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Women's Contraceptive Method Choice in the United States: The Role of the Health Care System, the Importance of Contraceptive Attributes, and Exploring the Potential for a Decision Support Intervention in the Clinical Setting

By

Cassondra Marshall

A dissertation submitted in partial satisfaction of the

requirements for the degree of

Doctor of Public Health

in the

Graduate Division

of the

University of California, Berkeley

Committee in charge:

Professor Amani M Nuru-Jeter, Chair
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Professor Jane Mauldon

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Abstract

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In spite of an expanding menu of contraceptive options, women in the United States (US) continue to experience high rates of unintended pregnancy, with 50% of all pregnancies being unintended. Unintended pregnancy has been associated with a number of adverse health outcomes for mothers and their children and results in significant financial cost to society. While the root causes of unintended pregnancy are likely complex and multi-factorial, the direct cause of an unintended pregnancy is sexual activity coupled with contraceptive misuse, failure or nonuse altogether. Although most women who do not wish to become pregnant have at some point used contraception, nonuse and inconsistent use of contraception in any given year is common. Thus, at its most proximal level, reducing unintended pregnancy requires increasing and improving contraceptive use among women and couples that want to avoid pregnancy.

This research focuses on contraceptive method choice as a critical decision because the method used by a woman has implications for how well she is able to prevent an unintended pregnancy. Further, dissatisfaction with the contraceptive methods women use is high, highlighting the importance of assisting women with choosing methods that meet their needs. Contraceptive method choice is a highly individualized decision made in the context of a woman's life circumstances. This decision can be complex and involves a number of considerations that can affect a woman's ability to successfully use the method. Given that the most commonly used and most effective methods require a prescription and/or an interaction with a health care provider in the US, factors related to the health care system influence the methods women choose. There is a need to develop patient-centered interventions that can assist women in choosing a contraceptive method that best meets their individual needs.

This dissertation presents the findings of three interrelated studies related to women's contraceptive method choice. The first paper presents the findings of a critical literature review of the role of the US health care system in impacting women's contraceptive method choice. In this study, I identified a comprehensive set of factors related to the health care system, such as

the provision of specific services by providers, that are associated with contraceptive method choice. The second paper examined a component of the contraceptive choice decision-making process by assessing the importance women assign to several contraceptive attributes when choosing a method. This quantitative analysis tested hypotheses to determine if the importance women assigned to various contraceptive attributes aligned with the methods they chose. Finally, in the third paper, I explored patient perceptions of a contraceptive decision support tool that can be used in clinical settings to help women choose contraceptive methods. Specifically, this qualitative study used semi-structured interviews to describe patients' perception of the value and utility of the tool in order to understand the mechanisms through which these tools have an impact on contraceptive method choice.

Dedication

This dissertation is dedicated to my parents, Saundra and Joseph Marshall. You are my number 1 cheerleaders. Thank you for supporting me in all that I do, believing in me and, most importantly, teaching me to believe in myself.

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Introduction

Unintended Pregnancy

Unintended pregnancy is a significant public health problem in the United States (US) because of its high prevalence, its association with numerous negative health outcomes, and its substantial cost to the health care economy. According to the most recent estimates, 51% of the 6.6 million pregnancies each year are unintended, which means the pregnancy occurs when a woman does not want to have a child (unwanted pregnancy) or wants to have one later (mistimed pregnancy).[1] The unintended pregnancy rate in the US has remained stagnant over the past decade and is higher than most other developed countries.[1–3] In the US, unintended pregnancy is disproportionately high among certain subgroups of the population: adolescents and young women, racial/ethnic minorities, and women with lower levels of education and income.[2] While these disparities exist, however, unintended pregnancy affects all demographic groups. By age 45, more than half of all American women will have experienced an unintended pregnancy, and 30% will have had an abortion.[4]

Unintended pregnancies that result in a birth have been studied extensively. While causal inferences have been challenging to make, available evidence demonstrates that unintended pregnancy is associated with a number of adverse infant health outcomes including delayed prenatal care, lower breastfeeding rates, and preterm birth.[5–7] Unintended pregnancy has also been associated with negative mental health outcomes among mothers such as lower levels of general psychological well-being throughout the perinatal period and increased experiences of physical abuse during pregnancy, which itself has been associated with a range of poor maternal and child health outcomes.[6] In terms of long-term child outcomes, unintended pregnancy has been associated with poor physical and mental health in middle childhood and poorer educational outcomes.[6] Additionally, the cost of the unintended pregnancy in the US is substantial.[8–10] In 2010, over two-thirds of the 1.5 million births resulting from unintended pregnancies were paid for by public insurance programs, primarily Medicaid. Public spending on births, abortions, and fetal loses from unintended pregnancies was estimated to be $21 billion dollars in 2010, and experts estimate that potential savings from averting unintended pregnancies would have been $15.5 billion.[10]

In 1995, the Institute of Medicine (IOM) developed a committee to review the topic of unintended pregnancy and subsequently published a report, which provided the most recent data on unintended pregnancy rates and trends as well as summarized the health and social consequences of unintended pregnancy.[11] Given the high prevalence, associated negative health outcomes, and substantial health care costs of unintended pregnancy, decreasing the proportion of unintended pregnancies has been a goal of the last three Department of Health and Human Services' (DHHS) Healthy People reports (i.e., 2000, 2010, and 2020), illustrating its importance as part of the national health care agenda.[12]

Contraception

The root causes of unintended pregnancy are likely complex and multi-factorial and include intra- and inter- personal factors as well as more structural factors. However, the direct cause of unintended pregnancy is sexual activity coupled with contraceptive misuse, failure or nonuse altogether. Thus, the majority of research on preventing unintended pregnancy has

focused on increasing and improving contraceptive use among women and couples that want to avoid an unintended pregnancy.

In the US, nearly all sexually active women aged 15 to 44 who do not wish to become pregnant have, at some point, used a form of contraception.[13] When used correctly, modern contraceptives are extremely effective at preventing pregnancy. Thus, unintended pregnancy mainly results from sexual intercourse coupled with a lack of contraception or inconsistent or incorrect use of contraceptive methods. While most women at risk for unintended pregnancy, meaning they are sexually active but do not wish to become pregnant, consistently and correctly use contraception throughout the course of any given year, the 19% of women at risk for unintended pregnancy who use contraception inconsistently or incorrectly account for 43% of all unintended pregnancies. The 16% of women at risk who do not practice contraception at all for a month or more during the year account for 52% of all unintended pregnancies. Only 5% of unintended pregnancies can be attributed to contraceptive failure.[14]

Contraceptive Method Choice

The act of using a contraceptive method can be conceptualized as a series of decisions. First, a woman must decide if she wants to use contraception. Second, a woman must decide which contraceptive method to use (i.e. contraceptive method choice). Subsequent decisions include deciding to continue using or discontinue a particular method as well as adhering to the specified regimen. Thus, understanding contraceptive decision-making is critical to increasing and improving contraceptive use and thereby reducing unintended pregnancy. Contraceptive method choice has often been studied as an outcome (i.e. the contraceptive method chosen by a woman). However, contraceptive method choice is a decision with an associated decision-making process that leads women to choose a particular method. For contraceptive method choice, the term "decision-making process" refers to "how and why women make the tradeoffs that they do when choosing among available methods".[15] This process is poorly understood but has important implications for the method ultimately chosen. A number of factors are considered in the decision-making process associated with contraceptive method choice. Examples are: women's reproductive goals, health history, personal characteristics such as frequency of sexual intercourse and relationship status, and sexual partners. Women's perceptions of the attributes of available contraceptive methods and advice from health care providers are also involved in decision-making.[16–19]

Contraceptive method choice is a particularly important decision because the method chosen by a woman has important implications for her ability to prevent pregnancy. This is because contraceptive methods vary in terms of their effectiveness in preventing pregnancy and their level of "user dependence", which refers to how dependent the effectiveness of the contraceptive method is on the person who uses it. Furthermore, contraceptive method choice is the decision upon which subsequent important contraceptive outcomes such as adherence and continuation of use are based. Therefore, understanding the factors involved with contraceptive method choice is a critical step in improving successful contraceptive use.

Studies have shown that many women are dissatisfied with the contraceptive methods they use.[20–22] This dissatisfaction is of particular concern because a woman's dissatisfaction with her contraceptive method has been positively associated with inconsistent contraceptive method use and frequent contraceptive method switching, factors both associated with a woman's risk of unintended pregnancy.[14] An analysis of data from the National Survey of Family Growth, a nationally representative sample of women aged 15-44 in the US, found that, among women who have used at least one method of contraception, nearly 50% have ever discontinued the method

due to dissatisfaction.[22] This high level of dissatisfaction suggests the need for efforts intended to assist women in choosing contraceptive methods that better suit their needs.

The Role of the Health Care System

Contraceptive care is a key preventive health service. The provision of the full range of contraceptive methods as well as education and counseling on contraception has been designated by the IOM and acknowledged by the US DHHS as a key clinical preventive health care service for women.[23] Under the Affordable Care Act, health care plans are required to cover contraceptive care, along with other key preventive services, as an effort to promote the health and well-being of women.[23,24] Currently, the majority of and most popular contraceptive methods, including hormonal methods (birth control pills, patches, rings, implants, and injections), intrauterine devices, and sterilization, are available through prescription in the US and require consultation with a health care provider. Contraceptives tend to be provided in the context of routine preventive health visits or a dedicated reproductive health visit (e.g., family planning visits). For this reason, there is great potential for health care system-level factors to influence women's contraceptive method choice. Despite this, however, the broad range of health care-related factors associated with women's contraceptive choice have not been fully identified and explained.

Recently, researchers and key reproductive health organizations have called for a greater focus on patient-centeredness in contraceptive care.[14,25,26] Patient centered care, as defined by the IOM, refers to "care that is respectful of and responsive to individual patient preferences, needs and values, and ensures that patient's values guide all clinical decisions".[27] In the area of contraceptive care, a suggested way to provide patient centered care is to provide individualized contraceptive counseling about method selection based on regular assessments of a woman's sexual activity, relationship characteristics, and other life events, including family, educational, and/or work life.[14]

Decision Support and Current Practice

Theory suggests that an approach that provides support by a health care provider for the decision-making process can be beneficial for making decisions that patients feel are informed and values-based.[28] Therefore, decision support, the process by which individuals are helped in a non-directive way to facilitate progress in decision-making, provided to patients may be appropriate for impacting contraceptive method choice. Interventions, such as contraceptive counseling from healthcare providers, have been used in clinical settings as a way to provide decision support for contraceptive method choice. In 1996, the US Preventive Services Task Force (USPSTF), an independent, non-Federal panel of experts that develops recommendations and guidelines for primary care providers and health systems, recommended counseling as a way to prevent unintended pregnancy.[29] The recommendation calls for periodic counseling about effective contraceptive methods to all women and men at risk for unintended pregnancy, and says that the counseling should be based on information from a careful sexual history and should take into account the individual preferences, abilities, and risks of each patient.[29] However, in 2002, the USPSTF withdrew this recommendation due to "insufficient evidence supporting the efficacy of contraceptive counseling in changing contraceptive behavior and improving health outcomes".[30]

Contraceptive counseling remains a key intervention, however, and providers often rely on their clinical expertise and use a variety of techniques to counsel their patients, including increasing awareness of risks, empowering women to adopt behaviors to protect themselves, and

using their authority as a clinician to guide patients in decision-making.[31] Studies on contraceptive counseling have examined many outcomes, including knowledge about contraceptive methods, patient satisfaction with the counseling, method choice, method adherence, method continuation, and contraceptive use at last intercourse. However, results are inconsistent, with some showing that contraceptive counseling impacts contraceptive behavior while others show that it does not.[32,33] In many research studies, it is unclear what exactly counseling consists of or what type of counseling has been used. As it relates specifically to women's contraceptive method choice, contraceptive counseling has been shown to have a positive influence.[31,34] In fact, health care providers cite counseling as one of the most important things they can do to influence a patient's contraceptive choice.[35] Studies that have examined differing types of counseling (e.g., structured, tailored, etc.) in an effort to determine what aspects of counseling impact contraceptive method choice have not found differences between counseling types.[36,37]

Beyond counseling, health care providers and health care systems have often provided information on available contraceptive methods, often through pamphlets or booklets, as a way to help women make a informed choice about contraceptive methods. More recently, decision support tools have been used as interventions to support the participation of patients in their medical decision-making.[38] Usually designed to complement, not replace, counseling from a health care provider, decision support tools refer to a broad set of patient-centered interventions that can help patients when they are faced with a decision regarding their health and/or medical care. Decision support tools come in a variety of formats, ranging from pamphlets that can easily be examined during a clinical encounter to web-based, interactive platforms and videos that patients can review at home. Multiple tools to support contraceptive method choice are currently being developed and evaluated.[39–41] Providing decision support involves taking into consideration what patients need to make an informed decision. Therefore, understanding contraceptive method choice as a consequence of a decision-making process and identifying what influences their decision is necessary to provide adequate decision support. For example, if we know that women factor potential side effects of contraceptive methods into their decision-making, contraceptive decision support interventions can be designed to adequately highlight side effects.

A recent IOM report on women's health research urged for health-services research on how to strengthen services for the provision of contraceptive methods.[42] An important step in improving contraceptive care services is developing patient-centered interventions that provide the necessary support for women to make informed contraceptive choices. Ultimately, these informed choices will allow women to avoid unintended pregnancy and meet their personal reproductive goals.

Overview of Dissertation

This three-paper dissertation presents the findings of three interrelated studies each focused on different aspects of women's contraceptive method choice. The first study examines the relationship between the health care system and women's method choice, the second study assesses a factor involved in the contraceptive method choice decision-making process, and the third study focuses on a decision support intervention for patients choosing a birth control method.

The first paper presents a comprehensive examination of the aspects of the health care system that have influenced women's choice of contraception in the United States. The purpose of this critical literature review was to identify and elucidate the aspects of the health care system

that impact women's method choice. The second study was designed to gain a better understanding of the factors that are important to women when choosing a birth control method. Specifically, we examined the importance of several characteristics, or attributes, of contraceptive methods that women consider when choosing a contraceptive method. In this quantitative analysis, we empirically tested whether the importance of these attributes varied by women's socio-demographic characteristics and whether and how they were associated with the methods women chose to use. Finally, the third study examined a decision support intervention that can be used in the clinical setting for women's contraceptive method choice. In this paper, I present data on patients' perceptions of the value and utility of a contraceptive decision support tool (DST) that can be used in clinical settings to assist women who are choosing a contraceptive method. The goal of this study was learn about how and why DSTs impact contraceptive method choice and describe the processes women engage in when using a contraceptive DST.

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Paper #1: Health care system factors and women's contraceptive method choice in the United States: A critical review of literature

Abstract

Factors related to the health care system, including the provision of specific services by health care providers and the organization of service delivery, can influence the contraceptive method choices that women make. Given that the most commonly used and most effective methods require a prescription and/or an interaction with a health care provider in the United States, this review sought to elucidate the aspects of the health care system that influence women's method choice. Using an integrative literature review methodology, we identified 19 studies for inclusion. Six thematic clusters of health system-level factors were identified as influencing method choice: contraceptive counseling by a provider, type of clinical setting, service delivery integration models, type of clinical visit, patient financial burden, and use of computer-based assessment modules. Future clinical interventions to improve contraceptive method choice and contraceptive use overall as well as future theoretical models of choice behavior should consider these findings.

