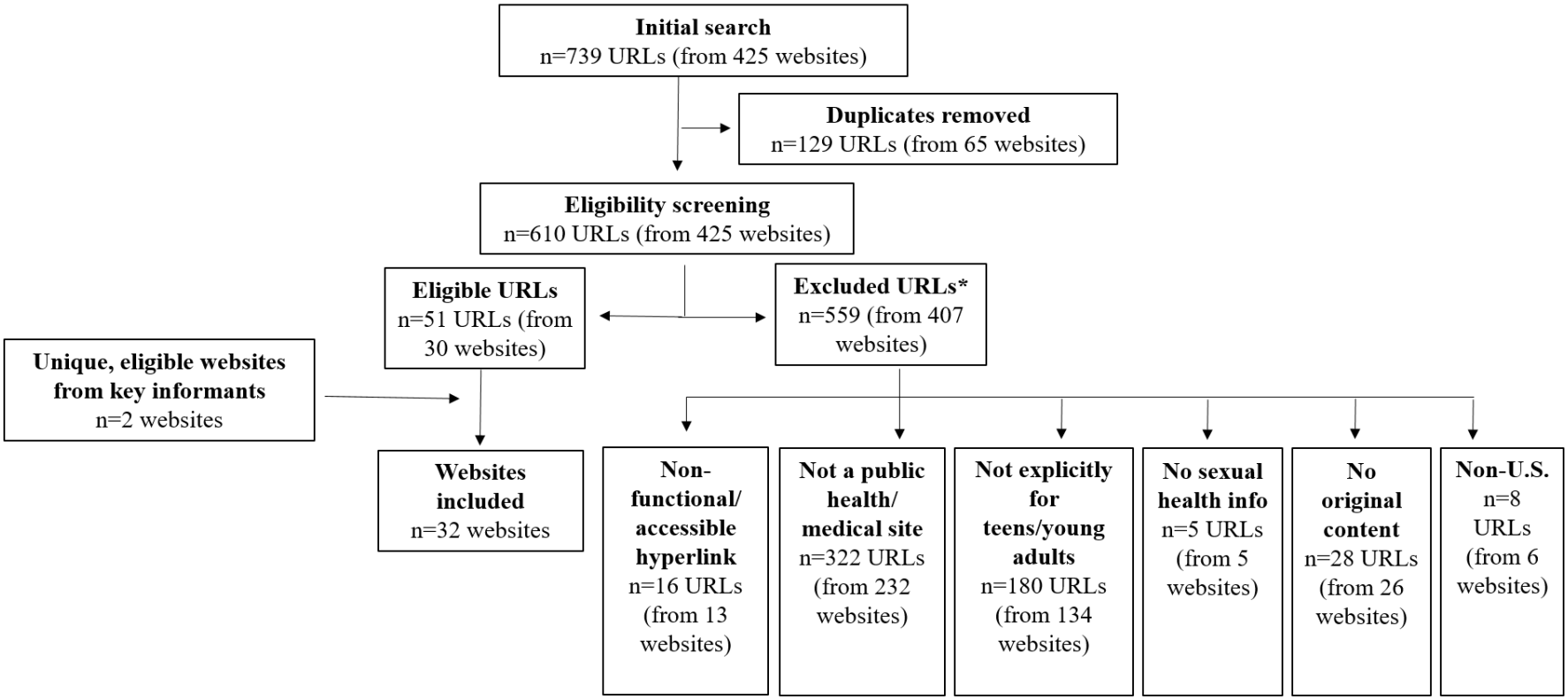


Table 3.1 Search Terms[a]

Adolescent Term[b]	*Sexual and Reproductive Health Term*[c]
teen	sexual health
young	sex education
youth	birth control
girls	IUD
	implant
	the pill

[a]All key word combinations between the two columns were searched.

[b]We did not use terms such as "adolescent," "contraception," or "pregnancy prevention," because preliminary searches with these keywords yielded content primarily for health professionals rather than consumers.

[b]Given the study objective, we also did not use STI-related search terms, such as condoms or specific STI names, to minimize selection bias.

Table 3.2 Key Exclusions for Eligibility Criteria

Mission to promote health and/or provide clinical services[a]	*For adolescents/young adults*	*About sexual and reproductive health*	*Original content*
• For-profit websites that provided health information only in the context of product promotion • Pregnancy resource center websites	• Web pages addressing parents of adolescent/young adults • Web pages that discussed adolescent/young adult sexual health but did not use second person or other language to specify adolescents were the intended audience (e.g. "for teens")	• Web pages about breast implants	• Web pages with information about clinic location/hours only • Web pages with list of resources/links only • Web pages with blog, forum, or video content only • Links to PDF documents only

[a]Based on information provided on the "About" page or similar web page; all other eligibility criteria assessed using the specific web page (i.e. URL) identified through the search.

Table 3.3 Website Characteristics

Website	*Operated By*	*Organization Description*	*Primary Audience*	*Scope of Content*	*Type of Content*
http://annexteenclinic.org/	Annex Clinic	Local medical provider	Teens	Sexual and reproductive health	Informational web pages
http://kidshealth.org/	Nemours	Non-profit pediatric health system	Kids, teens, and parents	Multiple health topics, including a defined sub-section on sexual health	Informational web pages
http://publichealth.lacounty.gov/	LA County Department of Public Health	Local health department	Health professionals and health consumer, including youth in foster care	Multiple health topics	Informational web pages
http://stayteen.org/	Power to Decide (formerly The National Campaign to Prevent Teen and Unplanned Pregnancy)	National non-profit organization	Teens	Sexual and reproductive health	Informational web pages Q&A
http://teen411.com/home	Valley Community Clinic	Local medical provider	Teens	Sexual and reproductive health	Informational web pages
http://teenclinic.org/	Boulder Family Women's Health Center	Local medical provider	Teens	Sexual and reproductive health	Informational web pages Q&A

http://utteenhealth.org/	University of Texas Health Science Center at San Antonio	Academic medical center	Teens	Sexual and reproductive health	Informational web pages
http://www.acog.org/	American Congress of Obstetricians and Gynecologists	National professional medical organization	Providers and patients, including teens specifically	Sexual and reproductive health	FAQs
http://www.advocatesforyouth.org/	Advocates for Youth	National non-governmental organization	Public health practitioners, parents, teens	Sexual and reproductive health	Informational web pages
http://www.ashasexualhealth.org/	American Sexual Health Association	Non-profit sexual health advocacy and education organization	Health consumers	Sexual and reproductive health	Informational Web pages
http://www.emedicinehealth.com/script/main/hp.asp	WebMD	Health consumer website	Health consumers, including teens specifically	Multiple health topics	Informational web pages
http://www.goaskalice.columbia.edu/	Columbia University	Academic institution	Health consumers, including adolescents and young adults	Multiple health topics	Informational web pages
http://www.helpnothassle.org/	The Youth Project	Local non-profit organization	Teens	Multiple health topics	Informational web pages

http://www.iwannaknow.org/	American Sexual Health Association	Non-profit organization that promotes sexual health through advocacy and education	Teens and young adults	Sexual and reproductive health	Informational web pages Ask the Experts
http://www.nysyouth.net/	ACT Youth Network ACT for Youth Center of Excellence	Technical assistance provider on positive youth development	Teens	Multiple health topics	Informational web pages
http://www.pamf.org/	Palo Alto Medical Foundation for Health Care, Research and Education (PAMF)	Non-profit health care organization	Patients, including a teens specifically	Multiple health topics, including a defined subsection on sexual health	Informational web pages
http://www.positive.org/Home/index.html	Coalition for Positive Sexuality	Non-profit advocacy and sex education organization	Teens	Sexual and reproductive health	Informational web pages
http://www.safeteens.org/	Maternal and Family Health Services, Inc.	Non-profit health and human services organization	Teens	Multiple health topics	Informational web pages

http://www.scarleteen.com/	Scarleteen	Independent, grassroots sexuality and relationships education and support organization and website	Teens and young adults	Sexual and reproductive health	Informational web pages
http://www.summitmedicalgroup.com/	Summit Medical Group	Physician-owned multispecialty practice	Patients and caregivers, including teens specifically	Multiple health topics	Informational web pages
http://www.teenhealthrights.org/	National Center for Youth Law	Non-profit legal organization	Teens	Sexual and reproductive health, with a focus on pregnancy and parenting	Informational web pages
http://www.teensource.org/	Essential Access Health	Administrator of California's Title X federal family planning program	Teens	Sexual and reproductive health	Informational web pages
http://youngmenshealthsite.org/	Boston Children's Hospital	Local medical center	Teenage boys and young men	Multiple health topics, including a defined sub-section on sexual health	Informational web pages Q&A
http://youngwomenshealth.org/	Boston Children's Hospital	Local medical center	Teen girls and young women	Multiple health topics, including a defined sub-section on sexual health	Informational web pages Q&A

https://healthychildren.org/	American Academy of Pediatrics	National professional medical organization	Parents	Multiple health topics	Informational web pages
https://sexetc.org/	Answer	National sexuality education organization	Teens	Sexual and reproductive health	Informational web pages
https://sites.google.com/site/mchdyouthsexualhealth/	Mesa County Public Health Clinic	Local medical provider	Teens	Sexual and reproductive health	Informational web pages
https://www.bedsider.org/	Power to Decide (Formerly The National Campaign to Prevent Teen and Unplanned Pregnancy)	National non-profit organization	Women 18-29 years old	Sexual and reproductive health	Informational web pages Q&A
https://www.fairview.org/	Fairview Health Services	Local medical provider	Patients, including teens specifically	Multiple health topics	Informational web pages
https://www.girlshealth.gov/	U.S. Department of Health and Human Services Office of Women's Health	Federal government	Teen girls	Multiple health topics	Informational web pages
https://www.plannedparenthood.org/	Planned Parenthood Federation of America	National sexual and reproductive health care advocate and provider	Health consumers, including teens specifically	Sexual and reproductive health	Informational web pages Q&A
https://www1.nyc.gov/site/doh/index.page	New York City Department of Health	Local health department	Health consumers, including teens specifically	Multiple health topics	Informational web pages

Table 3.4 Examples of Messages about How to Simultaneously Prevent Unintended Pregnancy and STIs

	One Method
Abstinence only	• Abstinence, which means no sexual activity whatsoever, is the most effective method for both birth control and STD prevention. • Abstinence is, and will remain, the very best way to avoid sexually transmitted diseases/infections (STD/STIs) and unwanted pregnancy. • It's important to know that the only 100% way to protect yourself from pregnancy and/or STI transmission is to practice abstinence.
Condoms only	• Condoms are also the friend of the college student, as they perform the double duty of protecting against both STIs and pregnancy. • Condoms—including female condoms (also known as receptive or internal condoms)—are both effective at preventing pregnancy and providing protection against STDs. • Condoms don't just act as contraceptives--they also prevent the spread of most sexually transmitted infections. • Remember: condoms are the only method that protect against BOTH pregnancy and STDs . • Female condoms are inserted before sex to protect against both pregnancy and STDs. *Framing Condoms as Contraception* • Condoms are the only type of birth control that can help prevent both pregnancy and STDs. • In fact, latex condoms are the *only* birth control method that protects 1. against pregnancy and 2. against STDs.
	Multiple Methods
Condoms plus a moderately or highly effective method of contraception	• For couples who choose to have vaginal sex, the most effective way to avoid a pregnancy or sexually transmitted disease (STD) is by using both hormonal birth control, like the Pill, and a condom. • And don't forget—Nuva Ring does not prevent against STI transmission, so be sure to use a condom, too! • Bottom line: if you decide to have vaginal sex, condoms + birth control = the best way to prevent pregnancy and STDs. • Even if you are taking birth control pills or using any other form of birth control, you still need to use a condom to protect against STIs.* *Promoting Condoms for Both STI and Pregnancy Prevention* • And remember, a birth control pill can prevent pregnancy, but it provides no protection against sexually transmitted infections (STIs). Using a condom will, however, provide reasonable protection against STIs while also acting as a backup method of preventing pregnancy. • And consider wearing condoms 100% even though you're on a hormonal birth control method. Condoms can help prevent infection; they also serve as a great back-up birth control. *Framing Condoms as Contraception* • Using two types of contraceptive methods, such as the birth control pill and condoms, increases protection against both pregnancy and STIs. • It's important to use a condom together with another type of birth control, like the birth control pill, patch, implant, or IUD, to help prevent both pregnancy and STDs.