Introduction

Unintended pregnancy remains a significant public health problem in the United States (US) with half of all pregnancies unintended each year.[1,2] The majority of research and programs aimed at reducing unintended pregnancy have focused on increasing and improving contraceptive use among women that wish to avoid pregnancy.[3–5] Contraceptive methods vary in terms of their effectiveness in preventing pregnancy and level of "user dependence" (i.e. how dependent the effectiveness of the method is on the person who uses it). Therefore, a woman's choice of contraceptive is particularly important for her ability to avoid an unintended pregnancy. Furthermore, contraceptive method choice influences subsequent important contraceptive outcomes such as adherence and continuation of use. It has been hypothesized that improving contraceptive method choice is a critical step in improving overall contraceptive use, and reducing rates of unintended pregnancy in the US.[6]

Women's contraceptive choice has been described as a complex, multifactorial, and highly individualized decision.[7–9] Most research on contraceptive choice has focused on individual factors, such as socio-demographics and knowledge, attitudes and beliefs towards pregnancy and contraception, as well as interpersonal-level factors including relationship and/or partner-related factors.[10–14] Although less frequently examined**,** factors related to the health care system are also thought to influence women's method choice and subsequent contraceptive behavior. Health system-level factors include factors related to services patients receive, such as contraceptive counseling, practices and policies related to financing of care, and the organization of systems through which women have access to contraceptive services. Health care delivery systems and associated factors have been cited as key distal factors that influence an individual's contraceptive behavior.[10] Further, women have highlighted such factors as the role of health care providers in influencing the methods they choose.[15]

Both the Institute of Medicine and US Department of Health and Human Services acknowledge the provision of Food and Drug Administration-approved contraceptive methods as well as education and counseling on contraception as a key clinical preventive health care service for women. Under the Affordable Care Act, health care plans are required to cover contraceptive

care, along with other key preventive services, as an effort to promote the health and well-being of women.[16,17] Currently, the majority of and most popular contraceptive methods, including hormonal methods (e.g. birth control pills, patches, rings, implants, and injections), intrauterine devices, and sterilization, are available only through prescription and require consultation with a health care provider. Contraceptives tend to be provided in the context of routine preventive health visits or a dedicated reproductive health visit (e.g., family planning visits). Reproductive health organizations have suggested a patient-centered approach for contraceptive care that emphasizes assisting women in choosing effective methods that fit their specific lifestyle, needs and preferences.[3,18]

Previous studies have assessed the influence of health care system-related factors on contraceptive method choice, including the delivery of specific services by health care providers.[6,19–22] However, there have been few efforts to synthesize this body of literature, and most reviews have examined the role of contraceptive counseling in contraceptive method choice.[8,23] A comprehensive examination of the broad range of health care-related factors that can influence contraceptive choice is a notable gap. With the increasing focus on improving patient-centeredness in contraceptive care and efforts to improve family planning service delivery systems, a systematic review of existing evidence may help to close this gap and inform interventions and policy designed to strengthen family planning delivery systems in the US.[18,24] The objective of this paper is to identify and critically review aspects of the health care system that have influenced women's choice of contraception in the United States.

Methods

Integrative review methodology was used for this review of the literature. The purpose of an integrative review is to provide a comprehensive understanding of a particular phenomenon or health care problem, and allows for the inclusion of diverse methodologies and study designs to achieve this goal.[25] Most commonly used in the field of nursing, integrative reviews have been used in the development of evidence-based practices and protocols. As outlined by Whittemore and Knafl, we followed a 5-stage process for this review: 1) Clear Identification of the problem to be studied, 2) Well-defined literature searches, 3) Evaluation of the quality of the included studies, 4) Thorough analysis of the studies including data reduction and data comparison and 5) Presentation of conclusions.[25]

We searched PubMed and the Cumulative Index of Nursing and Allied Health Literature (CINAHL). Our search terms were a combination of indexed terminology for health care delivery and health care administration and the keywords "contraceptive method choice" or "contraceptive use" or "contraceptive choice". In order for inclusion, papers must have: 1) been published in the peer-reviewed literature, 2) focused on American women of all age ranges, 3) been published in English from January 2002 to December 2014, 4) stated an explicit study objective to examine contraceptive method choice or use of various contraceptive methods, 5) examined an aspect of the healthcare delivery system, and 6) utilized quantitative methodologies. Although qualitative literature has provided important information regarding the multiple influences on contraceptive decision-making, focusing on the quantitative literature helped to narrow the scope of the review and allowed for the selection of papers based on a clear outcome variable (i.e. contraceptive method choice). 2002 was selected as the lower-bound of the dates for the review since the Mirena IUD and vaginal ring were FDA-approved in 2001. By starting in 2002, our goal was to capture studies that would have examined the full-range of contraceptive methods that are FDA-approved and available today. Exclusion criteria for the review included: 1) papers that solely focused on men, 2) studies where the focus was to only

examine use of any contraceptive method versus nonuse or only condom use versus nonuse, 3) non-empirical research (e.g. theoretical papers, commentaries, editorials, etc.), 4) papers that utilized qualitative methodologies only, and 5) unpublished papers, dissertations/theses, and conference abstracts. Studies that only examined the use or nonuse of contraception were excluded because we were specifically interested in the type of method(s) chosen or used by women. We excluded papers examining only condom use because an interaction with the health care system is not required to obtain condoms. Although related to the health care system, health insurance was considered to be a characteristic of an individual rather than of the system and was therefore not examined in this review.

Our search strategy yielded 439 references (274 from PubMed and 165 from CINHAL). Using the criteria described above, after 3 rounds of review, first by title, then by abstract, and full text, 19 papers were included in the final literature review. We extracted and summarized the following information from the articles selected for study inclusion: study purpose, methods, results, study conclusions, sample description and size, how contraceptive choice was measured and defined, and type of health system factor examined. Regarding the contraceptive choice outcome, we extracted data on outcomes that included at least one contraceptive method that required an interaction with a health care provider (i.e. prescription methods). Quality of the articles was assessed by examination of study design, sample size, loss to follow up, validation of data instruments, and generalizability. Following the approach cited by Whittmore and Knafl, we analyzed the data by organizing studies into categories defined by health care factor examined (data reduction) and identifying similarities between studies in each group (data comparison). First, we categorized studies based on the aspect of the health care system under investigation: service delivery, organization of or access to services, or the financing of services. Next, we grouped studies with similar exposure variables (i.e. what factor was studied as a potential predictor of contraceptive choice). Finally, we identified an overarching theme for each grouping and developed working definitions for each thematic cluster [see below]. Several studies were included in more than one cluster.

Results

Description of Included Studies

Both observational and experimental or quasi-experimental studies were represented, including 6 randomized controlled trials, 9 cross-sectional designs, and 4 cohort studies (Table 1). Study samples included women ranging from ages 12-50, and 4 studies focused exclusively on adolescents (<18 years). 4 of the 19 studies examined nationally representative (n=2) or state-representative (n=2) samples, while all other studies were geographically-limited. 4 studies were secondary data analyses of the National Survey of Family Growth (NSFG) (n=2) or the Pregnancy Risk Assessment Monitoring system (PRAMS) (n=2), 10 studies assessed the impact of a specific intervention, and the other 5 were observational studies that involved primary data collection. Included studies were published 2002-2014.

Regarding quality, studies varied in terms of study design, the reliance upon self-report data, and sample size. A few studies used sampling plans that allowed for generalization to larger populations, but many had limited external validity due to narrowly defined samples. When appropriate, the vast majority of studies performed multivariate analyses adjusted for potential confounders and several examined potential interactions. Adjustments were typically made for socio-demographic, reproductive, and health service-related characteristics. Sensitivity testing as well as both intent-to-treat and per protocol analyses were conducted in several of the trials to

account for bias and improve confidence in findings. Comments on the quality of each study are available in Table 2.

Definition of the outcome

There was no standard definition of contraceptive choice in the included studies (Table 1). Contraceptive choice was examined at several different time points, including contraceptive choice at last sex, current contraceptive choice, defined as contraceptive use at the time of or in the month prior to data collection, and method chosen and/or initiated at the end of a health care visit. Two studies specifically examined postpartum contraceptive use.

In nearly all of the papers, contraceptive methods were grouped together in some fashion for analyses, but categories varied greatly across studies. Methods were grouped together based on several dimensions: effectiveness for pregnancy prevention, whether it was a prescription method, length of effectiveness (i.e. whether the method provides long-acting or shorter-acting protection from pregnancy), reversibility, and presence of hormones. A couple of studies were particularly interested in long-acting reversible contraception (LARC) methods which were sometimes classified as "very effective" methods. One study examined dual method use, which refers to use of a method for pregnancy prevention and use of a method for STI prevention.

One important dimension on which studies varied is the inclusion of contraceptive nonusers in analysis. Some studies only examined method choice among women using a method, while others included contraceptive nonusers in analyses. In the latter group, contraceptive nonusers were sometimes their own category in multinomial outcome while in other studies nonuse was combined with ineffective method use.

Health care system factors examined in the literature

Several health system factors were examined in the literature. These were grouped in 6 thematic based clusters: 1) patient education or counseling, 2) the clinical setting of service delivery, 3) patient financial burden, 4) service delivery integration, 5) type of clinical visit, and 6) computer-based assessment modules. Patient education and counseling referred to studies that specifically examined the provision of contraceptive education or counseling by a health care provider in a health care setting. This cluster was further divided into observational studies and studies that tested a specific education and/or counseling intervention. Studies included the clinical setting of service delivery cluster examined the association between where contraceptive care was delivered and women's method choice. Patient financial burden referred to studies that focused on the impact of practice or policy related to the patient cost of contraceptive care. The integration and/or bundling of services category referred to studies that examined a service delivery model that combined the provision of contraceptive care along with other services or in a non-traditional clinical setting. Type of clinical visit included studies where a specific clinical visit type was examined as a predictor of method choice. Finally, the computer-based assessment cluster included studies that examined the use of computer-based interventions used in clinical settings. Studies included in this cluster involved education and the assessment of patient perspectives.

Cluster 1: Patient education or counseling

The provision of contraceptive education and/or counseling by a health care provider was the most frequent health-care system factor examined in the literature (n=11).[19–22,26–32] Both

experimental and observational studies were used to test the association between contraceptive counseling and method choice.

Observational study designs

The observational studies examined the association between the receipt of contraceptive education and counseling and method choice. In addition, several studies assessed other aspects of the counseling, including the nature, content, and patient perception of the counseling received.

Receipt of contraceptive counseling

Six cross-sectional studies and one cohort study examined whether the receipt of contraceptive counseling was associated with contraceptive method choice. Studies differed in terms of study population, clinical setting, definition of counseling, and the how the contraceptive choice outcome was defined. Counseling was studied in several different populations, including postpartum teens, young women attending Planned Parenthood clinics, women of reproductive age from primary care centers, and a nationally-representative sample of obese women. Study samples were diverse in terms of race and socioeconomic status as well. For example, one study examined predominately white women with private insurance, while other studies were based in publically funded clinics serving minority populations. In terms of health care setting, counseling was examined in primary care, managed care, and reproductive-health focused clinical settings. 2 studies specifically examined contraceptive counseling in the prenatal period. Counseling and/education was also defined differently in the various studies. One study operationalized contraceptive counseling as a positive response to a question that assessed whether a health care provider talked to them about birth control methods, while other studies directly assessed if someone had received formal "contraceptive counseling".

The variety of study populations and settings as well as differing measures of counseling make it challenging to compare studies and come to overall conclusions. Nevertheless, the studies demonstrated an association between receipt of contraceptive counseling and the contraceptive choices that women made. For example, in their study of contraceptive counseling in primary care, Lee et al. (2011) found that women in need of counseling who received contraceptive counseling from a primary care provider were more likely to report use of hormonal contraception (aOR: 2.7; 95% CI: 1.5, 4.9) in models adjusted for socio-demographic and reproductive characteristics.[20] However, while receipt of counseling was associated with greater use of hormonal methods overall, it was not associated with use of IUDS or implants (aOR: 2.2; 95% CI: 0.8, 6.5).[20] In the study of obese women included in the 2006-2010 NSFG, Callegari and colleagues found that, after adjustment for socio-demographic, reproductive and health service characteristics, behavioral (withdrawal, fertility awareness methods) (aRR: 0.1; 95% CI: 0.1, 0.3) and barrier (diaphragm, foam, jelly, sponge, other) method (aRR: 0.2; 95% CI: 0.1, 0.3) users were less likely to report discussing contraception with a health care provider than prescription method users.[26] The two studies that used PRAMS data to examine prenatal contraceptive counseling likewise found significant relationships between counseling and method choice. For example, in their study of teen mothers, Wilson and colleagues found that women who received counseling had an increased likelihood of using pills (predicted probability: 32% vs. 22%; adjusted for socio-demographic and pregnancy-related characteristics).[22]

Two studies noted subgroup differences in the relationship between contraceptive counseling and method choice. For example, in the PRAMS study examining the association between prenatal contraceptive counseling and postpartum contraceptive use, women with less than a high school education who received counseling experienced higher odds of using an effective contraceptive method (sterilization, IUD, injectable, pill patch, vaginal contraceptive, condom and diaphragm) (aOR: 2.5; 95% CI: 1.3, 5.1), while no association was found for women with greater than a high school education.[21] Results were adjusted for several socio-demographic and pregnancy-related characteristics to control for confounding.

Patient satisfaction with counseling

Only one study examined the association between patient satisfaction with contraceptive counseling and method choice. In the study of reproductive-aged women presenting at primary clinics in Western Pennsylvania, Lee et al. found no association between patient satisfaction with counseling and method choice (AOR: 1.9; 95% CI: 0.4, 10.6).[20]

Content and type of counseling

The content and type of education and counseling was examined in 5 of the observational studies. In the study of contraceptive counseling among reproductive-aged women at primary care clinics, counseling regarding specific types of contraception was associated with an increased use of those methods. For example, among women in need of contraceptive counseling, counseling about hormonal contraception was associated with use of hormonal methods (pill, patch, ring, or injection) (aOR: 4.8; 95% CI: 4.5, 9.1) and counseling regarding highly effective methods was associated with use of highly effective methods (IUD or implant) (aOR: 18.5; 95% CI: 4.9,69.8).[20] The number of methods discussed during counseling sessions also appeared to be associated with method choice. Among young women presenting at Planned Parenthood clinics, Harper et al. found in adjusted models that the greater the number of hormonal methods discussed during a counseling session, the less likely the woman to choose injectable contraception compared to newer methods (the patch and ring) (p=0.004).[31] In the study of contraceptive counseling in a managed care setting in Michigan, a difference between personalized counseling and informational only counseling was found. Receipt of personalized counseling was associated with greater odds (aOR: 3.68; adjusted for socio-demographic and health service characteristics) of use of prescription contraceptive methods (pills, diaphragm, IUD, injectable, implant) while informational only counseling was not.[19]

Patient perception of provider influence

Patients' perception of the influence providers' counseling had on their decision-making**,** as opposed to just the receipt of counseling, was associated with method choice. In the cohort study of young women presenting to Planned Parenthood clinics in the Bay Area, over half of the sample reported choosing the method they did because of what their provider told them.[31] In models controlling for socio-demographic and reproductive characteristics, women who initiated the vaginal ring (coefficient: 1.5; p value <0.001) or the patch (coefficient: 0.5; p value: 0.001) were more likely than women who chose the pill to report that they chose their method due to provider counseling. This study also examined patients' level of trust in their provider as a predictor of contraceptive method choice. No association was found in unadjusted or adjusted models (p=0.89).

Intervention studies

Four of the contraceptive education and counseling studies were experimental in nature and examined the impact of a specific counseling or educational intervention. The first three studies involved education and counseling provided in the clinical setting.[28–30] Two of these studies used randomized controlled trials and one was a comparison group design. One intervention involved the provision of a brief educational script about long-acting contraceptive methods, while the other two were longer structured, standardized contraceptive counseling sessions. Interventions were tested in different study populations including, postpartum patients at a private hospital, women seeking a first trimester procedure for a spontaneous or induced abortion, and women from academic and community clinical settings seeking to start a new reversible contraceptive method. Study populations also varied in terms of race and geographic location. In all 3 studies, the counseling interventions were tested against usual care. Usual care involved some degree of education and counseling in two studies, and there were no standard procedures for counseling in the other. All studies hypothesized that exposure to the intervention would increase use of more effective methods, but no association between the intervention and contraceptive choice was found in any study. The comparability of the studies is limited due to differing counseling models and samples.

Only one study assessed counseling provided outside of the initial clinical visit and method choice.[32] In this randomized controlled trial, teens from a racially diverse, low-income clinic were randomized to receive either regular clinic services or regular clinic services plus nine follow-up counseling phone calls over 12 months. Phone calls utilized motivational interviewing, which is a directive, client-centered counseling style designed to elicit behavior change by helping clients explore and resolve ambivalence. No association was found between phone calls and use of hormonal contraception (pill, ring, patch, injectable, IUD) at last sex. Authors attributed results partly to challenges with reaching participants by phone and completing counseling phone calls.

Cluster 2: Clinical setting of service delivery

Three studies examined the association between the clinical setting of service delivery and contraceptive method choice.[12,31,33] Results were mixed. Two studies examined differences in women's method choice depending on whether the woman was seen in private or publically-funded setting.[12,33] Using data from the National Survey of Family Growth, Boardman et al. analyzed the association between insurance status and clinical setting and method choice among sexually active, reproductive-aged women at risk of unintended pregnancy.[33] In models adjusting for potential confounders and examining effect modifiers, authors noted an association between clinical setting and use of long-acting methods among women of low parity (1 child), however results were not statistically significant. Privately insured women seen in a clinic were more likely (ROR: 1.6; 95% CI: 0.7, 3.4) to use long-acting contraception (sterilization, IUDs, implant and injectable) than pills compared to their privately insured counterparts seen in private offices. Authors attributed the insignificant results to small sample size rather than a lack of association between clinical setting and method choice. However, Frost and colleagues, using a different nationally-representative sample of reproductive-aged women, found no significant differences in method choice between women seen in private doctors' offices and women seen in clinics in multivariate models. At the bivariate level, however, women seen in clinics (23%) had a significantly higher proportion of long-acting contraceptive use than women seen in private doctors' offices (17%) or women with no health care visit in the past two years (7%) ($p<0.05$).

In their cohort study of provider influence on contraceptive choice, Harper et al. demonstrated a relationship between clinical setting and method choice. Authors found that after adjusting for socio-demographic and reproductive variables women who chose the ring and patch were significantly more likely ($p<0.001$) to come from specific clinical sites.[31] All clinics were Planned Parenthoods that served low-income patient populations, but were located in different cities in the same geographic region.

Cluster 3: Patient financial burden

Only one study examined a practice or policy related to the financing of care.[34] Specifically, this study examined the impact of the removal of patient financial burden on contraceptive choice. In this study, participants were recruited from a major, metropolitan area, and the majority of participants were between 18-25, white or black, had children, had more than 5 sexual partners, and either received public assistance or had trouble paying for basic needs. Using a prospective cohort design, authors assessed the impact of 1) improving knowledge of long-acting reversible contraceptives (LARC) through brief education and counseling, and 2) providing no-cost contraception on participants' contraceptive method choice. In this study, authors were particularly interested in assessing if providing no-cost contraception and LARC education would lead women to choose LARC methods, which, at the time of this study, had high upfront costs and less commonly used in the US than other methods.[35,36] 67% of participants chose long-acting reversible contraceptives, which authors explained was much greater than expected given that less than 3% of women use LARCs in the US. Authors attributed the high use of LARC methods in the study in part to the removal of financial barriers for patients as well as the counseling and education provided to women about long-acting contraceptive methods. However, study findings should be considered in light of the limitations, which include use of a convenience sample, inability to isolate impact of the removal of financial barriers from the provision of LARC education, and the lack of an appropriate comparison group (e.g. women who did not receive no-cost contraception).

Cluster 4: Service Delivery Integration

Three studies in this review examined integrated service delivery models and contraceptive choice.[37–39] An integrated clinical and social services program for low-income postpartum teens, a school-based health center (SBHC) at a public school in a major metropolitan area, and a program that combined STD and contraceptive services model were studied. Service delivery models that emphasize integration and/or bundling of services with contraceptive care appeared to have an impact on method choice. For example, in a randomized controlled trial, Shlay and colleagues examined the integration of contraceptive care services into an public STD clinic through use of an intervention that provided STD clinic-initiated contraceptive care followed by facilitated referral to a primary care provider (PCP). The study site was an urban STD clinic, and the majority of participants was Hispanic or African American, less than 24 years, unmarried, and achieved no more than a high school diploma/GED. Compared to the control group, which only received a referral list of PCPs, those who received the intervention had higher rates of effective contraceptive use (pill, injectable, implants IUD, spermicide with condom, male or female sterilization) at both 4-month (50% vs. 22%, $p<0.0001$) and 8-month (44% vs. 26%, $p<0.0001$) follow-ups.

Patchen and colleagues examined the impact of a program that integrated family planning clinical services and social services on contraceptive utilization among teens with a recent birth

in Washington, DC. Authors found that at the 6- and 24-month follow-up 80% and 57% of teens, respectively, were using long-acting reversible contraception (injectable or IUD). Although study findings should be considered in terms of the study's extremely weak one group time series design, authors concluded that an integrated clinical model that responds to the social and behavioral elements of teenager's lives may be especially important for contraceptive use in postpartum teens.

Cluster 5: Type of clinical visit

Two of the included studies found an association between having certain type of clinical visits and contraceptive method choice.[22,26] Specifically, an annual Pap smear visit and having a 6-week postpartum visit was examined. Using data from the National Survey of Family Growth, Callegari and colleagues examined the association between an annual Pap smear and method choice among obese women aged 20-44. In models adjusted for demographic, reproductive and health services characteristics, authors found that women who had an annual Pap smear were less likely to be using barrier (diaphragm, foam, jelly, sponge, other) (aRR: 0.5 95% CI: 0.2, 0.8) or behavioral (withdrawal or fertility awareness methods) methods (aRR: 0.5; 95% CI: 0.3-1.0) compared to prescription contraception (pill, patch, ring, injection, implant or IUD). Annual Pap smears were common practice in the US at the time the data collected although they are not recommended by current guidelines.

In a sample of teens 15-19 in 33 reporting areas of the Pregnancy Risk Assessment Monitoring Survey, Wilson et al. examined the association of postpartum check-ups with method choice. In models controlling for socio-demographic and other pregnancy- and delivery-related characteristics, receipt of a 6-week postpartum checkup was significantly associated with greater use of medium-acting contraceptives (injectable, ring, patch) (predicted probabilities: 26% vs 12%, $p<0.001$) and a decreased likelihood of relying on condoms (13% vs 24%, $p <0.01$). However, no association between postpartum checkup and use of pills (31% vs 23%) or IUDs (13% vs 9%) was found.

Cluster 6: Computer-based assessment modules

Two studies included in this review examined the impact of a computer-based assessment module on contraceptive choice.[6,40] Both studies were experimental in nature, and the assessment modules were used in clinical settings. Although both modules involved education and counseling, a separate category was created for these because the education and counseling were not delivered via interaction with a health care provider. Both studies found that the computer-based modules improved method choice, which referred to greater use of highly effective methods and dual method use. For example, Garbers and colleagues used a randomized controlled trial to determine the impact of a computer-based contraceptive assessment module on contraceptive method choice. This study was conducted in urban family planning clinics in New York City that served predominately low income, foreign-born Latinas. Using patient responses to a series of questions, this module served as contraceptive method selector, which used an algorithm that accounted for patient preferences, medical, obstetric, gynecological and contraceptive history, and sexual risk factors. The RCT included 3 arms: 1) use of the computer assessment module plus printed tailored educational material listing methods that were a best fit given responses to the module, 2) use of module plus generic educational handout listing available contraceptive methods, and 3) a control condition of use of tablet to answer basic demographic questions plus generic educational handout. Authors found that users of the

assessment module, whether in Arm 1 or Arm 2 of the study, were more likely to choose methods with the highest effectiveness in pregnancy prevention (male and female sterilization, IUD, or implant) than those in the control group (tailored; 22%, generic 24%, control 15%, $p< 0.001$). Tailored health materials (Arm 1) were found to be no more effective than generic materials (Arm 2) in affecting contraceptive choice.

Commentary

As previously stated, the purpose of this review was to determine the health care system-level factors associated with women's contraceptive method choice in the United States. Although individual-level and intrapersonal level factors, such as socio-demographic and partnership characteristics, have been shown to be strong predictors of women's method choice, the influence of the factors related to the healthcare system level undoubtedly shape women's choice. Given that the most commonly used and most effective methods require a prescription and/or an interaction with a health care provider in the US, this review sought to elucidate the aspects of the health care system and potentially the mechanisms in which the system influences women's method choice. We found a range of factors have been shown to be associated with method choice such as the provision of services from health care providers, educational interventions in the clinical setting, the arrangement and integration of services, and the clinical setting in which care is delivered.

The majority of studies in this review examined the potential association between contraceptive counseling and education by a health care provider and method choice. This is not surprising given that, in 1996, contraceptive counseling was recommended by the United States' Preventive Services Taskforce (USPSTF) as a way to prevent unintended pregnancy.[41] However, in 2002, the USPSTF withdrew this recommendation due to "insufficient evidence supporting the efficacy of contraceptive counseling in changing contraceptive behavior and improving health outcomes".[42] As documented by this review, several studies have examined contraceptive counseling and method choice since then. It is challenging to come to an overall conclusion regarding an possible impacts of contraceptive counseling because the studies vary greatly in terms of study population (e.g. young women seeking abortion, postpartum teens, etc.), content/type of counseling given (e.g. brief educational script about certain methods, theory-based structured counseling, etc.), and categorization of the method choice outcome (e.g. use of prescription methods, use of "effective" methods, etc.). In addition, we found a discrepancy between the observational and intervention studies in this review, with several of the observational study designs showing an association between counseling and contraceptive choice while the intervention studies did not. Notably, the intervention studies used rigorous experimental and cohort designs. It is possible that the null effect found in these studies is because the interventions didn't provide any benefit beyond contraceptive counseling provided under usual circumstances. However, the effect of routine contraceptive counseling has not been fully established. Overall, the available evidence from the observational study designs show a relationship between counseling and education from a health care provider and women's method choice, but the abundance of cross-sectional studies examining the receipt of counseling limits causal inferences. Further, the lack of specificity on the type of counseling provided as well as the varying definitions of counseling limit our understanding of the impact of standard practice counseling.

Our findings suggest the content and type of counseling needed to influence method choice also remains unclear. The development of future counseling and educational interventions should consider incorporating the findings that personalization and/or tailoring as well as the

number of methods mentioned during counseling sessions can influence method choice. Furthermore, the finding that a brief educational-only intervention about LARC methods did not increase use of these methods should be investigated further. It is possible that education alone, without any form of counseling, may not be enough to influence method choice. The distinction between education and counseling warrants greater attention and should be teased apart. It is also important to note that subgroup differences were found in the relationship between contraceptive counseling and method choice. For example, one study found that a woman's overall health status influenced the relationship between contraceptive counseling and method choice. This suggests that, in order to have an impact, counseling interventions may need to be tailored for certain subgroups.

Because providers can have a strong impact on their patient's decision-making, it was surprising that only one study examined patients' perception of the influence that their health care provider had on their contraceptive method choice. A recent survey of contraceptive care providers documented the practices they use to counsel their patients, but it remains unclear whether patients report experiencing these same practices.[43] Additional research is needed in this area. This information can be used to develop new and refine older contraceptive counseling models. In addition, the finding that greater provider influence on decision-making was associated with the choice of newer contraceptive methods is significant. This finding suggests the integration of new methods into clinical settings may hinge upon providers making patients aware of newer methods and providing them with contraceptive options that might meet their needs. The role of providers may be particularly important for the uptake of long-acting reversible contraceptives (LARCs). LARCs, which include intrauterine contraceptives and subdermal implants, are highly effective, safe, and cost-effective, but are used by a relatively small proportion of women in the US. Considerable effort has been made to increase uptake of LARCs. Our findings highlight the important role that health care providers can play in education and offering their patients these methods.

Several studies in the review found that clinical setting of service delivery influences method choice. In the included studies, this finding was significant in multivariate models controlling for characteristics of the patient population. One possible reason for this finding is that public and private providers have differences in the provision of contraceptive care, including topics covered in contraceptive counseling and service protocols.[43] For example, compared to other types of clinics, clinics that receive Title X funding are more likely to have dispensing protocols that make it easier to initiate a method.[24] Additional research is needed to determine what aspects of clinical setting influences women's method choice. In their paper examining clinical setting, Harper and colleagues postulated that clinic site might reflect differences in counseling practices, methods favored, or even which ones are offered, but this was not tested. It is also possible that provider norms and attitudes vary between clinic sites and that these provider attitudes ultimately influence method choice. Notably, minimal information was found in the current literature on characteristics of the health care provider other than if they are public or private providers. This may be important to investigate as characteristics of the provider may strongly influence the advice women receive about birth control methods. In a study where physicians were asked to recommend a contraceptive method for standardized patients seeking contraception (in a video), provider characteristics were associated with the method recommended (i.e. providers with different characteristics made different recommendations for the same patient).[44] However, this has not been examined in relation to women's actual method choice.

Our findings that integrated health care models and certain types of clinical visits are associated with women's method choice highlight the importance of access to care. The two clinical visits examined in our review, postpartum check-ups and annual Pap smear visits, likely serve as markers of women's overall health care access and engagement with the health care system. Thus, we found that women with greater access were more likely to be using prescription and more effective methods of contraception. Our findings suggest that these two visit types may be important intervention points for providing contraceptive services. Integrated service delivery models similarly represented increased access to contraceptive care. Our finding that integrated and bundled service delivery models influenced method choice demonstrates the importance of creating opportunities for women to access contraceptive care services. Future interventions intended to influence women's contraceptive method choice may find success in non-traditional settings that capture women wishing to avoid pregnancy and in need of contraception.

It is worth highlighting that the two studies that examined the impact of computer-based assessment modules in the clinical setting on contraceptive choice both found a significant relationship. Garbers' et al. finding that a computerized contraceptive assessment module was associated with use of more effective contraceptive methods is especially important. Computer-based interventions might be a particularly timely avenue to explore given today's health care delivery climate. Currently, health care delivery is characterized by an increasing emphasis on efficiency and limiting costs, increasing administrative requirements, mounting pressures on provider time and limited face-to-face time, all of which can make it challenging to provide patient-centered contraceptive services. Computer-based interventions that patients can use independently or in concert with a provider may be a way to improve contraceptive choice while increasing efficiency. Further, in light of the time constraints in clinical settings, computer-based interventions may allow patients to go at their own pace and obtain the specific information they desire, thus providing a more patient-centered experience. Additional research with a variety of populations and clinical settings is needed to examine the potential of non-provider educational and decision-making interventions to influence contraceptive choice.

A final important point is that substantial gaps in our knowledge about health system-level factors that can impact dual method contraceptive use remain. Only one study in this review examined dual use as a type of method choice outcome. The concept of dual method of contraception involves the use of both a method that is effective at pregnancy prevention and a method that is effective at prevention of STIs. Existing data indicate that dual method use is currently not the norm, but has been increasing.[45] It may be important for future studies to include the option of dual method use as a contraceptive method choice outcome.

Strengths of this literature synthesis include the novelty of the review topic and the use of systematic search strategies to identify relevant studies. There are also a number of limitations to consider. First, our review did not examine studies that utilized qualitative methodologies. It is likely that the qualitative literature provides important information on the ways in which the health care system influences women's contraceptive method choice, and future research is needed to synthesize the qualitative and quantitative bodies of literature. Another limitation of this review is the limited time frame of included studies. While we believe it was important to focus on contemporary contraceptive methods, there are likely studies prior to 2002 that can provide important information on aspects of the health system that can influence women's contraceptive method choice. These papers were not included here. Finally, our review did not prioritize the findings of studies of higher quality. Studies all of levels of quality were included

in an effort to be comprehensive. However, comments on the quality of studies were noted in the review when relevant.