*This is the only message in this list of examples that explicitly states that condoms should be used with contraception *specifically for STI prevention*.

Box 3.1 Examples of Promoting Condoms with Moderately or Highly Effective Contraceptive Methods for Pregnancy Prevention Only

- For maximum pregnancy prevention, use condoms with another form of birth control […]
- The male condom works best to prevent pregnancy when it is used along with a highly reliable method of birth control such as an implant, IUD or the Pill.
- To prevent pregnancy, use another method of birth control (such as birth control pills) along with the condom.
- Do my partner and I need to use other forms of contraception with the male condom? It's a good idea to use two different types of contraception to increase protection against pregnancy. For example, you can use birth control pills and condoms.
- The best way to avoid getting pregnant is though abstinence. Abstinence (not having any kind of sex) is the only 100% effective form of birth control. If abstinence isn't an option, using a condom in combination with a hormonal form of birth control is a close second.
- Whenever semen or pre-cum gets on the vulva or in the vagina, you can get pregnant—whether it's the first time or the hundredth time. That's why lots of people use both birth control and condoms when they have sex.
- When they are always used, and used as directed, reliable methods of contraception, like those listed here, do a great job of preventing pregnancy. Dual contraception -- using two methods, not one, like pairing condoms with the pill, as an example -- does that even better.
- You may also decide to use a combination of birth control methods to avoid an unexpected pregnancy; using a hormonal birth control or the copper IUD with a backup method, such as an external or internal condom, may offer more protection than one method alone.
- When it comes to pregnancy prevention, it's a great idea to combine methods. Using a hormonal birth control method and condoms gives you a back-up in case something goes wrong.

Box 3.2 STI Prevention Strategies Promoted Within Reviewed Websites

- Condoms
- Abstinence
- Dental dams
- STI/HIV testing
- HBV vaccination
- HPV vaccination
- Mutual monogamy
- Treatment*
- Testing and treatment of partners
- Minimizing number of partners
- Partner communication
- Pre-exposure prophylaxis
- Post-exposure prophylaxis
- Avoiding alcohol
- Avoiding injecting drugs
- Washing hands and sex toys
- Avoiding sharing personal care items
- Masturbation
- Outercourse
- Circumcision

*Specifically for genital herpes, scabies, HIV, and perinatal HBV

References

Bearinger, L. H., & Resnick, M. D. (2003). Dual method use in adolescents: A review and framework for research on use of STD and pregnancy protection. *Journal of Adolescent Health, 32*(5), 340-349.

Borzekowski, D. L., Schenk, S., Wilson, J. L., & Peebles, R. (2010). E-ana and e-mia: A content analysis of pro-eating disorder web sites. *American Journal of Public Health, 100*(8), 1526-1534. doi:10.2105/AJPH.2009.172700

Boyar, R., Levine, D., & Zensius, N. (2011). *Techsex USA: Youth sexuality and reproductive health in the digital age*. Oakland, CA: ISIS, Inc.

Buhi, E. R., Daley, E. M., Fuhrmann, H. J., & Smith, S. A. (2009). An observational study of how young people search for online sexual health information. *Journal of American College Health, 58*(2), 101-111. doi:10.1080/07448480903221236

Cates, W., Jr., & Steiner, M. J. (2002). Dual protection against unintended pregnancy and sexually transmitted infections: What is the best contraceptive approach? *Sexually Transmitted Diseases, 29*(3), 168-174.

Cooper, M. L., Agocha, V. B., & Powers, A. M. (1999). Motivations for condom use: Do pregnancy prevention goals undermine disease prevention among heterosexual young adults? *Health Psychology, 18*(5), 464-474.

Finer, L. B., & Zolna, M. R. (2016). Declines in unintended pregnancy in the United States, 2008-2011. *New England Journal of Medicine, 374*(9), 843-852. doi:10.1056/NEJMsa1506575

Gallagher, K. M., & Updegraff, J. A. (2012). Health message framing effects on attitudes, intentions, and behavior: A meta-analytic review. *Annals of Behavioral Medicine, 43*(1), 101-116. doi:10.1007/s12160-011-9308-7

Gavin, L., Moskosky, S., Carter, M., Curtis, K., Glass, E., Godfrey, E., . . . Zapata, L. (2014). Providing quality family planning services: Recommendations of CDC and the U.S. Office of Population Affairs. *Morbidity and Mortality Weekly Report: Recommendations and Reports, 63*(RR-04), 1-54.

Harris, K., Byrd, K., Engel, M., Weeks, K., & Ahlers-Schmidt, C. R. (2016). Internet-based information on long-acting reversible contraception for adolescents. *Journal of Primary Care & Community Health, 7*(2), 76-80. doi:10.1177/2150131915621058

Hsieh, H. F., & Shannon, S. E. (2005). Three approaches to qualitative content analysis. *Qualitative Health Research, 15*(9), 1277-1288. doi:10.1177/1049732305276687

Kaiser Family Foundation. (2014). Sexual health of adolescents and young adults in the United States. Retrieved from http://kff.org/womens-health-policy/fact-sheet/sexual-health-of-adolescents-and-young-adults-in-the-united-states/

Korda, H., Itani, Z. (2013). Harnessing social media for health promotion and behavior change. *Health Promotion Practice, 14*:15-23.

Lemoine, J., Teal, S. B., Peters, M., & Guiahi, M. (2017). Motivating factors for dual-method contraceptive use among adolescents and young women: A qualitative investigation. *Contraception, 96*(5), 352-356. doi:10.1016/j.contraception.2017.06.011

Marques, S. S., Lin, J. S., Starling, M. S., Daquiz, A. G., Goldfarb, E. S., Garcia, K. C., & Constantine, N. A. (2015). Sexuality education websites for adolescents: A framework-based content analysis. *Journal of Health Communication, 20*(11), 1310-1319. doi:10.1080/10810730.2015.1018621

Minzer-Conzetti, K., Garzon, M. C., Haggstrom, A. N., Horii, K. A., Mancini, A. J., Morel, K. D., . . . Frieden, I. J. (2007). Information about infantile hemangiomas on the internet: How accurate is it? *Journal of American Academy of Dermatology, 57*(6), 998-1004. doi:10.1016/j.jaad.2007.06.038

O'Leary, A. (2011). Are dual-method messages undermining STI/HIV prevention? *Infectious Diseases in Obstetrics and Gynecology, 2011*, 691210. doi:10.1155/2011/691210

Potter, J., & Soren, K. (2016). Long-acting reversible contraception and condom use: We need a better message. *JAMA Pediatrics, 170*(5), 417-418. doi:10.1001/jamapediatrics.2016.0141

Rahnavardi, M., Arabi, M. S., Ardalan, G., Zamani, N., Jahanbin, M., Sohani, F., & Dowlatshahi, S. (2008). Accuracy and coverage of reproductive health information on the internet accessed in English and Persian from Iran. *Journal of Family Planning and Reproductive Health Care, 34*(3), 153-157. doi:10.1783/147118908784734882

Satterwhite, C. L., Torrone, E., Meites, E., Dunne, E. F., Mahajan, R., Ocfemia, M. C., . . . Weinstock, H. (2013). Sexually transmitted infections among U.S. women and men: Prevalence and incidence estimates, 2008. *Sexually Transmitted Diseases, 40*(3), 187-193. doi:10.1097/OLQ.0b013e318286bb53

Search Engine Land. (n.d.). Google still world's most popular search engine by far, but share of unique searchers dips slightly. Retrieved from https://searchengineland.com/google-worlds-most-popular-search-engine-148089.

Steiner, R.J., Liddon, N., Swartzendruber, A.L., Pazol, K., & Sales, J.M. (2018). Moving the message beyond the methods: Toward integration of unintended pregnancy and STI/HIV prevention. *American Journal of Preventive Medicine, 4*(3):440-443. doi: 10.1016/j.amepre.2017.10.022.

Steiner, R. J., Liddon, N., Swartzendruber, A. L., Rasberry, C. N., & Sales, J. M. (2016). Long-acting reversible contraception and condom use among female US high school students: Implications for sexually transmitted infection prevention. *JAMA Pediatrics, 170*(5), 428-434. doi:10.1001/jamapediatrics.2016.0007

Swartzendruber, A., & Zenilman, J. M. (2010). A national strategy to improve sexual health. *JAMA, 304*(9), 1005-1006. doi:10.1001/jama.2010.1252

Tharp, A. T., Carter, M., Fasula, A. M., Hatfield-Timajchy, K., Jayne, P. E., Latzman, N. E., & Kinsey, J. (2013). Advancing adolescent sexual and reproductive health by promoting healthy relationships. *Journal of Women's Health, 22*(11), 911-914. doi:10.1089/jwh.2013.4534

Williams, R. L., & Fortenberry, J. D. (2013). Dual use of long-acting reversible contraceptives and condoms among adolescents. *Journal of Adolescent Health, 52*(4 Suppl), S29-34. doi:10.1016/j.jadohealth.2013.02.002

Chapter Four:

The Safe Side: A Qualitative Study of Condom Use by Contraceptive Type among Adolescents in Atlanta, GA

Abstract

Purpose: Quantitative data suggest that adolescent users of long-acting reversible contraception (LARC), as compared to moderately effective methods (oral contraception, patch, ring, injectable), may be less likely to use condoms. We sought to qualitatively describe and explain adolescent contraceptive users' motivations for condom use, including variation by contraceptive type.

Methods: We conducted individual, in-depth interviews (n=30) with sexually active contraceptive users 17-19 years old in Atlanta, GA. We purposively enrolled a stratified sample of LARC (n=10), injectable (n=10), and oral contraceptive (n=10) users. Interviews were transcribed verbatim and analyzed thematically.

Results: Overall, most participants (n=25; 83.3%) used condoms with their contraceptive method, although many used them inconsistently (n=11; 44%). Participants were particularly motivated to use condoms for additional pregnancy prevention, although this motivation was less salient for LARC users who were primarily motivated by sexually transmitted infection (STI) prevention. A theme we termed "the safe side" emerged as participants described using condoms for additional pregnancy prevention, given concerns about contraceptive method efficacy. Across contraceptive type, factors influencing condom use motivations included sexual health education, personal awareness and/or experience, and perceived consequences and risk.

Conclusions: Given that all participants were using a moderately or highly effective contraceptive method, it is notable that pregnancy prevention was a prominent motivator for using condoms. However, LARC users may perceive STI prevention to be a more important motivation. Parental and school-based sexual health education should emphasize the risks and consequences of STIs and promote condom use with contraceptive methods as an effective STI prevention strategy.

Introduction

Recent trends in adolescent sexual and reproductive health in the United States underscore the fundamental challenge of integrating unintended pregnancy and sexually transmitted infection (STI) prevention. The past decade has seen marked declines in teen pregnancy rates, largely attributed to increasing use of effective methods of contraception (Finer & Zolna, 2016; Lindberg, Santelli, & Desai, 2016). However, the most effective contraceptive methods do not prevent STIs, which continue to disproportionately affect adolescents and young adults (Centers for Disease Control and Prevention, 2017). Moreover, condom use, a primary STI prevention strategy, appears to be declining, particularly among adolescents engaged in behaviors (e.g., having multiple partners) that increase STI risk (Harper, Steiner, Lowry, Hufstetler & Dittus, 2017). National family planning guidelines recommend condom use with contraception for those at risk for STIs (Gavin et al., 2014), but users of more effective contraceptive methods are less likely to use condoms(Goldstein, Upadhyay, & Raine, 2013; Ott, Adler, Millstein, Tschann, & Ellen, 2002), raising the possibility that increases in use of effective contraceptive methods among adolescents may be contributing to declines in condom use.

In particular, increasing use of intrauterine devices (IUDs) and implants among adolescents, also known as long-acting reversible contraception (LARC) (Abma & Martinez, 2017), has driven current attention to the relationship between contraception and condom use (Bastow, Sheeder, Guiahi, & Teal, 2017; Steiner, Liddon, Swartzendruber, Rasberry, & Sales, 2016; Warner et al., 2016). Professional medical organizations recognize these methods as safe and effective for young people (American Academy of Pediatrics, 2014; American College of Obstetricians and Gynecologists,

2012), and their use has contributed to population-level reductions in teenage pregnancies (Harper et al., 2015). Because these methods are distinct from most contraceptive methods in that they are highly effective even with typical use (1% failure rate for the first year vs. 7% for oral contraceptives and 13% for condoms) (Sundaram et al., 2017), several recent studies have considered whether condom use patterns among LARC users differ from other contraceptive users. Findings suggest that LARC as compared to moderately effective method users are less likely to use condoms (oral contraceptives, injectables, patch, ring) (Bastow et al., 2017; Steiner et al., 2016; Warner et al., 2016). One analysis also found that adolescent users of LARC, as compared with oral contraception, were more likely to have multiple partners, an important factor for STI risk (Steiner et al., 2016).

However, explanations for these differences in condom use by contraceptive type remain unclear. One hypothesis is that young people are primarily motivated to use condoms with contraception for back-up pregnancy prevention; those using highly effective LARC methods may no longer perceive a need for additional protection against pregnancy. Support for this explanation comes from prior research suggesting that pregnancy prevention is a more salient motivator for condom use than STI prevention (Cooper, Agocha, & Powers, 1999; Harvey, Washburn, Oakley, Warren, & Sanchez, 2017; O'Sullivan, Udell, Montrose, Antoniello, & Hoffman, 2010). For example, a mixed methods study of college students found that nearly 80% associated condom use with pregnancy prevention whereas just 10% linked condom use solely to STI prevention (O'Sullivan et al., 2010). Yet such studies have not considered condom use motivations

and decision-making specifically among adolescents or young women also using more effective contraceptive methods.

To date, much of the research on condom and contraceptive use has focused on quantitatively identifying demographic and behavioral correlates of simultaneously using both methods at the same time. Only a few studies have examined this topic qualitatively (Carter et al., 2012; Lemoine, Teal, Peters, & Guiahi, 2017; Murray et al., 2013), a methodological approach particularly well suited to describing behavioral motivations (Henninck, Hutter, & Bailey, 2011). Moreover, only one qualitative study of 15-24 year olds in Colorado has considered whether decision-making about condom use with contraception varies by type of contraceptive method (Lemoine et al., 2017).

We sought to add to the evidence base using a distinct sample and context. Specifically, the purpose of our study was to explore condom use motivations, including variation by contraceptive type, among clinic- and community-recruited contraceptive users 17-19 years old in Atlanta, Georgia. Contraceptive users in this narrow age range are distinct from younger adolescents (Clarke et al., 2016), and sexual and reproductive health indicators in the Southeast are particularly poor, including high rates of teenage pregnancy and STIs/HIV (Martin, Hamilton, Osterman, Driscoll, & Mathews, 2017; Centers for Disease Control and Prevention, 2017). This study thus addresses an important population and setting that can inform public health and clinical efforts to increase condom use among adolescent contraceptive users.

Methods

Study design. We conducted in-depth, semi-structured interviews with thirty adolescent contraceptive users 17-19 years old in Atlanta, GA. To recruit participants, we

employed both active and passive strategies in clinic and community settings. Passive strategies included posting fliers in university buildings, public libraries, and community-based organizations. We also emailed fliers for distribution to staff at community organizations and posted information about the study on Facebook and Craigslist. We actively approached potential participants at community locations (e.g., near metro stations) and a hospital-affiliated, adolescent medicine clinic. Additionally, we contacted participants in other clinic- and community-based studies who indicated interest in hearing about future studies. Enrolled individuals were invited to refer friends.

We screened young women for eligibility either in-person or via phone, depending on the recruitment approach. Individuals were eligible to participate if they (1) were 17-19 years of age; (2) had vaginal sex with a male sex partner in the prior six months; and (3) used a highly (IUD or implant) or moderately (oral contraceptives, injectable, patch, or ring) effective contraceptive method at last sex. We chose this specific age range for inclusion given that factors associated with contraceptive use differ between older (17-19 years) and younger (14-16 years) adolescents (Clarke et al., 2016).

We purposively enrolled a stratified sample of contraceptive users based on their method's length of action. Specifically, we recruited young women using LARC methods (n=10) for which no action is needed over a 3-10 year period following insertion; injectable, ring, or patch, for which quarterly, monthly, or weekly action must be taken, respectively (n=10); and oral contraceptives that must be taken daily (n=10). We specifically distinguished oral contraceptive users given findings that condom use was lower among LARC users compared to oral contraceptive users but not injectable, patch,

or ring users (Steiner et al., 2016). Although patch and ring users were eligible, none were enrolled in the study, so only injectable users are included in that category.

Data collection. We conducted all interviews between June 2017 and January 2018, according to procedures approved by the Emory University Institutional Review Board (IRB). Following eligibility screening, either an in-person (n=21) or telephone interview (n=9) was scheduled, depending on the participant's preference. In-person interviews occurred in a private conference room at Emory University or a public location suggested by the participant (e.g., coffee shop). Written (for in-person interviews) or oral (for phone interviews) informed assent/consent was obtained at the start of the interview. The IRB waived parental consent for 17-year-olds given the focus on sexual and reproductive health.

Subsequent to providing informed consent, participants completed a brief quantitative survey that assessed demographic characteristics, contraceptive and condom use, health-seeking behaviors, and relationship factors. Participants self-administered this survey during in-person interviews; during phone interviews, the interviewer stated each item and accompanying response options and marked the participant's answer. Then, the qualitative interview took place using a semi-structured interview guide that covered five domains: (1) pregnancy prevention goals and strategies; (2) STI prevention goals and strategies; (3) condom use behavior and motivations; (4) health services experiences; and (5) terminology, which was added for a sub-study and thus not discussed herein.

Table 4.1 provides example questions for each domain. We asked parallel questions about pregnancy and STI prevention, and questions about condom focused on understanding motivations underlying participants' condom use behavior. Health services

questions centered on clinical experiences related to contraceptive initiation or follow-up, including advice received from medical providers about STI prevention and condom use. Questions and probes were refined after completing the first four interviews (conducted with two LARC users, one injectable user, and one oral contraceptive user). For example, initial participants mentioned parents when explaining their pregnancy prevention goals so we added a probe specifically about parental influences. Interviews lasted about 40 minutes and were digitally audio-recorded with participant's permission. Each participant received $25 for completing the study.

Analysis. We conducted a thematic analysis, which is a common and flexible approach to identify themes or patterns across a qualitative data set, following the guidelines laid out by Braun & Clark (2006). First, a professional transcription service transcribed de-identified audio recordings verbatim; the first author reviewed the transcripts while listening to the audio recording to confirm accuracy. Transcripts were uploaded to MAXQDA version 12.3 (VERBI Software, Berlin, Germany). We then developed a codebook, starting with deductive codes based on the interview guide (e.g., pregnancy prevention, STI prevention, condoms, motives, parents, peers, medical advice). Two coders independently reviewed a subset of transcripts (n=10) to identify inductive codes (e.g., condom error, perceived risk, personal experience) and met to discuss potential additions. Including both inductive and deductive codes is fairly standard for thematic analysis (Henninck et al., 2011). Each coder independently coded the remaining transcripts and resolved discrepancies through discussion. Additionally, each coder created a case-level meta-matrix to summarize condom use behavior, motivations, and influencing factors for each participant. The two coders discussed these

summaries to ensure consistent interpretation of the data. The first author developed additional matrices to examine coded text across the entire sample and within and between the three strata of contraceptive users. Here we present themes relevant to two overarching domains: 1) description of condom use motivations and 2) explanation of condom use motivations.

Results

Sample characteristics

Table 4.2 summarizes characteristics of the study sample overall and for each contraceptive type. Overall, mean age was 18.5 years; only two 17-year-olds enrolled in the study. The majority of the sample was black (60%; n=18); one-fifth was Hispanic/Latina (20%; n=6). Number of partners in the past three months ranged from 0-3 (median: 1). One-half of participants (53%; n=16) used a condom at last sex yet most used condoms (83%, n=25) either consistently or inconsistently, based on participants' qualitative descriptions of their condom use behavior. Five participants (17%), including two LARC users, two injectable users, and one oral contraceptive user, had previously been diagnosed with an STI; one injectable user had an unplanned pregnancy (data not shown).

Qualitatively, there were only a few differences by contraceptive type—most notably race/ethnicity. Most injectable users were black (90%; n=9) whereas one-half of LARC users were Hispanic/Latina (50%; n=5). The only two white participants were oral contraceptive users. Of note, consistent condom use was highest among LARC users (60%; n=6), followed by injectable users (50%; n=5) and then oral contraceptive users

(30%, n=3). However, when taking into account inconsistent use as well (n=11; 37%), condom use was similar across the three contraceptive categories.

Description of condom use motivations

Given that most participants (n=25; 83%) were using condoms with their contraceptive method (either consistently or inconsistently based on participants' descriptions), we were able to determine current condom use motivations in relation preventing pregnancy, STIs, or both adverse outcomes for the majority of the sample. We briefly summarize these motivations, including apparent differences by contraceptive type. Then, we present a theme we refer to as the "the safe side" that emerged as a defining characteristic of how participants further describe their motivations.

Pregnancy prevention as a motivator for condom use, except among LARC users. Although all participants were using moderate or highly effective methods of contraception, 19 of the 25 individuals (76.0%) using condoms indicated that additional protection against unintended pregnancy was an important reason for their condom use. Of these, pregnancy prevention seemed to be the primary motivator for most, yet some described using condoms with their contraceptive method for both pregnancy and STI prevention (e.g., "I use a condom to prevent from STDs [sic] and then that's my second for preventing pregnancy"). Among participants not using condoms with their current contraceptive method, most had used them previously for pregnancy prevention. For example, an injectable user described using condoms only before staring her injectable and with her injectable initially "just not to get pregnant." One LARC user noted she had inconsistently used condoms for pregnancy prevention when taking oral contraceptives.