In summary, this literature review demonstrates that the health care system influences women's contraceptive method choice in the US in a variety of ways. We were able to categorize the system-level influences into six thematic clusters. Future clinical interventions to improve contraceptive method choice and contraceptive use overall as well as future theoretical models of choice behavior should consider these dimensions.

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Table 1.

Description of included studies: study objectives and methodology, sample description and outcome definition

Authors/year	Purpose and Method	Sample description and setting	Method Choice Definition
THEMATIC CLUSTER 1: Patient Education or Counseling			
Harper et al.; 2010	To identify provider factors that are associated with selection of hormonal contraceptive methods by young women at high risk of unintended pregnancy, in the context of two newly available methods: the vaginal ring and the transdermal patch. Cohort study (n=1387)	Young women 15-24 at Planned Parenthood clinic sites in low-income communities outside of San Francisco	Contraceptive method initiated following visit: 1) ring, 2) patch 3) pill 4) injectable Multinomial outcome Study only included women choosing these methods; participants must have been using their method for the first time ever
Callegari et al.; 2014	To identify the demographic, reproductive and health service factors associated with contraceptive nonuse and use of less effective methods among obese women in the US. Health service factors included reporting discussing contraception with a clinician (defined as having received contraceptive counseling or having had a visit related to contraception in the past year) and having had a Pap smear in the past year (surrogate measure for access to preventive health services) Secondary data analysis of National Survey of Family Growth, 2006-2010 (n=1,345)	Sexually active obese women aged 20-44	Current contraceptive use: most effective method used in the month of the interview. Categories: 1. prescription methods (pill, patch, ring, injectable, IUD, implant) 2. behavioral methods (withdrawal or fertility awareness) 3. barrier methods (diaphragm, foam jelly, sponge, other) 4. nonuse Multinomial outcome
Hernandez et al.; 2012	To examine the association between family planning counseling during prenatal care visits and the use of	Women with a recent live birth in the state of Florida who were not	Current use of effective postpartum contraceptive

Authors/year	Purpose and Method	Sample description and setting	Method Choice Definition
	effective contraceptive methods among postpartum women Secondary data analysis using the Florida Pregnancy Risk Assessment Monitoring System 2004–2005 (n=4,036)	pregnant and did not want to be pregnant	(methods that are at least 80% effective according to the FDA-female and male sterilization, IUDs, injectable, pills, patch, condom, diaphragm, or vaginal contraceptive) Dichotomous outcome Yes= Use of the above methods No= No use of specified methods or no method use
Kirby et al.; 2010	To evaluate whether follow-up phone calls to address young women's concerns can improve RCT (n=805)	Females aged 14–18 attending a reproductive health clinic in San Francisco. Clinic serves a racially diverse, low-income population from surrounding communities	Hormonal contraceptive use at last sex Dichotomous outcome Yes= Use of pill, ring, injectable, IUD No=Use of nonhormonal method
Langston et al.; 2010	To evaluate the addition of structured contraceptive counseling to usual care on choice, initiation, and continuation of very effective contraception after uterine aspiration. RCT (n=222); Women were randomized women to usual care or usual care with structured counseling.	Women referred from a family planning referral clinic to a private practice setting serving a predominately Hispanic (Dominican) population with Medicaid coverage in New York City.	Choice of very effective contraceptive method (sterilization, IUDs, and implants) following visit Dichotomous variable Yes= Use of sterilization, IUD, implant No= use of pills, rings, patches, injections, condoms, withdrawal, periodic abstinence and no method
Lee et al.; 2011	To evaluate the association between contraceptive counseling provided by primary care physicians and patients' contraceptive use. Cross-sectional study following clinical visit (n=770)	Women aged 18–50 years who visited one of four primary care clinics in western Pennsylvania	Contraceptive use at last sex: 1) use of any reversible contraceptive method (condom, diaphragm, pills, patch, ring, injectable, implant or IUDs) 2) use of hormonal methods (pills, patch, ring, or injection)

Authors/year	Purpose and Method	Sample description and setting	Method Choice Definition
			3) use of highly effective reversible methods (IUDs or implant) 3 Dichotomous outcomes Yes= see above No= no method use or no use of specified methods
Madden et al.; 2013	To compare contraceptive methods selected between clinic site that offered structured contraceptive counseling to patients and community partner clinics where "usual" counseling was given Cohort study (n=1,107)	Women 14–45 years in St. Louis City or County who wanted to start a new reversible contraceptive method.	Type of contraceptive initiated 1. Long-Acting Reversible Contraceptive (LARC)- IUD, implant 2. Other- Injectable, Pills, Ring, Patch, Diaphragm, Fertility Awareness Dichotomous outcome (Other methods not chosen; all women included started a method)
Wilson et al. 2013	To describe postpartum contraceptive use among adolescent mothers and assess the hypothesis that receipt of prenatal contraceptive counseling or a postpartum checkup is associated with the use of more effective methods. Secondary data analysis of PRAMS (n=3,207)	Women with a recent live birth in seven states and the city of New York for the years 2006–2008.	Current method use 1) no method, having sex 2) no method, not having sex 3) condom, withdrawal, other 4) pills 5) injectable, ring, patch 6) IUD, implant, sterilization Multinomial outcome
Tang et al.; 2014	To evaluate if a postpartum educational script about LARC (LARC script) could increase postpartum LARC utilization at the 6-week postpartum visit. RCT (n=800)	Women 14-15 admitted to the postpartum unit of large nonprofit hospital in North Carolina	Use of LARC (IUD or implant) following 6 week postpartum visit Dichotomous outcome Yes= Use of IUD or Implant No= Use of other methods or no use

Authors/year	Purpose and Method	Sample description and setting	Method Choice Definition
Weisman et al.; 2002	To test the hypothesis that adult women who receive contraceptive counseling in their managed care plans, compared with women who do not receive counseling, have more positive contraceptive attitudes and are more likely to use contraception if at risk of unintended pregnancy Cross-sectional telephone survey (n=898)	Women 18 to 44 enrolled in a managed care plan in Michigan	Current method use: 1. Prescription methods (pills, diaphragm, IUD, Depo-Provera, Norplant) 2. Nonprescription method (condoms, rhythm, withdrawal, foam, jelly, or cream, diaphragm) or no method Dichotomous outcome
Lee et al.; 2013	To explore associations between health status, contraceptive counseling and contraceptive use. Cross-sectional study following clinical visit (n=977)	Women aged 18–50 years who visited one of four primary care clinics in western Pennsylvania	Contraceptive use at last sex: 1) use of any reversible contraceptive method (condom, diaphragm, pills, patch, ring, injectable, implant or IUDs) 2) use of hormonal methods (pills, patch, ring, or injection) 3) use of highly effective reversible methods (IUDs or implant) 3 Dichotomous outcomes Yes= see above No= no method use or no use of specified methods
CLUSTER 2: Clinical Setting of Service Delivery			
Boardman et al.; 2004	To measure the effect of the context of care (defined as a combination of a woman's insurance status type of clinical setting in which she received health care) on the use of contraceptive methods Secondary data analysis of women in the 1995 National Survey of Family Growth (n=4,358)	Nationally representative; Women aged 15-44 at risk for unintended pregnancy, and had a healthcare visit in past 12 months	Current contraceptive use with contraceptive methods categorized by length of contraceptive efficacy and ease of reversibility: 1. Long-acting forms: male or female sterilization, IUD, Norplant, and Depo-Provera 2. Pills 3. Barrier methods (male and female condoms, sponge,

Authors/year	Purpose and Method	Sample description and setting	Method Choice Definition
			diaphragm, cervical cap and spermicide) 4. Periodic abstinence (rhythm method, natural family planning or withdrawal) Multinomial outcome The method requiring the least maintenance on the part of the patient was chosen as the dominant method for the analysis.
Frost et al.; 2008	To examine factors associated with contraceptive choice and inconsistent use of the pill and condoms Cross-sectional telephone survey (n=1,978)	Nationally representative sample of women aged 18–44 using reversible contraceptive methods	Current contraceptive use (use of method in the month preceding the interview). Women reporting use of more than one method were classified according to their most effective method 1. long-acting methods/most effective methods (IUD, implant, injectable, ring and patch) 2. pills 3. male condoms 4. Other (withdrawal, periodic abstinence, spermicides and other barrier methods) 4 Dichotomous outcomes (only among method users) Yes= Use of specified method(s) in each category No= Use of a different method
Harper et al.; 2010 (see cluster 1)			
CLUSTER 3: Patient Financial Burden			
Secura et al.; 2010	To describe baseline contraceptive method choice and the demographic, reproductive and behavioral	Women who want to avoid pregnancy for at least 1 year and are initiating a	Type of contraceptive initiated at end of visit

Authors/year	Purpose and Method	Sample description and setting	Method Choice Definition
	characteristics of a study where women are read a script regarding long-acting reversible methods of contraception to increase awareness of these options. Participants choose their contraceptive method that is provided at no cost. Analysis of the baseline data (cross-sectional) of a prospective longer cohort study (n=2,500)	new form of reversible contraception. Women 14-45 years in St. Louis region	1. Long-Acting Reversible Contraceptive (LARC)- IUD, implant 2. Other- Depo, Pills, Ring, Patch, Diaphragm (Other methods not chosen; all women included started a method) Dichotomous outcome
CLUSTER 4: Service Delivery Integration			
Shlay et al.; 2003	To determine the effectiveness of STD clinic-initiated contraceptive care followed by facilitated referral to a primary care provider (PCP) for improvement in establishing contact with a PCP, improvement in initiation of and ongoing adherence with an effective method of contraception, and decreasing the rate of unintended pregnancy. RCT (n=877); Both groups received condoms with spermicide and a referral list of primary care providers for ongoing reproductive health care, and the intervention group also received enhanced contraceptive counseling, initial provision of contraception, and facilitated referral to a PCP.	Nonpregnant women seen at urban STD clinic in CO; women were using no contraception or less effective method	Use of effective contraception (pills, injectable, implant, IUD, spermicide with condoms, male or female sterilization) Dichotomous outcome Yes=use of one of these methods at 75% of sexual acts or sexual abstinence No= Use of one of these methods less than 75% of the time; no use
Patchen et al.; 2013	To determine the impact of an integrated clinical services program for teen mothers on unintended subsequent pregnancy and contraceptive utilization One group, time series design/cohort study(n=235)	Postpartum teens ages 12-18 from a hospital and community-based health center in Washington DC.	Use of long-acting reversible contraception, Depo or IUD, at 6, 12, 18, and 24 months after delivery. Dichotomous outcome 1= Use of Depo-Provera or IUD 2= Use of pills, patch, ring, condoms, abstinence (if identified by method as participant), or nothing

Authors/year	Purpose and Method	Sample description and setting	Method Choice Definition
Ethier et al.; 2011	To examine whether students will differ in their receipt of reproductive health care and use of contraception depending on whether they have access to a school-based health center Quasi-experimental intervention study with random sampling/Cohort study (n=5,930)	15-19 year old students in 12 from urban high schools selected from areas with high rates of teen birth and STDs (Los Angeles)	Use of hormonal contraception at last sex Dichotomous outcome Yes= pills, patch, ring, shots No= use of other methods or no method use
CLUSTER 5: Type of Clinical Visit			
Wilson et al.; 2013 (see cluster 1)			
Callegari et al.; 2014 (see cluster 1)			
CLUSTER 6: Computer-based assessment modules			
Garbers et al.; 2012	To determine the effectiveness of an intervention (computer-based contraceptive assessment module) on increasing the proportion of patients choosing an effective method of contraception RCT Arm I: use of contraceptive assessment module + printed tailored educational materials based on response to assessment questions Arm II: use of module + printed generic educational material Arm III: Control-- no module and generic handout (n=2448)	English- or Spanish-speaking women 16+ at publicly funded family planning centers in New York City; predominately Hispanic	Effectiveness of the contraceptive method chosen at the time of the visit 1. Effective methods: male and female sterilization, implants, IUDs, injectable, pills, ring and patch 2. Less effective: male and female condoms, diaphragm, sponge, spermicide, abstinence withdrawal or no method Dichotomous outcome Also examined secondary categorical outcome in chi-square test: 1. Tier 1 effectiveness (female and male sterilization, implants, IUDs 2. Tier 2 (injectable, pills, ring, patch)

Authors/year	Purpose and Method	Sample description and setting	Method Choice Definition
			3. Tier 3 (male and female condom, diaphragm, periodic abstinence) 4. Tier 4 (withdrawal, spermicide)
Peipert et al.; 2008	To determine whether a trans theoretical model–tailored expert system intervention increases dual-method contraceptive use, compared with a nontailored educational intervention. RCT; Intervention group received computer-based tailored feedback using a multimedia program, while the control group received general contraceptive information and nontailored advice (n=542)	English speaking women ages 13 and 35 at high risk for unintended pregnancy or STI; Rhode Island.	Contraceptive use at 24-month follow-up 1. use of hormonal contraception plus barrier method 2. male condoms plus female condoms 3. condoms plus spermicide 4. IUD or sterilization plus barrier method Dichotomous outcome Yes= Any dual method use (any one of the above 4 combinations) No= Not reporting one of the 4 combinations including no method use

Table 2.

Study findings and quality considerations

Authors/year	Key Findings (Multivariate results reported unless noted)	Quality Considerations
THEMATIC CLUSTER 1: Patient Education or Counseling		
Harper et al.; 2010	Over half (51%) reported that they chose they method because of what the provider told them. Ring and patch initiators were significantly more likely than pill initiators to report that they chose their method due to what the provider said ($p \leq 0.001$). The greater the number of hormonal study methods that women reported were discussed by the provider in counseling, the less likely the women was to select DMPA ($p=0.004$). The Provider Trust scale was not associated with a specific method initiated. Significant differences in method initiated existed by clinic site. Compared to pill users, patch ($p<.05$) and DMPA ($p<0.01$) users more likely to come from certain clinical sites.	Strengths - examination of multiple clinic sites - comprehensive set of provider factors examined - large sample size Weaknesses - reliance on self-report data on patient-provider interaction - cross-sectional data limits causal inferences - likely underpowered to detect clinical site differences
Callegari et al.; 2014	Behavioral (aRR: 0.1; 95% CI: 0.1, 0.3) and barrier method (aRR: 0.2; 95% CI: 0.1, 0.3) users were less likely to report discussing contraception with a health care provider than women using pills. Women who had an annual Pap smear were less likely to be using barrier (aRR: 0.5 95% CI: 0.2, 0.8) or behavioral methods (aRR: 0.5; 95% CI: 0.3-1.0) compared to prescription contraception.	Strengths - nationally representative sample; high generalizability - low percentage missing data - use of survey with extensive and thorough information on reproductive outcomes and outcomes Weaknesses - self-report data on BMI - cross sectional data; no inferences of causality
Hernandez et al.; 2012	Women who had prenatal contraception counseling had significantly higher odds of using effective postpartum contraception (aOR: 1.47; 95% CI: 1.10-1.96) Women with lower levels of education and received prenatal counseling experienced higher odds of using an effective method (aOR: 2.5; 95% CI: 1.3, 5.1), than women with the same level of education but no prenatal counseling.	Strengths - large sample size - population-based sample; high generalizability Weaknesses - potential recall bias - self-report data for outcome - cross-sectional data limits causal inferences