Most oral contraceptive users who were also using condoms cited pregnancy prevention as a motivator, either primarily or in addition to STI prevention (Table 4.3). In contrast, most LARC users who were also using condoms explained their use primarily in relation to preventing STIs. An implant user who had previously used oral contraceptives highlighted how her motivations changed based on her contraceptive method: when using pills it "was like 60/40 at that point. It was like 60 like oh my god, STIs, the 40 was like I don't know how consistent [with pills] I am right now." Now using the implant "it's very much like 100 STI, 0 pregnancy." Pregnancy prevention did not seem to be a strong motivator for LARC users. One of the LARC users who was also using condoms consistently stated that she was using them for pregnancy prevention but intended to discontinue her condom use; two of the LARC users not using condoms had previously used them for pregnancy prevention (alone and with oral contraceptives). Injectable users' motivations were more mixed.

The safe side. Participants described their motivation to use condoms for pregnancy prevention in a specific way that we've termed "the safe side," which refers to participants desires for additional protection (i.e. "back-up plan") "just in case" or to be "safe than sorry." Some participants discussed condom use for STI prevention similarly. An injectable user summed up the theme well when she suggested young women should "look into using condoms too or just like as an extra prevention method if they just want to like double check to make sure that they're not going to get pregnant or have an STI."

Across all contraceptive types, participants recognized that their contraceptive methods were not 100% effective and described using condoms as a way to be on the safe side for pregnancy prevention. Illustrative quotes by contraceptive type are provided in

Table 4.4. A few indicated concern about method effectiveness and motivation to use condoms as back-up pregnancy prevention at specific times, including when initiating a new method, starting a new pill pack, missing pills, ovulating, or when "paranoia is more active."

Several participants actually described contraceptive methods as back-up to condoms. For example, a young woman who considered her implant as a back-up method said, "I feel a lot like more calm in knowing that I have a back-up plan and I'm safe if anything happened." In general, participants were clear that using condoms alone did not provide sufficient protection against pregnancy. When asked why she does not solely use condoms, an injectable user said, "I don't want one type of protection. I'd rather have two, to kind of break the odds of getting pregnant." An oral contraceptive user specifically cited concern about condoms breaking as a reason for using pills as a "second layer of protection." Most participants were aware of the potential for condom errors, and a number had experienced them.

Descriptions of condom use in relation to being on the safe side for STI prevention were less common. Some LARC users noted their decision to use condoms as a way to provide extra STI protection in the context of their relationship with a serious boyfriend (Table 4). Additionally, a couple of participants discussed condoms as a way to ensure extra protection for both pregnancy and STI prevention. For example, an oral contraceptive user said:

> *"It [the pill] doesn't work 100 percent of the time. There's always a chance where it's like you can still get pregnant. And on top of that, it doesn't protect from STDs. You can still get STDs regardless of using the pill or not. So, it's*

always better to be safe. Unless you truly, truly trusted that person, it's better to be safe."

Notably, this theme applied to other preventive behaviors in addition to condom use, including withdrawal and emergency contraception for pregnancy prevention and STI testing for STI prevention (Table 4.4). Some participants were using withdrawal instead of condoms as their back-up method while a few used withdrawal in addition to condoms and their hormonal contraceptive method. Across contraceptive types, participants described STI testing as a strategy for being on the safe side. In many of these cases, partnership characteristics, including mutual monogamy, trust, and conversations about sexual history, seemed to be the primary approach to STI prevention while testing offered some additional reassurance.

Explanation of condom use motivations

Although participants' motivations seemed to vary by contraceptive type, factors influencing those motivations were common across the contraceptive categories. These factors included sexual health education, personal awareness and/or personal experience, and perceived consequences and risks. Some directly attributed their motivations to these factors whereas others were less explicit about causality. We also highlight some atypical individuals for whom these factors did not explain their motivations.

Parental and school-based sexual health education. Participants explained how information about pregnancy and STI prevention from parents and school influence their condom use motivations and behavior. Across contraceptive types, several participants who were motivated to use condoms as an additional contraceptive noted that their sexual health education emphasized pregnancy prevention, but not STIs. For example, an oral

contraceptive user not using condoms, but who had previously used them for pregnancy prevention, described her school-based sexual health education this way: “It just focused on pregnancy. They tell you, ‘Oh, use condoms because you don’t wanna end up pregnant.’ So it was like, yeah, they touched on STDs, but they didn’t go in depth with it.” Likewise, for those participants motivated to use condoms for pregnancy prevention (see Table 4.3), conversations with parents tended to emphasize pregnancy prevention over STI prevention.

In contrast, a couple participants motivated to use condoms for STI prevention described sexual health education that clearly addressed this prevention goal. For example, an oral contraceptive user consistently using condoms primarily for STI prevention attributed her condom use to her health teacher who “really, really paid attention to STDs and sexual health. And after we talked about all the types of diseases and permanent diseases and things like that you can get if you’re not careful and you don’t protect yourself, then I was just like, I don’t even play with that.” Several LARC users who reported using condoms consistently for STI prevention described conversations with their parents about STIs, and one noted that her mother offered to provide condoms.

Of course, sexual health education did not always correspond to condom use motivations and behavior. As an example, one injectable user summarized a conversation in which her mother promoted condoms to be on the safe side for preventing STIs: “Basically that like you don't want to put all your trust in him and just possibly risk getting an STI when you don't know for sure what he's done before you.” However, the participant did not feel she needed to use condoms because she was in what she perceived

to be a monogamous relationship and had been tested, although she did not know if her partner had been tested as well.

Personal awareness and experience. More than half of participants across contraceptive methods had parents, other family, and/or friends who had experienced an unintended pregnancy. Many of these contraceptive users cited pregnancy prevention as a reason for using condoms with their method; some explained how the experiences of people they knew had shaped their knowledge and risk perceptions. For example, a young woman using condoms for additional pregnancy prevention with her injectable said:

> *"I think I know so much about pregnancy 'cause it's been in my family [...] like I said, my grandma was pregnant at a young age, my mom. […] your parents don't want you to repeat what they did […] Because they never experienced it [STIs], it was more on the side of the pregnancy than on the STD side."*

This same participant also summarized how peer experiences have influenced her perception of STI risk: "I think more about pregnancy than STD because, like I said, it's more known and it's more happening around my age group. […] STD is something that you can hide. Pregnancy isn't something, you know, once your stomach grows, it's there." This sentiment was echoed by a LARC user using condoms for additional pregnancy prevention: "I haven't really heard of a lot of people getting STIs, so I feel like I'm not really worried about it. For me, I don't think it's a common thing, even though it might be. So, I'm less worried about that than I am about pregnancy." Several participants described pregnancy scares their friends have had, which made them particularly

concerned about preventing pregnancy. In contrast, a young woman whose mother had an STI was actually more concerned about pregnancy than STI prevention.

Personal experience also seemed to be important, particularly with regard to STI prevention. Of the five participants previously diagnosed with at least one STI, four described using condoms for STI prevention. One of these young women noted: "I've never been pregnant so I've never had to worry about it. But I've had three STDs so that's something that's more on the forefront of my mind." A couple other young women had close, personal experiences with STIs that shaped their thinking. A pill user using condoms for both pregnancy and STI prevention described being "super cautious" ever since her ex-boyfriend notified her that he had been diagnosed with herpes. Likewise, a LARC user using condoms consistently for STI prevention described when her friend was diagnosed with genital herpes: "I lived through her experience and I'm just like, that can't happen to me." The one participant who reported an unintended pregnancy and was currently using an injectable noted that she thought about pregnancy more than STIs "because I've been pregnant."

Specific consequences and perceived risk. Most participants, regardless of contraceptive type, described specific consequences of getting pregnant at a young age. For many, having a baby would negatively impact their future goals. According to one oral contraceptive user, "I have too much that I want to do […] I think that a pregnancy would just absolutely get in the way. I'm obviously a college student. I want to finish college. I hope to go to law school. I hope to enter the working world." Participants also described shorter-term consequences as well, including financial hardship and disappointing parents. For many participants motivated to use condoms for additional

pregnancy prevention, it seemed the consequences of pregnancy outweighed those of STIs. For example, the same oral contraceptive user quoted above said preventing STIs is "not quite as important to me as pregnancy prevention just 'cause I don't think it would change my life so drastically." A few of these participants actually struggled to articulate why STI prevention was important to them. As one oral contraceptive user said it's, "very important 'cause I just don't want to have it. I don't know much about it." Others described the consequences of STIs as merely an inconvenience in terms of having to go to the doctor or seek treatment. In contrast, many participants motivated to use condoms for STI prevention described specific consequences of STIs that they perceived as severe, including stigma, infertility, potential incurability, and transmission to partners. A LARC user also using condoms consistently for STI prevention said, having an STI "would completely change your whole life."

There were a few cases in which participants perceived the consequences of pregnancy and STIs to be equally concerning. However, their perceived risk of STIs was low because they were in what they considered to be stable, mutually monogamous relationships. For example, one oral contraceptive user using condoms inconsistently for pregnancy prevention said, "I'm equally concerned about getting pregnant and getting an STD, but I think my chances of getting pregnant are higher than an STD." In general, across contraceptive types, perceived STI risk was low to moderate, often largely based on partnership characteristics. As one LARC user said, "I don't really worry about it [STIs] just because I know I'm only with one person." Many of these participants were not using condoms or using them for pregnancy prevention only.

Discussion

We sought to qualitatively describe and explain young contraceptive users' motivations for condom use, including variation by contraceptive type. From a purposive sample of 17-19 year olds in Atlanta, GA, we found that oral contraceptive users seemed particularly motivated to use condoms for pregnancy prevention rather than STI prevention, whereas the opposite pattern was observed for LARC users. "The safe side" emerged as a theme based largely on participants' description of using condoms for additional pregnancy prevention given that contraceptive methods are not 100% effective; a few LARC users described condom use as a "safe side" strategy for STI prevention. Across contraceptive type, factors influencing condom use motivations included sexual health education, personal awareness and/or experience, and perceived consequences and risk. These findings have important implications given evidence that moderately effective method users often do not continue using condoms (Goldstein et al., 2013; Ott et al., 2002) and the recent data suggesting that use of condoms is especially unlikely among LARC users (Bastow et al., 2017; Steiner et al., 2016; Warner et al., 2016).

Although prior studies have found that pregnancy prevention is an important motivator for condom use (Cooper et al., 1999; Longmire-Avital & Oberle, 2016), few have focused on motivations for condom use among adolescents using additional contraceptive methods that are more effective than condoms for pregnancy prevention. Given that all participants in our study were using a moderately or highly effective contraceptive method, it is notable that, except among LARC users, pregnancy prevention was a prominent motivator for using condoms. This finding aligns with the

one other qualitative study we are of aware of that has considered condom use motivations among a sample of contraceptive users by method type. Interestingly, Lemoine et al. found no thematic differences between LARC users and users of shorter-acting methods (i.e. pills, patch, ring, injectables) (Lemoine et al., 2017). Perhaps distinguishing shorter-acting methods enabled us to detect what seems to be a difference in motivations between oral contraceptive and LARC users. Our finding that STI prevention seems to be an important motivator for condom use among those using LARC methods supports prior conclusions that promoting condom use specifically for STI prevention may be particularly important in the context of LARC use (Steiner, Liddon, Swartzendruber, Pazol, & Sales, 2018).

Although promising that many LARC users in this study were using condoms for STI prevention, it is somewhat concerning that participants described condom use to be on "the safe side" primarily for preventing pregnancy, but not STIs. While many participants were concerned that their contraceptive methods could fail, some of these same participants seemed confident that being in serious relationship would prevent STIs. Among those who expressed uncertainty about their partnership and a desire to be on the safe side for STIs, STI testing seemed to be a primary "safe side" strategy. A previous qualitative study also found that some young people were using STI prevention strategies other than condoms with their contraceptive method (Carter et al., 2012). It is encouraging that young women are tested, yet few described this as primary prevention strategy; most had not been tested with their partners at the beginning of the relationship. Moreover, given dynamics of adolescent partnerships that increase risk for STIs, such as breaking up and getting back together (Kelley, Borawski, Flocke, & Keen, 2003; Matson,

Chung, & Ellen, 2012), condom use for STI prevention remains critical for this population.

Our findings suggest that parental and school-based sexual health education and personal awareness/experiences that reinforce the consequences and risk of pregnancy but not STIs may explain participants' motivations to use condoms for additional pregnancy prevention. Lemoine et al. (2017) briefly described a similar finding regarding sexual health education. Other data sources support adolescents' perspectives. Not only is school-based education about condoms sub-optimal according to surveillance data (Brener, Demissie, McManus, Shanklin, Queen & Kann, 2017), but a recent content analysis of online health promotion information for adolescents found that messages promoting condom use with more effective contraception do not sufficiently emphasize STI prevention (Steiner et al., 2018).

Fortunately, our findings point to opportunities for intervention. Parental and school-based sexual health education should comprehensively address STIs, including risks and consequences, and promote condoms with contraceptive methods as an effective STI prevention strategy. Perhaps incorporating personalized stories in both formal and informal sexual health education can help such information resonate with young people. Of course, efforts to address STIs more directly should not involve fear-based tactics, such as exaggeration of negative consequences, shown to be ineffective (Wilson, Wiley & Rosen, 2012). Although challenging, tackling the shame and stigma associated with STIs to encourage open discussion with family and peers about experiences with or concerns about STIs would likely reinforce the importance of STI prevention. Drawing on the way young women describe using condoms for additional

protection against pregnancy, health educators and clinicians could promote condom use within the context of committed relationships as a way to be on “the safe side” for preventing STIs. Framing messages in this way could motivate young women to be extra cautious in a similar way that they are for pregnancy prevention, without undermining trust in the partnership. It is also possible that framing condoms as the primary prevention strategy for both pregnancy and STIs, supplemented by more effective methods of contraception and relationship characteristics that minimize STI risk, could be an effective approach. Health communications research that empirically tests these potential messages is warranted.

Of course, limitations of this study should be considered. Perhaps most importantly, the data are from a purposive, convenience sample; findings may not be generalizable to adolescent users of moderate or highly effective contraceptive methods outside of our target population. Although employing both clinic and community-recruitment approaches yielded a diverse sample, there were differences in recruitment approach by contraceptive type that could have influenced the findings. It is also possible that social desirability bias affected participants’ descriptions of their sexual behavior. We did, however, identify similar themes as Lemoine et al.,(Lemoine et al., 2017) providing some evidence of internal and external validity. Sample sizes within each contraceptive method category were small and precluded further stratification; additional thematic differences by contraceptive type may be evident with larger samples, and other factors, such as partnerships characteristics or condom use history, could be particularly salient. More generally, this work is exploratory and there are certainly other dimensions of condom use motivations in the context of contraceptive use not reflected in our data.

For example, condom use involves male participation so understanding the perspectives of young men is important.

Our findings suggest that adolescent contraceptive users may be particularly motivated to use condoms for additional pregnancy prevention, although this motivation may not be as salient for LARC users who were primarily motivated by STI prevention. Emphasizing condom use with contraceptive methods for STI prevention could encourage consistent condom use among contraceptive users regardless of contraceptive type. Parental and school-based sexual health education that clearly addresses STI prevention in addition to pregnancy prevention may have the potential to influence condom use motivations and behavior. Additionally, innovative health promotion messages may help ensure that adolescents are on “the safe side” in terms of both pregnancy and STI prevention.

Acknowledgments

We would like to thank many individuals at Emory University for assistance with recruitment, including: Devon Johnson, Ashley Phillips and other Women's PrEP study staff, Kelli Stidham Hall, Shelby Rentmeester, and Ilana Raskind. We are particularly grateful to our study participants for taking the time to share their experiences and insights. This work was supported by the Doug Kirby Adolescent Sexual Health Research Grant from Indiana University, Professional Development Support Funds from Emory University Laney Graduate School, and Letz Funds from the Department of Behavioral Sciences and Health Education at Emory University Rollins School of Public Health.

Table 4.1 Interview Guide Domains and Example Questions

Domain	*Example Questions*
Pregnancy Prevention	• How important is it to avoid getting pregnant at this point in your life and why? • How have people in your life influenced how you feel about getting pregnancy at this point in your life? • What do you currently do to reduce the chance that you'll get pregnant? - Why are these the strategies you use? • Thinking back, how have you prevented pregnancy in the past? - Why were these the strategies you used?
STI Prevention	• How important is it to avoid getting a sexually transmitted disease or STD at this point in your life and why? • How have people in your life influenced how you feel about getting an STD at this point in your life? • What do you currently do to reduce the chance that you'll get an STD? - Why are these the strategies you use? • Thinking back, how have you prevented STDs in the past? - Why were these the strategies you used?
Condom Use	• How do you feel about using condoms? • What is a scenario in which you'd be likely to use a condom - Probe for factors related to birth control (e.g., missing pills, shots) • Please describe a scenario in which you'd be unlikely to use a condom - Probe for factors related to birth control (e.g., effectiveness) • Why did you use/not use a condom the last time you had sex?
Health Services	• Tell me about your experiences starting your current method of birth control. What advice did you receive? - Probe for advice related to condom use, STI prevention • Since then, what are your clinic visits related to birth control like? What advice do you receive during these visits? - Probe for advice related to condom use, STI prevention

Table 4.2 Sample Characteristics

	Overall (n=30)	*LARC Users (n=10)*	*Injectable Users (n=10)*	*Oral Contraceptive Users (n=10)*
Community recruitment,[a] % (n)	75.9 (22)	80.0 (8)	40.0 (4)	100.0 (10)
Demographic characteristics				
Age, mean	18.5	18.7	18.2	18.6
Race/ethnicity, % (n)				
non-Hispanic black	60.0 (18)	50.0 (5)	90.0 (9)	40.0 (4)
non-Hispanic white	6.7 (2)	0 (0)	0 (0)	20.0 (2)
Hispanic/Latina	20.0 (6)	50.0 (5)	0 (0)	10.0 (1)
Other[b]	13.3 (4)	0 (0)	10.0 (1)	30.0 (3)
Mother graduated high school, % (n)	86.7 (26)	70.0 (7)	90.0 (9)	100.0 (10)
Contraceptive use and partner history				
Using current contraceptive method ≤ 1 year, % (n)	63.3 (19)	80.0 (8)	50.0 (5)	60.0 (6)
Number of partners past 3 months, range (median)	0-3 (1)	0-3 (1)	1-3 (1)	0-3 (1)
Current sex partner, % (n)	63.3 (19)	70.0 (7)	70.0 (7)	50.0 (5)
Serious boyfriend,[d] % (n)	84.2 (16)	85.7 (6)	85.7 (6)	80.0 (4)
Condom use behaviors				
Used a condom at last sex, % (n)	53.3 (16)	60.0 (6)	50.0 (5)	50.0 (5)
Consistency of condom use,[c] % (n)				
Uses consistently	46.7 (14)	60.0 (6)	50.0 (5)	30.0 (3)
Uses inconsistently	36.7 (11)	20.0 (3)	30.0 (3)	60.0 (6)
Not using	16.7 (5)	20.0 (2)	20.0 (2)	10.00 (1)

LARC=long-acting reversible contraception

[a]Including school-based and online strategies; remaining participants were recruited using clinic-based approaches.

[b]Including multi-racial

[c]With current method, based on semi-structured interviews; all other data based on quantitative survey

[d]Among those with a current sex partners

Table 4.3 Condom Use Motivations among Participants Using Condoms[a] with their Current Contraceptive Method

Motivation	*LARC Users (n=8) % (n)*	*Injectable Users (n=8) % (n)*	*Oral Contraceptive Users (n=9) % (n)*
Pregnancy	25.0 (2)	50.0 (4)	66.7 (6)
STIs	62.5 (5)	12.5 (1)	12.5 (1)
Both Pregnancy and STIs	12.5 (1)	37.5 (3)	25.0 (2)

[a]Includes consistent and inconsistent condom use

LARC=long-acting reversible contraception; STI=sexually transmitted infection

Table 4.4 Select Quotes Illustrating "the Safe Side"

	Pregnancy Prevention	STI Prevention
LARC Users	*Motivations for using condoms:* • "It's [the implant] only 99 percent effective. That one percent, you don't know what can happen with that one percent. And definitely I just think that if we use two methods it would be safer than using one. And if one fails, the other one is there to catch you or like be a back-up." • "Like I'm not entirely too comfortable with it [the implant] yet and putting all my confidence in it." *Motivations for withdrawal:* • "Pretty much every time, even if there is a condom involved. Just for precautionary measures." • "'Cause I don't wanna take any chances." • "'Cause most boys, I feel like they don't know that birth control is not 100 percent. So I told him. And I think he's still scared of that one percent."	*Motivations for using condoms:* • "With both of them [partners], the conversation about STDs was very open, but I still, to ensure. I feel a little more secure knowing that a condom was used to avoid STDs." • "You don't never know another person's mind. You don't know if they're going to go out and try and do something with somebody else." *Motivations for STI testing:* • "I just get tested just in case, because you can never completely trust what someone says." • "I like getting it [testing] that often. It makes me feel even more confident because even the time before that, I know I didn't have it, but I feel really confident about it" • "I mean even though you're in a relationship, you don't really know what that person's probably doing […]" • "We both got tested, just to make sure that we rule out any potential, like I don't know, something that went unnoticed."
Injectable Users	*Motivations for using condoms:* • "Even though I'm on the shot, it's only like 99% effective." • "What if my Depo doesn't work?"	*Motivations for STI testing:* • "So I went, I peed in cups, to get tested, just in case, and I was fine." • "Just to do it. I know for a fact that I'm not at risk for any of those things but just to have that including that as proof to somebody else […]."
Oral Contraceptive Users	*Motivations for using condoms:* • "Just in case – they're [pills] like 96 percent, I think it is, so just in case." • "I just started my new birth control again this past week so we just wanted to make sure that we weren't risking anything."	*Motivations for STI testing:* • "I just want to make sure that I have a clean slate, and nothing to worry about." • "I think it might bring me some peace of mind just to know that everything is fine."

- "Because I was missing [pills], I was like, even though this is supposed to be – not really guaranteed, but it's supposed to be a prevention of it, we could take other preventions. We can use others to prevent the risk."
- "Everything that you can do would never hurt 'cause no method is ever 100 percent preventative"

Motivations for withdrawal:

- "I trusted the pill will work, but maybe in that 0.01 percent that it doesn't, that [withdrawal] could help"
- "'Cause I don't trust the birth control to fully protect me against everything. So definitely still with the withdraw method."

Motivations for EC:

- "There was one time when I kind of had been messing up – I was between picking up my new prescription I guess and I didn't anticipate that I would be having sex and I ultimately think I would have been fine had I not used it, but I used it in kind of a nervous thing."

References

Abma, J. C., & Martinez, G. M. (2017). Sexual activity and contraceptive use among teenagers in the United States, 2011-2015. *National Health Statistics Report,* (104), 1-23.