Authors/year	Key Findings (Multivariate results reported unless noted)	Quality Considerations
Kirby et al.; 2010	Although contraceptive use increased from baseline to follow-up at six months in both groups, levels of hormonal contraceptive use did not differ between the intervention and control groups at any of the follow-up assessments (mean frequency of hormonal contraceptive use at 6-month follow-up intervention: 2.76 vs control: 2.85).	Strengths - power calculation conducted for sample size; adequately powered to detect differences - sensitivity analyses conducted to determine if results were due to categorization of outcome - strong internal validity; randomization Weaknesses - self-report data on contraceptive use - examination of one clinic site
Langston et al.; 2010	54% of all participants chose a very effective method. Women in the intervention group were no more likely to choose a very effective method (OR 0.74, 95% CI 0.44, 1.26) or to initiate their method compared to the usual care group (OR 0.65, 95% CI 0.31, 1.34).	Strengths - RCT with high internal validity - adequately powered to detect differences in method choice - use of theory-based intervention Weaknesses - limited generalizability due to specialized providers and specific ethnic demographic - providers not blinded to treatment groups
Lee et al.; 2011	Among those in need of contraceptive counseling, those who received contraceptive counseling from a primary care provider were more likely to report use of hormonal contraception when they last had sex (aOR: 2.68, 95% CI: 1.48–4.87). Association was not seen for use of reversible or highly effective methods. Counseling regarding specific types of contraception was associated with an increased use of those methods (e.g. counseling about hormonal contraception was associated with use of hormonal methods) (aOR: 4.78; 95% CI: 2.51, 9.12).	Strengths - large sample size - diverse sample in terms of insurance type - compared self-report data to medical record data Weaknesses - low response rate - potential recall bias - observational design - unclear is last intercourse happened before or after index clinic visit; threat to internal validity

Authors/year	**Key Findings** (Multivariate results reported unless noted)	**Quality Considerations**
Madden et al.; 2013	Uptake of long-acting reversible contraception was high at both the university site and partner clinics (72% and 78%, respectively, p<.0001). However, uptake of the intrauterine device was higher at the university site (58% compared to 43%, p<.0001) and uptake of the sub dermal implant was higher at partner clinics (35% versus 14%, p<.0001). After adjusting for confounders, we found no difference in the uptake of long-acting reversible contraception between women counseled at the university site compared to partner clinics (adjusted relative risk=0.98, 95% confidence interval [0.94, 1.02]).	Strengths - large sample size - use of theory-based counseling intervention Weaknesses - quasi-experimental design; no randomization - no standard for "usual care" counseling
Wilson et al. 2013	Multivariate: Receipt of prenatal contraceptive counseling and receipt of a postpartum checkup were both associated with contraceptive method used. Compared with receiving no prenatal contraceptive counseling, receipt of counseling was associated with an increased likelihood of using pills (predicated probabilities: 32% vs 22%). Receipt of a postpartum checkup was associated with an increased likelihood of using medium-acting contraceptives (injectable, ring, patch) (26% vs 12%).	Strengths - large sample size- - population-based data from multiple states; high generalizability Weaknesses - cross sectional data; no information on causality - self report information on counseling and postpartum visit; potential recall bias - potential selection bias- those who had postpartum visits likely very different that those who did not; strong possibility of unmeasured confounding
Tang et al.; 2014	Administration of LARC script to postpartum women did not significantly increase LARC use. LARC use was reported by 17.6% and 13.3% of women in the intervention and control arms, respectively (RR 1.3; 95% CI 0.9-1.9; p=.103).	Strengths - RCT; strong internal validity - large sample size - blinded follow up - low loss to follow up - scales were standardized and assessed for validity - power calculation for sample size; adequately powered - sensitivity analyses conducted Weaknesses - follow up data collection occurred at different times - limited generalizability of sample

Authors/year	Key Findings (Multivariate results reported unless noted)	Quality Considerations
Weisman et al.; 2002	Personalized counseling significantly increased the odds of use of prescription contraception (AOR=3.68), but informational counseling alone did not.	Strengths - examined content of counseling - controlled for demographic and reproductive history characteristics - large sample size Weaknesses - cross-sectional design limits casual claims - no information on who provided counseling or how long it lasted - Self report of counseling information; potential recall bias
Lee et al.; 2013	Women in poorer health who had been counseled on hormonal methods were more likely to have used hormonal methods at last intercourse (AOR=8.22 95% CI 1.77-38.19). No association found between counseling on highly effective methods and use of highly effective methods for women in poorer health. Women in better health were more likely to use hormonal contraception (AOR=3.79; 95% CI 2.66-5.40) and highly effective reversible contraception (AOR=15.05 95%CI 7.67-29.61) if specifically counseled on these methods.	Strengths - diverse sample included both privately and publicly insured women in both academic and community-based primary care settings Weaknesses - self report counseling information; potential recall bias - low response rate - small sample size for women with poorer health
CLUSTER 2: Clinical Setting of Service Delivery		
Boardman et al.; 2004	Among women with only 1 child, privately insured women seen in a clinic were more likely (ROR: 1.6; 95% CI: 0.7, 3.4) to use long-acting contraception (sterilization, IUDs, implant and injectable) than pills compared to privately insured women seen in private offices. Privately insured women seen in clinics were less likely to use barrier contraception compared to women seen in private doctors' offices (ROR: 0.57; 95% CI: 0.41, 0.78).	Strengths - large nationally representative sample; high generalizability - use of survey with extensive and thorough information on reproductive outcomes and outcomes Weaknesses - cross sectional; no inferences about causality - self-report data
Frost et al.; 2008	Compared to women with a private doctor, women who had not had a health care visit in the past 2 years were less likely to be using long-acting methods (aOR=0.3), pills (0.1) and more likely to be using condoms (4.7).	Strengths - large, nationally representative sample; high generalizability - detailed data on contraceptive behavior

Authors/year	Key Findings (Multivariate results reported unless noted)	Quality Considerations
	No significant differences in method choice between women seen in private doctors' offices and women seen in clinics. At the bivariate level, women seen in clinics (23%) had a significantly higher proportion of long-acting contraceptive use than women seen in private doctors' offices (17%) or women with no health care visit in the past two years (7%).	Weaknesses - cross sectional, retrospective data - potential for recall and nonresponse bias
Harper et al.; 2010 (see cluster 1)		
CLUSTER 3: Patient Financial Burden		
Secura et al.; 2010	Sixty-seven percent of women enrolled (95% confidence interval, 65.3–69.0) chose long-acting methods. Fifty-six percent selected intrauterine contraception and 11% selected the sub dermal implant. Other methods: 6% chose Depo, 27% chose combined hormonal methods (12% pills, 12% ring, and 3% patch).	Strengths - large sample size - diverse sample in terms of race/ethnicity, marital status, and SES= greater generalizability - use of standardized instruments and trained interviewers for data collection Weaknesses - observational design: Potential selection bias--women with interest in LARC enrolled in study - study design unable to isolate the impact of financial barriers - convenience sample
CLUSTER 4: Service Delivery Integration		
Shlay et al.; 2003	Rates of effective contraceptive use (ECU) were higher for the intervention group than for control group at the 4-month visit (50% vs 22%, P<.0001) as well as the 8-month visit (44% vs 26%, p<.0001) , although in the intervention group ECU diminished over the course of the study from 50% at the end of 4-month follow up to 33% at the 12 month visit.	Strengths -RCT with strong internal validity - large sample size Weaknesses - self report data on contraceptive use; potential recall bias - moderate loss to follow up

Authors/year	Key Findings (Multivariate results reported unless noted)	Quality Considerations
Patchen et al.; 2013	At 6 month follow up, 80.6% of participants reported using long acting reversible contraception. At 24 months after delivery, 57.1% of contraceptive users elected long-acting reversible contraception.	Strengths - intervention based in theory - use of medical records for contraceptive use data Weaknesses - no comparison group - completely descriptive - no baseline measurement - substantial loss to follow up
Ethier et al.; 2011	Access to an SBHC did not influence contraceptive use, either hormonal or condoms, for males. For females, however, those with access to an SBHC had increased odds of having used hormonal contraceptives at last sex (AOR = 1.68, 95% CI = 1.24–2.28).	Strengths - large sample and representative of student population - use of random sampling - quasi-experimental design Weaknesses - low response rate suggest issues with generalizability; however, study population did not differ from school population in terms of race, ethnicity, gender
CLUSTER 5: Type of Clinical Visit		
Wilson et al.; 2013 (see cluster 1)		
Callegari et al.; 2014 (see cluster 1)		
CLUSTER 6: Computer-based assessment modules		
Garbers et al.; 2012	In intent-to-treat analyses adjusted for recruitment site and using clinical-administrative data, family planning patients who used the module were significantly more likely to choose an effective contraceptive method: 75% among those who received tailored materials [odds ratio (OR)=1.56; 95% confidence interval (CI): 1.23–1.98] and 78% among those who received generic materials (OR=1.74; 95% CI: 1.35–2.25), compared to 65% among control arm participants.	Strengths - examined both self-report and clinical/administrative data for outcome; found similar results - RCT with strong internal validity - findings were similar in both intent-to-treat and as-treated analyses - sensitivity analyses conducted to assess missing

Authors/year	Key Findings (Multivariate results reported unless noted)	Quality Considerations
	In as-treated analyses using self-report and clinical data, module users were more likely to choose an effective method as well. 22% of those in the Intervention+Tailored arm and 24% of those in the Intervention+Generic arms chose a method in the top tier of effectiveness compared to only 15% in the control arm ($p<0.001$)	data information bias Weaknesses - generalizability limited to similar clinical settings with similar patient population - possible selection bias--those who did not complete participation were different in some ways than those who did - no blinding of providers
Peipert et al.; 2008	Participants in the intervention group were more likely to report use of dual contraceptive methods during follow-up (adjusted hazard rate ratio 1.70, 95% confidence interval 1.09, 2.66), compared with controls.	Strengths - RCT with strong internal validity Weaknesses - contact with participants differed between two arms -limited power to detect certain outcomes

Paper #2: Women's contraceptive decision-making: How well do women's preferences for certain contraceptive attributes align with the methods they use?

Abstract

Background: The extent to which women's contraceptive method choice is influenced by their assessment of the attributes of available methods is an understudied issue. Assisting women in choosing methods that are consistent with attributes that are important to them may increase correct and continuous method use. Objective: To assess the perceived importance of several contraceptive attributes by socio-demographic characteristics, and examine the association between importance of specific attributes and the contraceptive methods that women currently use. Methods: We used data from the 2009 National Survey of Reproductive and Contraceptive Knowledge, a sample of unmarried men and women ages 18-29 in the U.S. Bivariate and multivariate logistic regression analyses were used to examine the association between contraceptive attributes, socio-demographic characteristics and current contraceptive choice. Results: The vast majority of women felt it was extremely important that a method be very effective in preventing pregnancy when choosing a contraceptive method, while less than a quarter felt a hormone-free method was extremely important. Ever pregnant women were more likely than women without a previous pregnancy to report a preference for a hormone-free method and less likely to feel it was important that a method be very effective for pregnancy prevention. A preference for a method that was very effective in preventing pregnancy was not associated with use of the most effective methods. Women who believed it was important that a method didn't contain hormones were less likely to use hormonal methods and women who perceived STI protection to be important were more likely to use condoms, even after accounting for their preferences regarding a method's effectiveness. Conclusion: Women perceive a method's level of effectiveness in pregnancy prevention to be extremely important when choosing a method, but other attributes (e.g. STI protection) do influence method choice. Understanding how women's perceptions relate to method use can inform contraceptive counseling interventions.

Introduction

Despite the availability of a broad range of effective contraceptive methods, unintended pregnancy remains a significant public health problem in the United States.[1,2] Currently, half of all pregnancies are unintended with the highest rate among young women ages 18-24.[3] Efforts to curb unintended pregnancy have largely focused on increasing and improving contraceptive use among women.[4–6] Although virtually all sexually active women who do not wish to become pregnant have at some point used contraception, nonuse and inconsistent use of contraceptive in any given year is common.[7] In addition, dissatisfaction with contraceptive methods is high, with over 50% of female contraceptive users reporting they have discontinued a method due to dissatisfaction.[8] Importantly, method dissatisfaction has been associated with inconsistent contraceptive method use and frequent contraceptive method switching, both of which are linked

to a woman's risk of unintended pregnancy.[6] While there are many reasons that drive method dissatisfaction and discontinuation, such as financial barriers and access to care, one relatively overlooked reason may be a mismatch between the methods women use and the characteristics of methods that are important to them.[9–12]

Contraceptive methods vary in several ways, including efficacy for pregnancy prevention, routes of administration, frequency of required use, and side effects, among other things. Women desiring contraception often have preferences for and perceptions of these various characteristics or attributes of methods. Early research on contraceptive attributes assessed women's perceptions of attributes for specific methods (i.e. pills, diaphragm, condoms, etc.), and found that certain methods were perceived to be safer, more effective, and more convenient than others.[13] Researchers demonstrated that methods perceived has having more positive attributes were used by greater proportions of women.[13] More recent research has tried to gain a general sense of what attributes of contraceptive methods are important to women. These studies have revealed several contraceptive attributes that are important to women and are considered for method choice.[14–20] These include: a method's effectiveness in preventing pregnancy, side effect profile, ease of use or convenience, effects of menstrual periods, interference with sexual pleasure along with several other factors.[14,16,18–20] Some studies have found that contraceptive attribute preferences vary by socio-demographics such as age and race, however results have been inconsistent.[14,15,19]

While we are gaining a better understanding of what attributes are important to women in contraceptive methods, less is known about how women's preferences for specific attributes relate to their method choices. While a few recent studies have examined contraceptive attributes and their relation to contraceptive behavior, they have either included a limited number of attributes or did not examine associations with method choice.[20,21] To our knowledge only one study has explored how women's perceptions of several contraceptive attributes relate to their choice of a range of contraceptive methods.[22] In a sample of predominately black and white women from a major metropolitan area in the US, this study showed that women's preferences for certain attributes were associated with their method choice. For example, women who believed it was important that a method was long-lasting or forgettable were more likely to choose the IUD, implant, injectable, ring, or patch than pills.

Using a nationally-representative sample of young, unmarried women, our goal is to build upon this emerging evidence through the examination of two research objectives. First, we assess the relative importance women assign to several contraceptive attributes when choosing a method and determine if the importance of these attributes differ by socio-demographic characteristics. Second, we examine whether the importance women assigned to particular contraceptive attributes is associated with use of certain methods. For our second objective, we hypothesized that the methods women used would correspond to their ratings of importance for specific attributes. Specifically, we hypothesized that women who felt it was important that a method 1) be very effective, 2) doesn't contain hormones, or 3) protects from HIV/STIs would be associated with the corresponding types of methods (i.e. most effective methods, nonhormonal methods, and condoms, respectively).

Methodology

Sample and Data

We analyzed data from the 2009 National Survey of Reproductive and Contraceptive Knowledge (NSRCK), which was designed to assess a range of attitudes and behaviors regarding

pregnancy planning and contraception. Information was collected from 1800 unmarried 18 to 29 year old women and men in the United States. Sampling was conducted so that weighted results are nationally representative in terms of gender, age and race/ethnicity. Further details of the NSRKC sampling methodology can be found elsewhere.[23]

We excluded men (n=903), women who reported that they had never used a contraceptive method (n=165) and therefore not asked questions regarding the contraceptive attributes important for decision-making, respondents who replied "don't know" or refused to answer the question asking whether they have ever use contraception (n=3), and women who were missing data for one or more of seven contraceptive attribute questions (n=14; ~2%). Our final analytic sample consisted of the remaining 715 women. The contraceptive choice analyses were run on a subsample of this group, women reporting current method use. For these analyses, we excluded women who reported no contraceptive use in the past month (n=209) as women who reported contraceptive use in the last month but no sexual activity in the past year (n=3).