American Academy of Pediatrics, Committee on Adolescence. (2014). Contraception for adolescents. *Pediatrics, 134*(4), e1244-1256. doi:10.1542/peds.2014-2299

American College of Obstetricians and Gynecologists, Committee on Adolescent Health Care, Long-Acting Reversible Contractpion Working Group. (2012). Committee opinion no. 539: Adolescents and long-acting reversible contraception: Implants and intrauterine devices. *Obstetrics and Gynecology, 120*(4), 983–988. doi: 10.1097/AOG.0b013e3182723b7d

Bastow, B., Sheeder, J., Guiahi, M., & Teal, S. (2017). Condom use in adolescents and young women following initiation of long- or short-acting contraceptive methods. *Contraception*. doi:10.1016/j.contraception.2017.10.002

Braun, V., & Clarke, V. (2006). Using thematic analysis is psychology. *Qualitative Research in Psychology, 3*, 77-101.

Brener, N.D., Demissie, Z., McManus, T., Shanklin, S.L., Queen, B., & Kann, L. (2017). School Health Profiles 2016: Characteristics of health programs among secondary schools. Retrieved from https://www.cdc.gov/healthyyouth/data/ profiles/pdf/2016/2016_Profiles_Report.pdf

Carter, M. W., Hock-Long, L., Kraft, J. M., Henry-Moss, D., Hatfield-Timajchy, K., & Singer, M. (2012). Strategies for managing the dual risk of sexually transmitted infections and unintended pregnancy among Puerto Rican and African American

young adults. *American Journal of Public Health, 102*(3), 449-456. doi:10.2105/AJPH.2011.300461

Centers for Disease Control and Prevention. (2017). Sexually transmitted disease surveillance, 2016. Retrieved from https://www.cdc.gov/std/stats15/STD-Surveillance-2015-print.pdf

Clarke, K. E., Kraft, J. M., Wiener, J. B., Hatfield-Timajchy, K., Kottke, M., Sales, J. M., . . . Kourtis, A. P. (2016). Factors associated with contraceptive use differ between younger and older African-American female adolescents. *Journal of Pediatric & Adolescent Gynecology, 29*(5), 448-453. doi:10.1016/j.jpag.2016.01.129

Cooper, M. L., Agocha, V. B., & Powers, A. M. (1999). Motivations for condom use: Do pregnancy prevention goals undermine disease prevention among heterosexual young adults? *Health Psychology, 18*(5), 464-474.

Finer, L. B., & Zolna, M. R. (2016). Declines in unintended pregnancy in the United States, 2008-2011. *New England Journal of Medicine, 374*(9), 843-852. doi:10.1056/NEJMsa1506575

Gavin, L., Moskosky, S., Carter, M., Curtis, K., Glass, E., Godfrey, E., . . .Zapata L. (2014). Providing quality family planning services: Recommendations of CDC and the U.S. Office of Population Affairs. *Morbidity and Mortality Weekly Report: Recommendations and Reports, 63*(RR-04), 1-54.

Goldstein, R. L., Upadhyay, U. D., & Raine, T. R. (2013). With pills, patches, rings, and shots: Who still uses condoms? A longitudinal cohort study. *Journal of Adolescent Health, 52*(1), 77-82. doi:10.1016/j.jadohealth.2012.08.001

Harper, C. C., Rocca, C. H., Thompson, K. M., Morfesis, J., Goodman, S., Darney, P. D., . . . Speidel, J. J. (2015). Reductions in pregnancy rates in the USA with long-acting reversible contraception: a cluster randomised trial. *Lancet, 386*(9993), 562-568. doi:10.1016/S0140-6736(14)62460-0

Harper, C.R., Steiner, R.J., Lowry, R., Hufstetler, S., Dittus, P.J. (2017). Variability in condom use trends by sexual risk behaviors: Findings from the 2003-2015 national Youth Risk Behavior Surveys. *Sexually Transmitted Diseases*. In press.

Harvey, S. M., Washburn, I., Oakley, L., Warren, J., & Sanchez, D. (2017). Competing priorities: Partner-specific relationship characteristics and motives for condom use among at-risk young adults. *Journal of Sex Research, 54*(4-5), 665-676. doi:10.1080/00224499.2016.1182961

Hennick, M.M., Hutter, I., Bailey, A. (2011). *Qualitative Research Methods* London: Sage.

Kelley, S. S., Borawski, E. A., Flocke, S. A., & Keen, K. J. (2003). The role of sequential and concurrent sexual relationships in the risk of sexually transmitted diseases among adolescents. *Journal of Adolescent Health, 32*(4), 296-305.

Lemoine, J., Teal, S. B., Peters, M., & Guiahi, M. (2017). Motivating factors for dual-method contraceptive use among adolescents and young women: A qualitative investigation. *Contraception*. doi:10.1016/j.contraception.2017.06.011

Lindberg, L., Santelli, J., & Desai, S. (2016). Understanding the decline in adolescent fertility in the United States, 2007-2012. *Journal of Adolescent Health, 59*(5), 577-583. doi:10.1016/j.jadohealth.2016.06.024

Longmire-Avital, B., & Oberle, V. (2016). "Condoms are the standard, right?": Exploratory study of the reasons for using condoms by Black American emerging adult women. *Women & Health, 56*(2), 226-241. doi:10.1080/03630242.2015.1086469

Martin, J. A., Hamilton, B. E., Osterman, M. J., Driscoll, A. K., & Mathews, T. J. (2017). Births: Final data for 2015. *National Health Statistics Report, 66*(1), 1.

Matson, P. A., Chung, S. E., & Ellen, J. M. (2012). When they break up and get back together: Length of adolescent romantic relationships and partner concurrency. *Sexually Transmitted Diseases, 39*(4), 281-285. doi:10.1097/OLQ.0b013e318244ac31

Murray, C. C., Hatfield-Timajchy, K., Kraft, J. M., Bergdall, A. R., Habel, M. A., Kottke, M., & Diclemente, R. J. (2013). In their own words: Romantic relationships and the sexual health of young African American women. *Public Health Reports, 128 Suppl 1*, 33-42. doi:10.1177/00333549131282S104

O'Sullivan, L. F., Udell, W., Montrose, V. A., Antoniello, P., & Hoffman, S. (2010). A cognitive analysis of college students' explanations for engaging in unprotected sexual intercourse. *Archives of Sexual Behavior, 39*(5), 1121-1131. doi:10.1007/s10508-009-9493-7

Ott, M. A., Adler, N. E., Millstein, S. G., Tschann, J. M., & Ellen, J. M. (2002). The trade-off between hormonal contraceptives and condoms among adolescents. *Perspectives on Sexual and Reproductive Health, 34*(1), 6-14.

Steiner, R. J., Liddon, N., Swartzendruber, A. L., Pazol, K., & Sales, J. M. (2018). Moving the message beyond the methods: Toward integration of unintended

pregnancy and sexually transmitted infection/HIV prevention. *American Journal of Preventive Medicine*. *4*(3):440-443.. doi:10.1016/j.amepre.2017.10.022

Steiner, R. J., Liddon, N., Swartzendruber, A. L., Rasberry, C. N., & Sales, J. M. (2016). Long-acting reversible contraception and condom use among female US high school students: Implications for sexually transmitted infection prevention. *JAMA Pediatrics, 170*(5), 428-434. doi:10.1001/jamapediatrics.2016.0007

Steiner, R.J., Rasberry, C., Sales, J.M., Gaydos, L., Pazol, K., Kramer, M., & Swartzendruber, A. (2018). *Do health promotion messagesiIntegrate pregnancy and STI prevention? A content analysis of online information for adolescents and young adults.* Poster session presented at the Society for Adolescent Health and Medicine, Seattle, WA.

Sundaram, A., Vaughan, B., Kost, K., Bankole, A., Finer, L., Singh, S., & Trussell, J. (2017). Contraceptive failure in the United States: Estimates from the 2006-2010 National Survey of Family Growth. *Perspectives on Sexual and Reproductive Health, 49*(1), 7-16. doi:10.1363/psrh.12017

Warner, L., Williams, L., Le, B., Smith, R., Pazol, K., Harrison, L., Kourtis, A,. & Barfield, W. (2016). *Dual use of condoms with long-acting reversible contraception (LARC) versus moderately effective methods among teen mother participating in the pregnancy risk assessment monitoring system (PRAMS).* Paper presented at the STD Prevention Conference, Atlanta, GA.

Wilson, K.L., Wiley, D., & Rosen, B. (2012). Texas sexuality education instruction: Shame and fear-based methdology. *Journal of Health Education Teaching, 3*(1), 1-10.

Chapter Five:

Summary and Conclusions

Summary and Synthesis of Findings

The current study responded to an emerging public health issue—potential declines in condom use and increases in sexually transmitted infection (STI) rates, including HIV, associated with use of long-acting reversible contraception (LARC) among adolescents and young adults (Gallo, Warner, Jamieson, & Steiner, 2011). We sought to answer an outstanding question about the impact of LARC use on STI/HIV-related services, further explain the implications of findings about condom use for health education and clinical care, and inform strategies for addressing STI prevention while increasing awareness of and access to LARC. This work has generated new evidence and practical recommendations for research and practice as summarized below.

First, we used data from the 2011-2015 National Survey of Family Growth (NSFG) to consider an additional unintended consequence of adolescent LARC use—namely, lower receipt of recommended STI/HIV services, including STI testing (Aim 1). We saw little evidence of differences in service receipt between continuing LARC users and users of moderately effective contraceptive methods (i.e., oral contraceptives, injectable, patch, and ring) that require annual care, which is encouraging. However, the direction of the effect estimates for these comparisons suggests lower likelihood of service receipt, and we may have been underpowered to detect significant differences. Moreover, new, but not continuing, LARC users, as compared to those not using a method requiring a clinic visit, were more likely to have had their risk assessed, suggesting that initiating LARC may offer an opportunity to receive services that does not persist as LARC use continues.

We then sought to explain prior findings about condom use—specifically, that LARC users are less likely to use condoms compared to moderately effective method users (Steiner, Liddon, Swartzendruber, Rasberry, & Sales, 2016; Warner et al., 2016). The possibility that pregnancy prevention is a primary motivation for using condoms with contraceptive methods underpins one potential explanation. Because ≤1% of LARC users become pregnant during the first year, even with typical use (Sundaram et al., 2017), these contraceptive users may be less likely to perceive the need for additional pregnancy protection and thus not use condoms with their method. Through our web content analysis (Aim 2), we assessed whether health promotion messages emphasize pregnancy prevention as a motivation for using condoms with contraceptive methods. Indeed, framing of condom use with moderate or highly effective contraceptive methods for back-up pregnancy prevention was prevalent, perhaps undermining STI prevention. Additionally, websites did not typically include STI/HIV prevention strategies in addition to condoms, such as testing, vaccination, pre-exposure prophylaxis (PrEP), or post-exposure prophylaxis (PEP), with information about pregnancy prevention methods. Discrete statements about strategies to simultaneously prevent pregnancy and STIs were common but these were limited to information about abstinence, condoms only, and condoms plus more effective contraceptive methods.

As a next step, we explored condom use motivations among users of moderate or highly effective methods of contraception. Specifically, we conducted a qualitative study of adolescent LARC, oral contraceptive, and injectable users 17-19 years old in Atlanta, GA (Aim 3). We found that oral contraceptive users were particularly motivated to use condoms to be on “the safe side” for preventing pregnancy whereas LARC users were

primarily motivated by STI prevention. These findings support conclusions from epidemiologic studies about condom use by contraceptive type: to motivate use of condoms with highly effective methods, health promotion messages may need to explicitly emphasize STI prevention as a distinct goal and promote condoms directly in relation to that goal (Bastow, Sheeder, Guiahi, & Teal, 2017; Steiner et al., 2016).