Measures

Dependent Variable(s): Current contraceptive choice

Current contraceptive choice refers to use of specific contraceptive methods in the past month. Women were asked if they ever used any of the FDA-approved contraceptive methods, withdrawal, natural family planning, or emergency contraception, and if so, she was then asked if she had used it in the past month. Responses for emergency contraception were not examined since it is not designed as a regularly used contraceptive method. Current contraceptive choice was categorized into 3 variables to test our hypotheses: 1) effectiveness for pregnancy prevention, 2) hormonal method use, and 3) STI protection.

- Effectiveness for pregnancy prevention was a 3-level ordinal variable, which classified methods from high to low effectiveness: Categories: 1) Most effective (Sterilization/IUD/Implant), 2) Highly effective (pill/vaginal ring/patch/injectable), and 3) Less effective (condoms, withdrawal, and natural family planning). Women reporting use of more than one method were coded as using the most effective method.
- Hormonal method use was a dichotomous variable examining whether or not a woman used a method that contained hormones. Women using IUDs were excluded from this particular analysis because the survey did not differentiate between hormonal and nonhormonal IUDs. Categories included: 1) Yes= use of pills, patch, ring, injectable, or implant, 2) No=use of all other methods.
- STI protection was a 3-level categorical variable: Categories: 1) Use of effective contraceptive method for pregnancy prevention (sterilization, IUD, implant, pill, patch, ring, injectable) PLUS condoms, 2) use of condoms alone, 3) Use of effective contraceptive method for pregnancy prevention alone (no condom use). Women using withdrawal and natural family planning (n=17) were excluded from this particular analysis because it was not clear if these women were using other methods as well.

Independent Variables: Contraceptive Attributes Important for Decision-Making

Respondents were asked "How important are each of the following characteristics to you in deciding which birth control method to use?". The 7 characteristics were "It is very effective

at preventing pregnancy"; "It has a low cost"; "It is easy to use"; "It doesn't contain hormones"; "It is acceptable to my partner"; "It doesn't interrupt sex"; "It is effective at preventing HIV or STDs". Responses for each characteristic were coded on a 4-point Likert scale with the options: Not at all Important, Slightly Important, Quite Important, and Extremely Important. For the bivariate and multivariate analyses, each attribute was dichotomized into Not at all/Slightly vs. Quite/Extremely Important due to small cell sizes for some categories.

Socio-demographic and reproductive characteristics

The following variables were included as covariates because they have been previously associated with women's contraceptive method choice in the US[7,8]: age [18-19/20-24/25-29], race/ethnicity [Non-Hispanic white/Non-Hispanic black/Hispanic/Asian, Other], health insurance status in the past year [Medicaid only/Medicaid and private/Private Insurance only/Other insurance/Uninsured], nativity [United States/Other], public assistance in the past year [y/n], in a current sexual relationship with a man [y/n], ever had a women's health care visit[y/n], and whether ever been pregnant [y/n]. Since a large proportion of our sample reported being in school at the time of the survey, we created a variable that combined school status and highest educational attainment: 1) Currently in school; 2) Not in school-high school graduate or less (level of education); and 3) Not in school-some college or higher.

Analyses

Univariate statistics were used to obtain the distribution of all 7 contraceptive preference variables at each level of importance, contraceptive method choice, and the socio-demographic variables. Because the attribute variables were on a Likert scale, a polychoric correlation matrix was run to examine the association between the contraceptive attribute variables.[24] Rao-Scott chi squared tests were used to assess the overall association between the socio-demographic variables and the contraceptive attributes as well as current method choice.

Bivariate and multivariate logistic regression was used to examine the association between contraceptive attributes and current method choice for each hypothesis. We removed women reporting use of "other" or unknown methods in the analyses testing our hypotheses as it was not clear what their method choice was. Adjusted models controlled for the socio-demographic variables that were associated with the outcome at the $p<0.10$ level to account for potential confounders. The women's health visit variable was not considered for this analysis as few women currently using a contraceptive method lacked a visit (n=27).

Multinomial logistic regression was used for outcome variables with more than two categories (i.e. effectiveness for pregnancy prevention and STI protection). Ordinal logistic regression was not used for the analysis examining the importance of effectiveness and method use categorized by method effectiveness because the proportional odds assumption was not met in multivariate models. All analyses were conducted using SAS 9.3. Appropriate sample weight and design variables were conducted using SAS SURVEY procedures. Significance was noted at $p<.05$.

Results

Sample Characteristics

The largest proportion of women in our sample were in between 20-24 years of age (43%) (Table 1). The majority were non-Hispanic white (61%), born in the United States (91%), and in a current sexual relationship (69%). Less than a fifth reported receiving public assistance

or welfare in the past year (18%), and over 40% of the sample was currently in school. The vast majority of women reported ever having a women's health visit (92%), and over 40% had ever been pregnant. Nearly half the sample (46%) reported having private insurance only in the past year, nearly a quarter relied solely on a public source of insurance, and 16% were uninsured.

Importance of contraceptive attributes for decision-making

The majority of women reported it was extremely important for a method to be very effective at preventing pregnancy (79%), followed by effectiveness at HIV/STI prevention (67%) and ease of use (49%) (Table 2). Less than a third of women perceived each of the other four attributes to be extremely important. In terms of attributes not at all important to women, about a quarter of the sample perceived the presence of no hormones (26%), acceptability to partner (24%), and interruption of sex (24%) to be not at all important when choosing a contraceptive method. Fewer than 10% of women reported that effectiveness for pregnancy prevention (3%), ease of use (5%), and protection against HIV/STIs (10%) was not important.

None of the contraceptive attribute variables were associated with each other, except for low cost and ease of use which appeared to be moderately correlated ($r=0.44$) [data not shown]. The vast majority of women considered more than one of the seven contraceptive attributes to be extremely important. When only one attribute was selected to be extremely important (15%), 61% of the sample chose effectiveness in preventing pregnancy [data not shown]. 40% of the women rated 2 (20%) or 3 (20%) of the 7 contraceptive attributes as extremely important. One out of five women (20%) considered 5 or more of these attributes to be extremely important.

Table 3 shows the bivariate association between the socio-demographic characteristics and contraceptive attributes. Women who reported a past pregnancy were more likely than women without a previous pregnancy to report a preference for a hormone-free method ($p<0.01$) and less likely to feel it was important that a method be very effective for pregnancy prevention ($p<0.05$). Relationship status was also associated the importance of some contraceptive attributes. Women in current sexual relationships perceived ease of use to be more important for method choice than women not in a current relationship ($p<0.05$). With respect to socioeconomic status, a greater proportion of women who received public assistance in the past year ($p<0.05$), were uninsured ($p<0.05$), and who had low education and were not in school ($p<0.05$) reported a preference for no hormones compared to those who did not. Age and race/ethnicity were not significantly associated with any contraceptive attributes. The importance of protection against STIs, low cost, and interruption of sex were not associated with any socio-demographics.

Current Method Use

Over 70% (n=503) of women reported contraceptive use in the past month (Table 1). When examining the most effective method a woman used for pregnancy prevention, nearly half (47%) relied on birth control pills, and about 20% relied on condoms. Fewer than 10% used vaginal rings (6%), injectable contraception (6%), or IUDs (7%). Another 5% or fewer women reported use of all the other methods (i.e. sterilization, implant, patch, withdrawal, natural family planning and other methods) (Table 4). While approximately a third of current contraceptive users reported use of condoms in addition to an effective method for pregnancy prevention (Sterilization, IUD, implant, pill, patch, ring, injectable), a larger proportion (45%) relied on methods that only provided effective pregnancy prevention (Table 4).

Regression Analyses

Bivariate and multivariate regression models were run to assess the association between contraceptive attributes and current contraceptive method choice, among those using a method.

Hypothesis 1: Importance of a method that is very effective for pregnancy prevention and use of the most effective contraceptive methods

We found no significant association between the importance of a very effective contraceptive method and current method choice in either the unadjusted and adjusted models. Compared to women who said it was either not or slightly important, women who reported that effectiveness was quite or extremely important when choosing a contraceptive method were not significantly more likely to rely on the most effective methods (AOR: 0.9; 95% CI: 0.2, 3.7) and were not less likely to rely on less effective methods (AOR: 1.3; 95% CI: 0.4, 4.0) compared to highly effective methods (Table 5).

Hypothesis 2: Importance of no hormones and nonuse of a hormonal method

Women who reported it was important that a method that did not contain hormones were less likely to be users of hormonal contraception in the unadjusted (OR: 0.4; 95% CI: 0.2, 0.8) models (Table 6). The association remained significant after controlling for potential confounders, including a women's perception of the importance of effectiveness in pregnancy prevention (AOR: 0.4; 95% CI: 0.2, 0.8).

Hypothesis 3: Importance of STI protection and use of condoms

We found a significant relationship between women's perception of the importance of STI protection and use of condoms, either with another method or alone (Table 7). Women who reported that it was important that a method be effective in preventing STIs/HIV were more likely to use condoms *plus* an effective contraceptive method for pregnancy prevention compared to using an effective contraceptive method alone (OR: 2.2; 95% CI: 1.0, 4.7). This relationship remained significant after controlling for the importance of a very effective method for pregnancy prevention and other confounders (AOR: 2.4; 95% CI: 1.1, 5.2). Women concerned about STI prevention were also more likely to rely on condoms alone compared to an effective contraceptive method for pregnancy prevention alone (AOR: 3.6; 95% CI: 1.2-10.6). We found that the relationship between the importance of STI protection and method choice did not differ depending on a woman's perception of the importance of effectiveness in pregnancy prevention) [data not shown].

Discussion

This study sought to identify characteristics of contraceptive methods that are important to women for contraceptive method choice, and to examine whether and how the importance women place on these characteristics relate to their contraceptive behavior. Through our exploration of specific hypotheses, we found that certain contraceptive attributes important to women correspond with their contraceptive method choices, while others do not.

Similar to other studies, we found that a large majority of women consider a method's effectiveness in preventing pregnancy to be very important to them when choosing a contraceptive method.[14,17,19] Contrary to our hypothesis, we did not find an association between importance of a very effective method for pregnancy prevention and use of more effective methods. There may be a couple reasons for this. One possibility is that women's perceptions of contraceptive effectiveness may not match the objective, clinical standards of effectiveness.[25]

For example, women may not know that IUDs and implants are more effective in preventing pregnancy than birth control pills or that condoms are less effective. Previous research has shown that women can over- or under-estimate the effectiveness of several contraceptive methods.[25,26] In this analysis, women for whom it was important that a method be very effective at pregnancy prevention were actually more likely to be using a less effective (e.g. condoms) than a highly effective method (e.g. pills) in our adjusted models although this was not significant. Another explanation for our findings is that while women indicate that a method's level of effectiveness is very important to their decision-making, it may not be the most salient reason for women's contraceptive method choices. Other factors may be more important. Interestingly, we found that the experience of a previous pregnancy was the only factor associated with the importance of effectiveness, with fewer women who had been pregnant reporting that effectiveness was important to them than never-pregnant women. No significant differences in the importance of effectiveness for pregnancy prevention were found for any other socio-demographic characteristics.

We found a relationship between a woman's preference for a method that doesn't contain hormones and use of a hormonal method. Women who preferred a method didn't contain hormones were indeed less likely to be using a hormonal method of contraception. The presence of no hormones may be an especially salient factor in women's contraceptive method choice. In their analysis of contraceptive preferences, Garbers et al. also found that a preference for no hormones influenced contraceptive behavior.[21] In unadjusted analyses, the authors found that women at risk for unintended pregnancy who did not receive a method at the end of a reproductive health visit were more likely to prefer a method that didn't contain hormones. Our finding that a preference for no hormones was negatively associated with hormonal contraception remained significant even after accounting for the fact that the vast majority of women believed it was important that a method be very effective for pregnancy prevention. Given that the majority of the most effective methods of contraception are hormonal, a preference for a very effective method may come into conflict with a preference for no hormones for women who find both to be important. The nonhormonal IUD may be an option for such women and should be considered by providers when counseling their patients. Further, there may be a need for the development of additional highly effective, nonhormonal contraceptive options. Although less than a quarter of the sample believed it was extremely important to have a method without hormones, we found significant differences by some socio-demographic characteristics. Women without health insurance, those who received public assistance, and women with lower levels of education were more likely to have preference for no hormones. It is possible that some unmeasured factor, such as previous experiences with hormonal methods, may be driving this association.

Women who reported prevention of STIs/HIV was important to them when choosing a method were more likely to be using condoms, either alone or with an effective contraceptive method for pregnancy prevention. Thus, women's preference for this contraceptive attribute corresponded with method choices they made. Our finding that two-thirds of women in this sample said STI/HIV protection was extremely important to them when choosing a contraceptive method is important because of the limited options of contraceptives meeting this standard—the condom is the only available method that prevents STIs/HIV. Interestingly, we did not find an association between relationship status and the importance of STI prevention in this sample of unmarried women. This is in contrast to other research, which suggests that STI protection may be less important to women in committed relationships.[27] Previous research has frequently

included married women, and this difference may be due to the sample of unmarried women. Further, the survey assessed the presence of a current sexual relationship, not level of commitment. Importantly, we found that a preference for a very effective method of pregnancy prevention and STI/HIV protection were the attributes that the greatest proportion of women rated as extremely important. This may highlight the need for counseling and other interventions to promote dual method use which can address both of these attributes. While use of condoms along with more effective methods of contraception has risen in recent years, it is remains low among young adults in comparison to single method use.[7]

Similar to other studies, race/ethnicity was significantly associated with method choice in several of the adjusted models.[7,28] We found that black and Hispanic women were far less likely than white women to use a hormonal method and more likely to use less effective methods of contraception as well as rely on condoms. This finding is important because young women of color bear the greatest burden of unintended pregnancy in this country. Additional research is needed to better understand the reasons for this. For example, it is possible that minority women are more likely to have had previous negative experiences with certain contraceptive methods.

This study has several limitations. One consideration is the limited variation in the contraceptive methods that women were currently using. Only a small number of women reported use of several methods (e.g. IUDs, implants, vaginal ring, patch). This limited our ability to assess the association between contraceptive attributes and specific methods. Additionally, only seven contraceptive features were available in the survey. There are a number of other contraceptive attributes that have been examined and shown to be important to women (e.g. side effect profile, alleviate menstrual cramps, effect on sexual pleasure, etc.) that we were unable to examine. Further, because women were not instructed to rank the various contraceptive attributes against each other, we were unable to examine women's priorities for importance, which would have helped in exploring some of complexity associated with contraceptive method choice. Another limitation is the possible presence of unmeasured confounders, such as previous experiences with specific contraceptive methods, which may have affected the association between women's perceptions of contraceptive attributes and method choice. In addition, since this study utilizes cross-sectional data, causal inferences between women's perceptions of contraceptive features and contraceptive method choice cannot be made. Finally, the issue of temporality is unclear. Our assumption is that women's assessment of contraceptive attributes drive their method choice, but it is also possible that use of specific methods drive their ranking of important attributes. Our analysis was unable to test this.

Despite these limitations, this study adds an important contribution to the body of literature examining women's contraceptive decision-making and method choice. Strengths of this study include use of the NSRCK, a nationally representative sample of young, unmarried adults, which is a population with high rates of unintended pregnancy. Further, this study is one of the few to link contraceptive attribute preferences to women's method choice. Our study has several implications, including the need for development of additional effective nonhormonal contraceptive options and programmatic effort promoting dual method use among those for whom STI prevention is important.

While women's perceptions of contraceptive attributes are just one of the many factors that influence contraceptive method choice, they help us understand what information to incorporate in interventions to influence contraceptive method choice. Based on this study, certain contraceptive characteristics deemed important by women do influence their contraceptive behavior. Future research should assess how accurately women rate contraceptive

methods in terms of the attributes that matter to them (i.e. how women desiring a very effective method for pregnancy prevention rate methods in terms of effectiveness) as this may moderate the relationship between attributes and choice. Additional work is also needed to better understand how contraceptive preferences interact with each other to influence method choice. Contraceptive method choice is a complex decision, and a variety of contraceptive attributes are likely considered by women when choosing a method. Qualitative work might be particularly helpful in teasing apart the tradeoffs that women make regarding contraceptive attributes when choosing a method.