Unfortunately, findings from both the web content analysis and qualitative interviews suggest that most sexual health education does not sufficiently emphasize STI prevention in the context of pregnancy prevention. Although statements online about how to simultaneously prevent both outcomes were common, these messages had limitations, including missed opportunities and problematic framing. In particular, information did not clearly promote condom use with more effective contraceptive methods specifically for STI prevention. Likewise, interviews with female adolescents indicated that parental and school-based sexual health education emphasizes risks and consequences of pregnancy more so than STIs.

Taken together, results from the three aims underscore the need for further integration of unintended pregnancy and STI prevention across multiple domains, including health services and sexual health education. Findings from Aim 1 indicate that prevalence of STI testing among all contraceptive users is low, including young people presumably accessing care for contraceptive initiation and/or continuation. Young women must have a provider visit for IUD or implant insertion, and users of moderately effective methods must seek care at least annually for contraceptive continuation. Yet prevalence of any STI testing for these two groups was 56.9% and 53.6%, respectively, despite guidelines for implementing annual testing as part of family planning services

(Gavin et al., 2014). It is particularly concerning that STI testing among contraceptive users does not seem to have substantially increased compared to estimates from 2002 NSFG data (Farr, Kraft, Warner, Anderson, & Jamieson, 2009).

Our findings from Aims 2 and 3 highlight similar missed opportunities for integration within the context of health education for adolescents and young adults. We found online content structured by separate sections about birth control methods and types of STIs, which may limit integration of health promotion information. Moreover, even discrete statements about how to prevent unintended pregnancy and STIs simultaneously, though common, could be strengthened. For example, many websites noted that hormonal contraceptive methods confer no STI prevention benefit yet about half of these statements did not include specific STI prevention strategies. Finally, qualitative interviews revealed how both parental and school-based sexual health education may emphasize pregnancy but not STI prevention, despite the fact that both outcomes are related to sexual behavior and should be addressed as part of comprehensive health education.

Although LARC methods have renewed attention on the integration of unintended pregnancy and STI prevention, challenges of integration are not unique to LARC. We found little evidence of differences in STI testing between LARC and other contraceptive users—testing was low regardless of contraceptive type. We also observed similar patterns in web content across contraceptive methods, although we did not systematically stratify our analysis by contraceptive type. Likewise, participants in each contraceptive category from the qualitative study articulated similar explanations for their motivations to use condoms with more effective contraception, including sexual health education,

personal awareness and/or experience, and perceived risks and consequences.

A final cross-cutting conclusion is that there are promising findings to build on. We did not observe differences in STI testing between new LARC and moderately effective method users; higher STI testing among new LARC users would suggest over-screening based on current guidelines (American College of Obstetricians and Gynecologists, 2017). Lessons learned from implementing these guidelines should inform efforts to improve adherence to recommendations for STI testing as a routine part of contraceptive care. The web content analysis revealed high prevalence of online information about strategies to prevent unintended pregnancy and STIs simultaneously. Although health educators should improve these messages, the frequency of this information suggests existing interest in and attention to preventing both outcomes. Finally, emergence of the "the safe side" as a key theme from the qualitative interviews reflects young women's diligence regarding personal health and safety. Although participants primarily discussed "the safe side" in relation to pregnancy prevention, public health professionals and clinicians can potentially leverage such attitudes to ensure that young women are on the safe side for both unintended pregnancy *and* STI prevention.

Strengths and Limitations

The current study has several key strengths. Perhaps most importantly, it makes theoretical and methodological contributions to the literature. In Aim 1, we considered STI/HIV services as focal outcomes whereas most research on contraception and STI prevention to date has examined condom use only. Aim 2 used a relatively novel methodology to address an innovative question about the integration of distinct yet

related health promotion content on the internet. Web content analyses appear to be increasing yet most studies apply this method to examine the presence of and/or accuracy of information about a single health topic (e.g., LARC only). Finally, Aim 3 is only the second study we are aware of to consider condom use motivations among a sample of contraceptive users stratified by contraceptive type (Lemoine, Teal, Peters, & Guiahi, 2017). A specific innovation of our approach is that we distinguished oral contraceptive users from injectable users given differences in condom use between these groups documented in the epidemiologic literature (Steiner et al., 2016).

Another strength of this research is the use of robust data sources yielding findings broadly generalizable to adolescent and young adult contraceptive users as well as specific to racial/ethnic groups at high risk for STIs and unintended pregnancy. Aim 1 data were from a national household probability sample, and we accounted for the complex sampling procedures to obtain nationally representative estimates. Aim 2 data were from a systematic process for identifying online content that minimized selection bias and resulted in a substantial sample of web content, with 32 included websites. Finally, we had a relatively large sample for the Aim 3 qualitative interviews (n=30), although the sample size for each contraceptive stratum was somewhat small. We also recruited participants from clinic- and community-settings, which ensured a diverse study sample. For example, over half of participants (57%) identified as non-Hispanic Black and one-fifth were Hispanic/Latina. Our findings are particularly informative given that we recruited participants from the Atlanta metro area, where STI/HIV rates are particularly high (Centers for Disease Control and Prevention, 2017).

Of course, there are limitations across the three aims that readers should consider. Each study reflects a snapshot in time—Aim 1 is based on cross-sectional data from 2011-2015, Aim 2 reflects the state of online web content in Spring 2017, and Aim 3 assessed behavioral motivations at the time of the interview (June 2017-January 2018). None of the research is longitudinal or even repeated cross-sectional, which is a particular limitation as the context of adolescent LARC use is changing. For example, many early adolescent LARC users may have initiated LARC post-partum, given recommendations for post-partum insertion to prevent rapid repeat pregnancy and provider concerns about LARC among nulliparous women (American College of Obstetricians and Gynecologists, 2016; Hopkins, 2017). Therefore, it is unclear how relevant our findings will be if LARC use among young people continues to increase, as would be expected given existing professional guidelines and ongoing efforts to improve awareness and access. Another related limitation is that online content is dynamic so findings from the web content analysis may be outdated quickly.

The cross-sectional nature of this research, in combination with other study design elements, precludes establishing causal relationships that fully describe the implications of adolescent and young adult LARC use for STI prevention. Although we distinguished new and continuing LARC users based on the calendar history of contraceptive use for Aim 1, we cannot conclude that any differences in service receipt by contraceptive type are the result of using a specific method. For Aim 2, we do not know how adolescents and young adults interpret the framing of information about condoms and the influence such messages have on condom use behavior. Likewise, while some participants in the Aim 3 interviews attributed their condom use motivations and behaviors to sexual health

education and/or personal awareness, we cannot definitively conclude that these factors are causal. The current study also did not examine differences in STI incidence by contraceptive type. Several recent analyses have considered associations between LARC use and STI diagnoses (McNicholas, Klugman, Zhao, & Peipert, 2017; Rose, Garrett, Stanley, & Pullon, 2017; Swartzendruber & Steiner, 2016) yet additional research is needed to fully understand potential causal pathways between LARC use and STI endpoints.

There is a broader limitation regarding the extent to which the current study is explanatory. Namely, although a sequential explanatory mixed methods design (i.e., qualitative findings subsequently explain quantitative findings) informed this work, it is not actually a mixed methods study (Creswell & Clark, 2018). We do not formally integrate the quantitative and qualitative data used. Rather, our quantitative analysis considered LARC use and STI/HIV services, and the qualitative research provided additional context and potential explanations for previous quantitative findings about condom use.

Another limitation is that we may not have detected differences by contraceptive type due to small sample sizes. Although we had a large sample overall for Aim 1, adolescent LARC use is still low so we may have had insufficient statistical power. Relatedly, the small numbers of participants per stratum in Aim 3 may have limited emergence of thematic differences between the three contraceptive categories. However, saturation of themes minimizes concern that findings would differ with a larger sample. It is also worth noting that we did not stratify our analysis for Aim 2 by contraceptive type. We observed minimal variation across information about different contraceptive

methods, but we did not systematically compare STI prevention content with information about LARC versus other methods.

Finally, these studies primarily focused on adolescent and young adult women, despite increasing recognition that men should be included in research on sexual and reproductive health (Marcell et al., 2016). Aim 2 included health promotion messages relevant to both young women and men, but both Aims 1 and 3 relied on reports from adolescent and/or young adult women only, which, as with all self-reported data, are subject to recall and social desirability biases. Relatedly, we did not collect data from health care providers despite their central role in counseling and provision of contraception and STI prevention services.

Future Research

In many ways, the current study represents a starting point for future research on the STI prevention implications of LARC use among adolescent and young adult women. In particular, associations between LARC use and STI-related outcomes warrant ongoing monitoring and epidemiologic investigation. For example, trend analyses of condom use should consider whether documented declines in adolescent condom use (Harper, Steiner, Lowry, Hufstetler & Dittus, 2017) are more pronounced among LARC users compared to other contraceptive method users. Such differences would further suggest LARC use may contribute to recent decreases in condom use. Similar studies should be conducted with other STI-related outcomes, including STI testing and STI diagnoses. Monitoring of testing is particularly important as point estimates from Aim 1 suggest lower prevalence of STI testing among continuing LARC users; with larger samples of LARC users, these differences may be significant. Meta-analysis offers another analytic approach that would

help establish the relationship between LARC use and STI outcomes. At this point, multiple studies have compared condom use between LARC and moderately effective contraceptive users so it is likely possible to synthesize those findings to determine a single effect estimate.

Behavioral studies with populations beyond adolescent and young adult women, including young men, healthcare providers, health educators, and parents, would further contextualize epidemiologic findings. For example, research should assess young men's motivations for condom use with sex partners using more effective methods of contraception. Examining concordance of motivations within partnership dyads would enrich understanding of condom use decision-making. Additionally, evaluation of the extent to which family planning providers address STI prevention in the context of contraceptive counseling is important given recommendations for doing so and little data on provider practice. Beyond family planning, it is unclear whether practice guidelines sufficiently emphasize integration of unintended pregnancy and STI prevention; content analysis of recommendations from a range of professional medical organizations could address this question. In fact, we preliminarily reviewed select provider content, which yielded findings comparable to the results of our adolescent web content analysis, but further analysis is warranted. Likewise, research with health educators and parents is needed given data from our qualitative interviews highlighting the influence of these populations on prevention motivations and behavior. In addition to surveys or qualitative studies with health educators and parents, content analysis of curricula for adolescent sexual health education and parenting programs to support parent-adolescent communication could identify specific opportunities for integrating content.

Beyond LARC use, our research has implications for the joint study of unintended pregnancy and STI prevention. Traditionally, most studies considering both topics have assessed prevalence and correlates of using condoms with more effective contraception. However, assessment of condom use motivations in relation to pregnancy prevention, STI prevention, or both prevention goals should be standard. Researchers should also consider how measurement of condom use with contraception could prime respondents to consider condoms primarily for pregnancy prevention. Specifically, including condoms as one option in a list contraceptive methods, as is typical, or asking about use of condoms "with another form of birth control" frames condoms as contraception. Such measures may influence reporting of condom use motivations or reinforce health education information emphasizing condoms for back-up pregnancy prevention more so than STI prevention. Unfortunately, a superior measurement approach in not immediately obvious given that condoms are, in fact, a contraceptive method, in addition to a critical STI prevention strategy. Further theoretical and measurement work is needed to address this challenge. In addition to condom use, researchers should examine use of other STI prevention strategies with contraceptive methods, including testing and mutual monogamy, vaccination for HPV and hepatitis B, and PrEP and PEP for HIV prevention. For example, survey research could assess receipt of STI/HIV testing among those who access emergency contraception; findings from Aim 2 offer one potential explanation if prevalence is low, as health promotion messages did not sufficiently emphasize STI testing when promoting emergency contraception in the context of condom failure.