Improving women's contraceptive use remains an important factor in reducing the high rate of unintended pregnancy in the US. Assisting women in choosing methods that are consistent with contraceptive attributes that are important to them may increase method satisfaction and continuous contraceptive method use.

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Table 1.
Sample Characteristics

Characteristic	n=715	%
Age		
18-19	164	22.3
20-24	325	43.2
25-29	226	34.5
Race/Ethnicity		
NH White	347	60.8
NH Black	185	21.0
Hispanic	146	12.8
Asian/Other	37	5.4
Nativity		
United States	650	91.0
Other	65	9.0
Sex/Relationship Status		
Current Sexual Relationship	474	68.8
No current sexual relationship	239	31.2
Public Assistance in past year		
Yes	106	18.2
Education Status		
Currently in school	331	42.3
Not In school; HS grad or less	171	27.2
Not in school; some college or higher	213	30.5
Ever had women's health visit		
Yes	657	92.0
Ever Pregnant		
Yes	301	43.2
Insurance Status		
Public only	144	24.1
Public and private	81	11.5
Private only	363	46.7
Other insurance	12	1.7
Uninsured	115	16.1
Current Method Use		
Yes	503	72.4

Table 2.
Importance of 7 Contraceptive Preferences for Contraceptive Method Choice

Contraceptive Attribute	Not at all Important (%)	Slightly Important	Quite Important	Extremely Important
Very effective at preventing pregnancy	3.3	6.9	10.6	79.2
Low Cost	19.3	34.9	22.1	23.7
Easy to Use	5.1	20.2	25.9	48.8
Doesn't contain hormones	25.9	37	14.8	22.3
Acceptable to my partner	23.7	25.9	18.3	32.1
Doesn't interrupt sex	24.3	26.3	17.5	31.9
Effective at preventing HIV/STIs	9.6	10.7	12.7	67.0

Table 3.
Proportion of Contraceptive Preferences Quite and Extremely Important by Sample Characteristics

Characteristic	Very effective at preventing pregnancy	Low Cost	Easy to Use	Doesn't contain hormones	Acceptable to my partner	Doesn't interrupt sex	Effective at preventing HIV/STIs
Age							
18-19	88.9	46.8	69.7	44.7	57.7	45.0	82.6
20-24	87.1	45.1	76.3	30.4	49.6	48.5	76.9
25-29	93.9	46.0	75.9	40.6	46.7	53.5	81.4
Race/Ethnicity							
NH White	90.7	46.4	74.3	35.4	51.3	48.4	76.8
NH Black	87.5	40.7	75.8	37.8	44.1	53.2	84.8
Hispanic	89.5	55.8	80.5	50.8	57.6	48.6	85.7
Asian/Other	90.7	35.0	59.7	21.9	47.4	48.2	78.6
Insurance Status							
Medicaid only	86.7	43.7	76.3	**38.4**	60.1	54.6	85.5
Medicaid and private	94.9	45.6	64.6	**44.9**	50.8	47.7	82.9
Private Insurance	90.3	44.5	75.7	**30.5**	49.1	51.0	76.1
Other insurance	95.3	67.6	88.9	**15.3**	34.0	12.7	99.4
Uninsured	89.3	50.5	74.9	**51.2**	41.1	42.0	77.3
Education Status							
Currently in school	90.0	49.7	71.3	**35.5**	50.0	47.7	79.8
Not In school; HS grad or less	90.2	44.3	79.6	**48.8**	56.5	58.0	82.2
Not in school; some college or higher	89.3	41.7	74.8	**29.0**	45.5	44.1	77.4
Nativity							
United States	89.7	45.1	74.3	36.5	49.9	49.2	79.1
Somewhere else	92.0	53.0	78.3	43.4	55.9	51.6	86.2
Public Assistance in past year							
Yes	93.0	46.7	81.9	**51.1**	59.9	57.5	85.6
No	89.1	45.7	72.9	**34.1**	48.4	47.7	78.7
Sex/Relationship Status							
Current Sexual Relationship	90.1	45.2	**78.1**	39.1	54.0	51.4	77.8
No current relationship	89.3	46.9	**67.1**	32.7	42.4	44.9	83.9
Ever had a women's health visit							
Yes	90.1	47.0	75.0	37.0	50.1	49.3	79.5
No	86.8	32.3	71.0	39.2	54.2	50.3	82.1
Ever Pregnant							
Yes	**86.0**	45.3	75.8	**45.7**	54.0	52.9	80.9
No	**92.8**	46.1	73.8	**30.6**	47.7	46.7	78.8

Note. **Bolded** values are significant at p<0.05

Table 4.
Current Contraceptive Use

	n	%
Effectiveness for pregnancy prevention		
Most effective		
Sterilization	19	3.1
IUD	36	6.7
Implant	4	0.1
Highly effective		
Injectable	28	6.4
Patch	5	1.1
Vaginal Ring	19	6.1
Pills	233	47.5
Less effective		
Condoms	111	20.5
Withdrawal	16	2.9
NFP	1	0.3
Other/Unknown method	31	5.2
Hormonal Method Use		
Yes	289	69.5
No	147	30.5
STI Prevention		
Effective contraceptive method alone	202	45.1
Effective contraceptive + condoms	142	32.5
Condoms alone	111	22.4

Table 5.
Unadjusted and adjusted regression models of the association between importance of a very effective method for pregnancy prevention and use of most effective and less effective methods for pregnancy prevention (Reference group = Highly effective methods)

	Most effective vs. Highly effective				Less effective vs. Highly effective			
	Unadjusted OR	95% CI	Adjusted OR	95% CI	Unadjusted OR	95% CI	Adjusted OR	95% CI
Importance of a method that is very effective at preventing pregnancy								
Not/slightly	REF	REF	REF	REF	REF	REF	REF	REF
Quite/Extremely	0.83	0.22, 3.19	0.92	0.23, 3.69	0.91	0.30, 2.81	1.25	0.39, 4.01
Age			1.09	0.96, 1.25			0.959	0.87, 1.06
Race/Ethnicity								
non-Hispanic white			REF	REF			REF	REF
non-Hispanic black			2.04	0.71, 5.86			3.46	1.39, 8.56
Hispanic			1.49	0.48, 4.63			4.61	1.96, 10.82
Asian/Other			0.25	0.05, 1.25			4.03	1.15, 14.1
Ever Pregnant								
Yes			REF	REF			REF	REF
No			0.28	0.09, 0.89			0.72	0.32, 1.62
Relationship Status								
Current Sexual Relationship			REF	REF			REF	REF
No current relationship			0.32	0.10, 1.03			0.71	0.33, 1.50
Insurance Status								
Uninsured			REF	REF			REF	REF
Public only			0.66	0.15, 2.81			0.32	0.11, 0.91
Public and private			1.49	0.31, 7.31			0.32	0.09, 1.14
Private only			0.4	0.08, 1.92			0.33	0.13, 0.81
Other insurance			10.27	0.63, 166.18			0.91	0.05, 18.33

Notes. Most Effective= Sterilization, IUD, Implants; Highly effective= Pills, patch, ring, injectable; Less effective= condoms, withdrawal, natural family planning; Final sample size for adjusted model, n= 471.

Table 6.
Unadjusted and adjusted regression models of the association between importance of a method that doesn't contain hormones and use of a hormonal method of contraception*

	Unadjusted OR	95%CI	Adjusted OR	95% CI
Importance of a method that doesn't contain hormones	REF	REF	REF	REF
Not/slightly				
Quite/Extremely	0.40	0.21, 0.75	0.42	0.22, 0.83
Importance of a method that is very effective at preventing pregnancy				
Not/slightly			REF	REF
Quite/Extremely			1.16	0.44, 3.05
Ever pregnant				
Yes			REF	REF
No			1.21	0.55, 2.68
Relationship status				
Current Sexual Relationship			REF	REF
No current relationship			1.67	0.75, 3.69
Insurance status				
Uninsured			REF	REF
Public only			2.25	1.03, 6.83
Public and private			2.20	0.68, 7.12
Private only			2.65	1.03, 6.83
Other insurance			0.39	0.03, 5.57
Race/Ethnicity				
non-Hispanic white			REF	REF
non-Hispanic black			0.25	0.11, 0.57
Hispanic			0.21	0.09, 0.49
Asian/Other			0.23	0.07, 0.76

* Hormonal methods= birth control pills, patch, ring, implant, and injectable. Final sample size for adjusted models, n=435.

Table 7.

Unadjusted and adjusted regression models of the association between the importance of STI protection and condom use, alone and with another effective contraceptive method
(Reference group = Use of effective contraceptive method alone)

	Use of effective contraceptive method PLUS condoms vs. use of effective contraceptive method alone*				Condom use alone vs. use of effective contraceptive method alone			
	Unadjusted OR	95% CI	Adjusted OR	95% CI	Unadjusted OR	95% CI	Adjusted OR	95% CI
Importance of a method that is effective at preventing HIV/STIs								
Not/slightly	REF	REF	REF	REF	REF	REF	REF	REF
Quite/Extremely	2.21	1.03, 4.74	2.35	1.06, 5.19	3.46	1.36, 8.78	3.60	1.23, 10.55
Importance of a method that is very effective at preventing pregnancy								
Not/slightly			REF	REF			REF	REF
Quite/Extremely			0.68	0.19, 2.40			1.12	0.26, 4.82
Race/Ethnicity								
non-Hispanic white			REF	REF			REF	REF
non-Hispanic black			1.02	0.38, 2.76			3.02	1.15, 7.91
Hispanic			0.81	0.30, 2.22			3.71	1.43, 9.62
Asian/Other			1.27	0.34, 4.76			4.57	1.11, 18.79
Insurance status								
Uninsured			REF	REF			REF	REF
Public only			1.40	0.41, 4.78			0.40	0.12, 1.27
Public and private			4.13	0.97, 17.59			0.47	0.10, 2.32
Private only			1.01	0.36, 2.79			0.37	0.14, 1.03
Other insurance			2.42	0.20, 29.23			0.77	0.03, 17.69
Relationship status								
Current Sexual Relationship			REF	REF			REF	REF
No current relationship			0.43	0.20, 0.93			0.58	0.25, 1.34
Ever pregnant								
Yes			REF	REF			REF	REF
No			0.69	0.31, 1.54			0.76	0.31, 1.88

* Effective contraceptive method alone= Sterilization, IUD, implant, birth control pill, patch, ring, injectable. Final sample size for adjusted model, n=454.

Paper #3: A qualitative exploration of women's perceptions of the value of a contraceptive decision support tool for contraceptive method choice: Findings from patients of an integrated health care system

Abstract

Background: Choosing a contraceptive method can be a complex decision. Contraceptive decision support tools (DSTs) have been suggested as a way to provide patient-centered contraceptive care, but use of these tools is limited and little is known about how and why they influence women's decision making. Objective: To better understand patients' perceptions of the value and utility of a recently-designed contraceptive DST among patients enrolled in integrated health care system. Methods: We conducted 13 semi-structured interviews with female patients 15-29 from an integrated healthcare system in the San Francisco Bay Area. Participants viewed the tool during interviews, which explored women's decisional needs for choosing a contraceptive method and perceptions of the value of the DST. Thematic analysis was conducted to identify common themes in the participants' experience. Findings: Four overarching themes were identified in the interview data: 1) User Friendly; 2) Educational; 3) Personalization; and 4) Preparatory. Overall, participants had a positive reaction to the DST and believed it would be valuable for their decision-making. While participants felt it increased their knowledge about available methods, some information was missing. The DST was valuable when participants were able to locate information deemed personally important to them. Participants reported that the tool could prepare them for a visit with their health care provider. Conclusions: Contraceptive DSTs can serve as a complement to provider counseling. Tools are relevant and useful to their users when they include information women care about and allow for personalization within the tool.

Introduction

Increasing and improving contraceptive use among women who want to avoid a pregnancy is critical to reduce unintended pregnancy in the United States (US). Approximately half of all pregnancies are unintended with the highest rates among adolescents and young women.[1] Because of the substantial public cost and association with negative health and social outcomes for mothers and infants, reducing unintended pregnancy is a public health priority.[1–6] Only five percent of all unintended pregnancies are attributable to contraceptive failure; the other ninety-five percent are due to either nonuse, inconsistent, or incorrect use of contraception.[7]

While providers routinely counsel their patients about contraception, evidence for the effectiveness of these interventions for helping women achieve optimal contraceptive choice and use is mixed.[8–12] Researchers and reproductive health organizations have suggested a patient-centered approach to providing contraceptive care.[7,13,14] This calls for individualized counseling about method choice and long-term contraceptive use that is based on regular assessments of women's sexual activity, reproductive goals, relationship characteristics and other life events.[7,13] Contraceptive decision support tools (DSTs) have been suggested as a way to provide patient-centered contraceptive care and assist women with their contraceptive decision-making.[15–17]

DSTs, including decision aids, refer to a broad set of patient-centered interventions that can help patients when they are faced with a decision regarding their health and/or medical care.[18,19] Their purpose is generally two-fold. One, to provide patients with a framework in which they can assess available options and their possible outcomes, and, two, help patients make a decision that best takes account of their individual needs and values.[20,21]

Usually designed to complement, not replace, counseling from a health care provider, decision support tools are considered well suited for contraception because of the large number of available contraceptive methods and the highly individualized nature of contraceptive decision-making.[15,22] Women choose contraceptive methods based on their knowledge, personal preferences and experiences, and evaluation of what would be the best fit for their current life situation.[23] DSTs have the potential to help women choose methods they are satisfied with, which is important as method dissatisfaction has been associated with inconsistent contraceptive method use and frequent contraceptive method switching, both of which are linked to a woman's risk of unintended pregnancy.[7] Further, DSTs may also assist health care providers with contraceptive counseling given the challenges of providing accurate and comprehensive information in the limited time available during a typical clinical encounter.

In the US, there is some evidence suggesting a positive role for decision support tools in impacting women's contraceptive decision-making. A handful of studies have shown that use of a contraceptive DST is associated with greater knowledge about contraception overall and about specific methods, method choice, and satisfaction with method choice.[24–26] At present, a number of contraceptive DSTs are being developed and/or tested.[27–29] Notably, each contraceptive decision support tool is unique, with differences in format, specific content, and requirement for user engagement.

While the available evidence suggests contraceptive decision support tools can influence the choices women make, little is known about how and why these tools impact contraceptive decision-making. There is a need to describe the mechanisms through which these tools impact contraceptive method choice in order to enhance available tools and tailor them for specific populations. Further, understanding whether and how contraceptive DSTs meet the needs of their users will help identify areas for improvement. Qualitative research within a target population prior to implementing a decision support tool can demonstrate if and how DSTs are relevant to their users.[30] To our knowledge, only two studies in the published literature have qualitatively assessed patients' perceptions of contraceptive decision support tools, and these have focused largely on general reactions and feasibility of use in clinical settings.[31,32] This paper builds upon this emerging body of evidence. We present findings from a qualitative study on patient perceptions of a contraceptive decision support tool designed to assist with contraceptive method selection among young women enrolled in an integrated health care system. Specifically, our research objective is to identify and describe patients' views on the value and utility of the tool for their contraceptive decision-making.

Methods

Data were drawn from a qualitative study designed to better understand young women's decisional needs for choosing a contraceptive method and to assess patient and provider perceptions of a recently designed contraceptive decision support tool. This study used semi-structured interviews in which participants used the DST and provided feedback on the tool.