A final avenue for future research involves using the primary data collected as part of the current study to address outstanding questions relevant to adolescent sexual

and reproductive health more broadly. Most salient to the current work is analysis of qualitative data on terminology and messages about simultaneously preventing unintended pregnancy and STIs. Understanding young women's interpretation of common terminology such as "dual use" and "dual protection," as well as their suggestions for improving messages, could help inform comprehensive and effective health promotion content. Other promising topics from the individual, in-depth interviews, based on preliminary analysis, include parents' involvement in contraceptive decision-making and barriers to LARC uptake specifically among adolescents using moderately effective contraceptive methods. Likewise, the web content dataset includes health promotion information about a range of important topics, such as confidentiality and HPV vaccination, and for a range of adolescent populations, including sexual and gender minority youth. Further analysis of this content would inform recommendations for improving online health information beyond those that emerged from Aim 2.

Practice Implications

An overarching goal of this work is to advance public health and clinical practice related to sexual and reproductive health for adolescents and young adults. Findings from each of the three aims highlight programmatic opportunities for addressing STI prevention as part of efforts to increase access to LARC specifically and contraception more generally. Aim 1 draws attention to the potential unintended consequence of adolescent LARC use for STI testing and reinforces the importance of addressing STI/HIV-related preventive services in counseling and health education about LARC. Our findings also minimize concern about this potential unintended consequence, thus bolstering the case that highly effective LARC methods are appropriate for adolescents

and young women. From the web content analysis, we concluded that innovative structures for online information, such as a section about simultaneously addressing unintended pregnancy and STI prevention, would facilitate integration of pregnancy and STI prevention information. Recommendations for strengthening specific messages include: promoting STI prevention strategies in conjunction with statements about birth control methods conferring no STI protecting; describing STI prevention strategies in addition to condoms, including PrEP, PEP, and STI testing; and explicitly connecting condom use to STI prevention, even when promoting condoms for back-up contraception. Findings from Aim 3 underscore the need for parental and school-based sexual health education to emphasize STI prevention in addition to pregnancy prevention.

Across these practice implications, integration of unintended pregnancy and STI prevention in health promotion is a key theme. In a recently published commentary, we outlined a framework for such integration, and the findings of the current study reinforce the need for such an approach, which is best illustrated by Table 5.1 (Steiner, Liddon, Swartzendruber, Pazol, & Sales, 2018). This table presents a menu of strategies in relation to preventing either unintended pregnancy or STIs. Strategies that address both goals (i.e. abstinence, condoms) appear in each column. Clinic-based counseling or broader health promotion should first address the two prevention goals, and then link specific prevention strategies/methods to those goals. Doing so would ensure that clinicians and health educators address both unintended pregnancy and STIs prevention and describe strategies directly in relation to these goals. Framing messages and counseling in this way makes it possible to promote the use of multiple strategies for each prevention goal, including STI prevention strategies in addition to condoms. Moreover, it

can help ensure that condom use is emphasized specifically for STI prevention. Reflecting such an approach in practice guidelines and policy statements from professional medical organizations could help motivate implementation, particularly in clinical settings.

Conclusions

We aimed to proactively assess and respond to a timely public health issue, given changes in the contraceptive landscape for adolescents and young adults. Findings from this research underscore an overall need for integrating unintended pregnancy and STI prevention. Such efforts can help prevent any increase in STI rates associated with LARC use among adolescents and young adults. By doing so, we can ensure that negative STI-related outcomes do not undermine efforts to improve access to LARC methods for this population. These specific benefits highlight the simple yet fundamental value of integrated prevention and care—the potential to achieve *both* unintended pregnancy and STI prevention goals.

More broadly, the current study offers a model for considering the implications of public health innovations specific to one outcome for integrating sexual and reproductive health overall. For example, concerns have been raised that use of PrEP for HIV prevention may decrease condom use, thereby increasing risk for other STIs (Alaei, Paynter, Juan, & Alaei, 2016). Our study highlights the importance of considering PrEP in relation to a full range of related outcomes, including STI testing. Of note, PrEP may actually increase routine engagement in clinical care and thereby receipt of STI testing. Our study also points to the need for assessment of health promotion information about PrEP to ensure condom use is emphasized in relation to preventing other STIs. Finally,

researchers should explore motivations for condoms use with PrEP in relation to preventing HIV, other STIs, or both outcomes. PrEP is just one example of an innovation that warrants a body of research similar to the current study. Other recent examples include home-based STI testing and over-the-counter contraceptive access, and advancements in the prevention of discrete sexual and reproductive health outcomes will continue to emerge. Our research should thus have relevance even when an integrated approach to LARC scale-up is fully realized.

Table 5.1 Unintended Pregnancy and STI/HIV Prevention Goals and Strategies

Goal: Prevent Unintended Pregnancy	*Goal: Prevent STIs/HIV*
Strategies	
Abstinence	Abstinence
Sterilization (vasectomy and tubal)	Condoms
IUDs	Testing and mutual monogamy
Implants	HPV vaccine (for HPV only)[b]
Oral contraceptives	HBV vaccine (for HBV only)[b]
Depo-Provera	PrEP (for HIV only)
Birth control patch	
Birth control ring	
Condoms	
Engaging in sexual behaviors other than intercourse	
Other birth control methods[a]	

[a]Withdrawal, sponge, spermicide, fertility awareness, lactational amenorrhea
[b]This strategy should be implemented universally in accordance with the Advisory Committee on Immunization Practices recommendations.

References

Alaei, K., Paynter, C. A., Juan, S. C., & Alaei, A. (2016). Using PrEP, losing condoms? PrEP promotion may undermine safe sex. *AIDS*. doi:10.1097/QAD.0000000000001262

American College of Obstetricians and Gynecologists, Committee on Obstetric Practice. (2016). Committee opinion No. 670: Immediate postpartum long-acting reversible contraception. *Obstetrics and Gynecology, 128*(2), e32-37. doi:10.1097/AOG.0000000000001587

American College of Obstetricians and Gynecologists, Committee on Practice Bulletins--Gynecology, Long-Acting Reversible Contraception Workgroup. (2017). ACOG Practice Bulletin No. 186: Long-acting reversible contraception: Implants and intrauterine devices. *Obstetrics and Gynecology, 130*(5), e251-e269. doi: 10.1097/AOG.0000000000002400.

Bastow, B., Sheeder, J., Guiahi, M., & Teal, S. (2017). Condom use in adolescents and young women following initiation of long- or short-acting contraceptive methods. *Contraception*. doi:10.1016/j.contraception.2017.10.002

Centers for Disease Control and Prevention (2017). Sexually transmitted disease surveillance, 2016. Retrieved from https://www.cdc.gov/std/stats15/STD-Surveillance-2015-print.pdf

Creswell, J.W., & Clark, V.L.P. (2018). *Designing and conducting mixed methods research, 3rd Edition.* Thousand Oaks, CA: Sage Publications.

Farr, S. L., Kraft, J. M., Warner, L., Anderson, J. E., & Jamieson, D. J. (2009). The integration of STD/HIV services with contraceptive services for young women in

the United States. *American Journal of Obstetrics and Gynecology, 201*(2), 142 e141-148. doi:10.1016/j.ajog.2009.04.018

Gallo, M. F., Warner, L., Jamieson, D. J., & Steiner, M. J. (2011). Do women using long-acting reversible contraception reduce condom use? A novel study design incorporating semen biomarkers. *Infectious Diseases in Obstetrics and Gynecology, 2011*, 107140. doi:10.1155/2011/107140

Gavin, L., Moskosky, S., Carter, M., Curtis, K., Glass, E., Godfrey, E., . . . Zapata L. (2014). Providing quality family planning services: Recommendations of CDC and the U.S. Office of Population Affairs. *Morbidity and Mortality Weekly Report: Recommendations and Reports, 63*(RR-04), 1-54.

Harper, C.R., Steiner, R.J., Lowry, R., Hufstetler, S., & Dittus P.J. (2017). Variability in condom use trends by sexual risk behaviors: Findings from the 2003-2015 National Youth Risk Behavior Surveys. *Sexually Transmitted Diseases*. In press.

Hopkins, B. (2017). Barriers to health care providers' provision of ong-acting reversible contraception to adolescent and nulliparous young women. *Nursing for Women's Health, 21*(2), 122-128. doi:10.1016/j.nwh.2017.02.007

Lemoine, J., Teal, S. B., Peters, M., & Guiahi, M. (2017). Motivating factors for dual-method contraceptive use among adolescents and young women: A qualitative investigation. *Contraception*. doi:10.1016/j.contraception.2017.06.011

Marcell, A. V., Gibbs, S. E., Choiriyyah, I., Sonenstein, F. L., Astone, N. M., Pleck, J. H., & Dariotis, J. K. (2016). National needs of family planning among US men aged 15 to 44 years. *American Journal of Public Health, 106*(4), 733-739. doi:10.2105/AJPH.2015.303037

McNicholas, C. P., Klugman, J. B., Zhao, Q., & Peipert, J. F. (2017). Condom use and incident sexually transmitted infection after initiation of long-acting reversible contraception. *American Journal of Obstetrics and Gynecology, 217*(6), 672 e671-672 e676. doi:10.1016/j.ajog.2017.09.009

Rose, S. B., Garrett, S. M., Stanley, J., & Pullon, S. R. H. (2017). Chlamydia testing and diagnosis following initiation of long-acting reversible contraception: A retrospective cohort study. *Australian and New Zealand Journal of Obstetrics and Gynaecology*. doi:10.1111/ajo.12685

Steiner, R. J., Liddon, N., Swartzendruber, A. L., Pazol, K., & Sales, J. M. (2019). Moving the message beyond the methods: Toward integration of unintended pregnancy and sexually transmitted infection/HIV prevention. *American Journal of Preventive Medicine*. *4*(3):440-443. doi:10.1016/j.amepre.2017.10.022

Steiner, R. J., Liddon, N., Swartzendruber, A. L., Rasberry, C. N., & Sales, J. M. (2016). Long-acting reversible contraception and condom use among female US high school students: Implications for sexually transmitted infection prevention. *JAMA Pediatrics*, *170*(5), 428-434. doi:10.1001/jamapediatrics.2016.0007

Sundaram, A., Vaughan, B., Kost, K., Bankole, A., Finer, L., Singh, S., & Trussell, J. (2017). Contraceptive failure in the United States: Estimates from the 2006-2010 National Survey of Family Growth. *Perspectives on Sexual and Reproductive Health, 49*(1), 7-16. doi:10.1363/psrh.12017

Swartzendruber, A., & Steiner, R.J. (2016). *Long-acting reversible contraception use and sexually transmitted infection acquistion during 12 months of follow-up among*

young African American women. Paper presented at STD Prevention Conference, Atlanta, GA

Warner, L., Williams, L., Le, B., Smith, R., Pazol, K., Harrison, L., Kourtis, A., & Barfield, W. (2016). *Dual use of condoms with long-acting reversible contraception (LARC) versus moderately effective methods among teen mother participating in the pregnancy risk assessment monitoring system (PRAMS).* Paper presented at the STD Prevention Conference, Atlanta, GA