Decision Support Tool Description

The contraceptive decision support tool was developed by a large integrated health care system in the San Francisco Bay Area and was completed in early 2014. The DST was a collaborative effort, developed by members of women's health, information technology, health education, and the research division. Briefly, the tool is a web-based contraceptive method selector that allows women to "filter" and "sort" available contraceptive methods by topics that are thought to be important to women's contraceptive decision-making, including effectiveness in preventing pregnancy, convenience and ease of use, whether or not it contains hormones and effects on menstrual periods. Each method can be selected and is then described in extensive detail in terms of its advantages and disadvantages including side effects, how it is used and contraindications. The tool was designed to be mobile optimized so that it can be used on cell phones and tablets. The tool is available to patients through the online patient portal. In the clinical setting where recruitment occurred, health care providers were aware of the tool and it was at their discretion to mention it to patients during clinical visits. It was not routinely used in clinical care.

Recruitment

We used a purposive sampling strategy to recruit participants. Our sample size was based on estimates of theoretical saturation. It was expected that saturation would be reached with 15-20 participants.[33] Women were eligible to participate in the study if they were current patients of the health clinic, 15-29 years of age, and had previously used a contraceptive method or were looking to start or switch to a new method. Participants were not expected to choose a method at the time of the interview. We excluded women who were pregnant, non-English speaking, or had never used a contraceptive method and did not plan to start one. These exclusions were made to ensure participants had experience with contraceptive method choice and could conduct an interview in English. Contraceptive method choice in the context of pregnancy, while important, was outside the scope of this study.

Between August 2014 and March 2015, flyers advertising the study were posted in one of several Obstetrics & Gynecology clinics with the integrated system. This clinic was chosen due to proximity to the research division and familiarity with clinical staff. Potentially eligible participants were also recruited by the study investigators or via referral from health care providers at the clinic. Interested participants were instructed to contact study staff via phone or email, and were screened for eligibility over the phone.

Interview Procedures

Once eligibility was determined, participants were scheduled for a face-to-face, interview at the health clinic. We used a semi-structured interview guide, which was developed by the research team based on a review of the literature on contraceptive decision-making and expertise of an OB/GYN with extensive experience providing family planning services. The interview guide was designed to identify participants' contraceptive decisional needs and assess perceptions of the decision support tool. Several questions were adapted from the University of Ottawa's Decision Need Assessment in Populations workbook and Preparation for Decision-Making Scale.[34,35] The interview consisted of 3 stages. First, participants were asked questions regarding their experience choosing a contraceptive method, including what factors they consider when choosing a method, and what they believe they need to make a decision about a method. Next, participants were asked to use the decision support tool on a tablet computer as if they were actually choosing a method. Last, participants were asked a series of open-ended questions

regarding their overall perceptions of the tool and their thoughts about the utility of the tool for their contraceptive decision-making. Selected questions that were asked about the tool are found in Table 1. Each participant was also asked to complete a short, paper-based socio-demographic questionnaire prior to the interview. Interviews lasted 35 to 59 minutes.

All interviews were audio recorded and transcribed. Participants were compensated with a $30 gift card to either Target or Starbucks. The research protocol was approved by the appropriate Institutional Review Boards.

Data Analysis

This analysis includes data from 13 English-speaking women recruited from the OB/GYN clinic. Study transcripts were analyzed using the thematic analysis approach as described by Braun and Clarke.[36,37] Their data analysis process includes the following 6 steps: 1) Familiarizing yourself with the data, 2) Generating initial codes, 3) Searching for themes, 4) Reviewing themes, 5) Defining and naming themes, and 6) Producing the report. First, we reviewed all transcripts to develop inductive and deductive codes and a codebook, which consisted of combining similar codes and organizing codes into overarching categories (steps 1 and 2). Next, using the codebook, all transcripts were coded in Atlas.ti. Codes were grouped together and then sorted into potential themes (step 3). Themes and sub-themes were identified by comparing code frequencies, examining code co-occurrence, and looking for relationships and similarity between codes. Definitions of themes were developed, and transcripts were reviewed to refine candidate themes (steps 4 and 5).

Results

The characteristics of interview participants are summarized in Table 2. Participants ranged from 18 to 28 and the mean age was 22.8 years. 6 participants were multi-racial or multi-ethnic (see Table 2 for details). The rest identified as Latina/Hispanic (n=3), non-Hispanic black (n=3), and non-Hispanic white (n=1). All participants had completed high school, 5 had completed college or graduate school, and 4 were currently in school. No participants were married, but 3 women reported living with a partner in a marriage-like relationship. 4 women had children.

We identified four overarching themes to describe patients' perception of the value and utility of the contraceptive decision support tool: 1) User Friendly, 2) Personalization, 3) Educational, and 4) Preparatory. Themes and sub-themes are described in detail below.

Theme 1: User Friendly

Nearly all participants had a positive reaction to using the decision support tool. The positive user experience was commonly mentioned in response to a question assessing participants' overall perception of and initial thoughts about the tool. Specifically, the tool was described as user friendly in terms of ease of use, aesthetics, amount of information, and use of simple, non-technical language. Several participants also emphasized the organization and categorization of information in the tool as something they found especially useful for navigating the tool. Here one participant describes what she liked about the tool:

> "I really liked, for example, on this page—let me see—effectiveness. Like, for example, it's in different categories. It tells you which one is the most effective, which one is kind

> of effective, and least effective. So I think for some women who might not know how effective it is, it's broken into categories."

Another participant shared the following when providing her overall thoughts on the tool:

> "I think it's organized really well. I think it makes it super easy, with all the different options as far as like convenience and the part in there that tells you how I can get it. It organizes everything for you."

While nearly all participants emphasized their positive user experience, we found that the tool was not completely functional. Several participants had difficulty identifying a link on the tool that allowed users to access in-depth information on each method. We found that this technical issue limited the ability of the tool to be educational [described below]. Here a participant describes her experience once the link was pointed out to her:

> "Oh, so this one, once you click on the link, it gives you a little bit more details. With the other one, it did only like a brief description, a few, like, bullet points. But I didn't notice that, once you open it, you get more of the advantages and disadvantages. Because I thought that the green part was part of that page. I didn't see the little arrow. Oh!"

Theme 2: Personalization

The theme of personalization describes the ability of participants to use the tool in a manner that made it relevant for them. Within the personalization theme, we identified two sub-themes: 1) Identifying important information and 2) Finding what's right for me.

Identifying important information

For many participants, the value of the tool was directly connected to their ability to locate the information deemed personally important to them. In the interviews, we found that each woman had different factors that were important to them when choosing a birth control method, and that they used the tool to look for information on these factors. Here one participant described what she felt was useful about the tool:

> "And just being able to filter through, because everybody has something that's like important to them. So if the most important thing is that I didn't have to take it every day, or it didn't have hormones, or whatever I could easily find what I was looking for…"

Another participant discussed the value of the categories for finding the information that mattered to her (i.e. effectiveness, ease of use and disadvantages of the methods):

> "Well now, it was very helpful because it let me look at everything, um, in categories, which categories are important to me. Like the effectiveness on preventing pregnancy, ease of use like I said, um, and then the disadvantages of each one."

Finding what's right for me

A second sub-theme within Personalization describes patients' perception that the tool could be used to identify the contraceptive method that was "right" for them. This involved using

the information and features (e.g. filter and sort) in the tool to eliminate methods they were considering. In addition, some participants stated that using the tool helped them to "narrow down" contraceptive methods. Here a participant discusses the ability of the tool to help her select a new method:

> "It just feels – like I said, it has so much information, and it categorizes it well, so if you were looking for something specific, it'll help you find that. So if I wanted to change and go to something that was for a longer duration and that was more effective, I could find that using this."

This participant describes how she would "look past" certain methods based on the categories in the tool. In this situation, the participant was looking for a contraceptive method that was long-term.

> "Every three years or longer, monthly, weekly, every three months. Because I knew I didn't want anything I had to worry about, I had to look past the weekly, monthly, every three months section[s]."

Many participants offered suggestions on how to make the tool more useful for them. Here a participant suggests a side-by-side comparison feature, which she felt would allow her to more easily hone in on the two methods she was deciding between.

> "I like clicking stuff, so you get to add or subtract things based on what you want. Yeah. Like I said, If they can do a side-by-side comparison, that'd be everything that you need right there."

Theme 3: Educational

According to participants, the contraceptive decision support tool played an educational role and increased contraceptive knowledge. Within the overarching Educational theme, we identified two sub-themes: Missing Information and Type of information.

Nearly all participants reported learning something from the tool. Participants frequently mentioned learning details about various contraceptive methods in terms of how to use it, when to use it, side effects, etc. In addition, several participants reported that using the tool made them aware of contraceptive methods they had never heard of before. Here two participants describe learning about additional methods after using the tool:

> "Like oh OK, these are the options. Um, because in my mind, there's only a few options, but there's actually a lot more."

> "Well I didn't know all of these options, actually. I didn't know about the um, the, there was a copper IUD and a hormonal IUD. So after reading into both of those, I didn't really want copper in my body. So that was one thing I learned that I didn't know."

Several participants commented on the comprehensiveness of the information in the tool. A few participants even felt they would gain more information from using the tool than they would

from talking to a health care provider. Here a participant describes what she liked best about the tool:

> "I really liked it. I liked its scope. And honestly, I thought the coolest thing was that it showed all – like, pretty much all the options available, which, again, most doctors don't actually do in person."

Missing Information

Although most participants discussed learning from the decision support tool, many also felt there was information missing from the tool. We did not identify a clear pattern regarding what was missing as each woman wanted different information. Here four participants describe the information that the tool did not provide them:

> "For mood changes, I thought that that was kind of vague; because, when they talked about Depo, it said, "mood changes." That's kind of vague, because I know someone who took that. If she had read "mood changes," it wouldn't have prepared her for what her mood changes were. They were like extreme highs and extreme lows, and, mood changes like, "Oh, maybe I'll just be sad every now and then." So, you know, it didn't—to me—describe the spectrum that those mood changes can occur on."

> "I noticed it doesn't necessarily talk about sexual pleasure or effects on sexual pleasure, which I would have liked to see, especially because I was doing it assuming that I had no decision and then I found myself going back and forth between the diaphragm and the IUD, and I also looked at sponges. It doesn't necessary say that it's messy, or that it can cause a different taste if you're having oral sex."

> "– but there's some brands [of birth control pills] that there is a higher likelihood for blood clots. So, I would want to know, like, if this brand has a higher likelihood of having this type of side effect – and then, some brands may have, like, other advantages, you know, contrary to some brands, like, they'll focus more on, like, you know, I guess, PMS symptoms or like that or like making your periods lighter or [have] a period once a year or whatever."

> "It talked about how soon you can get pregnant again, but it didn't talk about the risk of you never getting pregnant again. So, I mean, they talk about future fertility, but they don't say, 'This is the chance that it will be permanent'."

Type of Information

Within the Educational theme, we found that participants felt that the tool offered a certain type of information, mainly factual information about the contraceptive methods. When asked how the tool could be made more useful to them, a few participants mentioned they wanted information on other women's experiences and thoughts on specific contraceptive methods. These participants suggested having a place in the tool where they could get reviews of the methods by other women. Here is an exchange with a participant describing what she'd like to see in the tool:

> Participant: “Mmm. Um, I don't know, I don't know if this is something that you would want to do or, but it just, the first thing that comes to mind is like, um, like a message board of some sort. That could get really, I don't know, that could get bad, but, you know, I do read message boards like women's health message boards and sort of seeing what are people saying to each other, what are they. what was their experience on it, but then you couldn't really regulate that and that could kind of proliferate some messed up ideas, but. Um...sort of like…”
>
> Interviewer: “But what attracts you to that though?”
>
> Participant: “Yeah, like, well cuz I talk to my girlfriends about what they use and how they experienced it. So like it's like I wanna “Yelp” it…[participant laughs] I wanna see what other people felt, you know? I feel like we make a lot of our decisions like that now.”

Theme 4: Preparatory

The Preparatory theme refers to the idea that the decision support tool serves as a platform for participants to prepare for further conversation with a health care provider. Several participants mentioned a desire to talk to their health care provider after using the tool. When asked why she believed the decision support tool was helpful, this participant said:

> “I think this helped me to prepare myself to talk to the doctor, because sometimes we worry about, you know, going to the doctor, and you kind of forget, or you’re like, Am I asking too much? You know, for an appointment. But with this, I really like it because you prepare yourself ahead of time, and then you kind of can narrow it down to your, like, let’s say, top three choices. And then once you go to the doctor, you can kind of focus on those three instead of, you know, going to the doctor and asking her about every single thing. That would probably take a long time.”

Among participants who discussed wanting to consult with their provider following use of the tool, the majority mentioned that the tool helped them to think of questions they wanted to ask their health care provider. For some participants, the questions they had for their provider were related to the information that they felt wasn’t included in the tool. Other participants wanted their provider’s opinion of the contraceptive methods they were considering. Here a patient describes how she would interact with her doctor after using the tool:

> “Yeah. So, I guess if I were to change my birth control, if I were to look at that, it would help me narrow down my choices I guess. [I could] go to my doctor and say, ‘These are the three that I'm thinking about. Which out of these three do you suggest?’ ”

Discussion

This study is one of the first to qualitatively explore women’s perceptions of the value and utility of a contraceptive decision support tool for their decision-making. Our findings provide insight into the processes women use when navigating DSTs and contribute to our understanding of how DSTs may impact contraceptive method choice. Given that several

contraceptive decision support tools are currently in development, and the limited evidence suggesting DSTs influence the contraceptive choices women make, we believe our findings can be used to develop new and enhance available tools.

Overall, we found that women had a very positive reaction to the contraceptive decision support tool. All women in our study believed using the tool would be useful to them if they were choosing a contraceptive method. The positive response from patients is in similar to findings of other studies demonstrating high acceptability of a contraceptive decision support tool among patients.[31,32] In their qualitative study of patient perceptions of the *Smart Choices* contraceptive tool, Wilson and colleagues also found that the tool increased knowledge and served as preparation for an interaction with a health care provider.[32] Further, our finding that the tool plays an educational role for patients is consistent with quantitative studies showing improved contraceptive knowledge following use of contraceptive decision support tool.[24,26]

Despite the overall positive reaction, we found that several women in the study had difficulty with a functional aspect of the tool. This highlights the need for extensive user testing in the development phase to ensure that users can access all information. It may be particularly important to draw upon findings and techniques from the field of user-centered design, which emphasizes considering the user's needs, wants and abilities as well as actively involving user in multiple feedback and revision cycles.[38] User-centered design techniques have been used in the development of other patient decision support tools, and can help ensure that contraceptive decision support tools contain information most important to women for their contraceptive decision-making.[39]

A novel finding from our study is the theme of Personalization. Our findings suggest that a contraceptive DST can serve a greater purpose beyond increasing contraceptive knowledge. We found that participants engaged in several activities when navigating the tool to make it most relevant to them. In this study, the tool was most valuable to patients when they were able to gain information on the factors that were important to them when choosing a birth control method. This reinforces research demonstrating the highly individualized nature of contraceptive decision-making. Each woman has a set of questions, ideas, beliefs, etc. that they consider when choosing contraceptive methods.[23] Thus, ensuring contraceptive decision support tools offer information on factors and characteristics deemed relevant and important by users is important. Several recent studies have identified women's preferences for characteristics and attributes of contraceptive methods, such as effectiveness in pregnancy prevention, convenience, and side effect profile.[40–43] This research should guide the development of contraceptive decision support tools to ensure contain the information women care about. It may also be important to tailor this information to the specific clinical population as studies have shown that preferences vary by women's socio-demographics and reproductive characteristics.[41,42] Taking these steps to ensure contraceptive DSTs are relevant to women will help create a more patient-centered approach to contraceptive care that considers each woman's personal preferences. Regarding contraceptive decision-making, research has shown that some women prefer autonomous decision-making while others desire a shared-decision making style, in which patients and providers come to a mutually agreed upon decision that reflects the preferences of the patients as well as medical advice.[44] Our findings suggest contraceptive DSTs could be useful to either decision-making style as patients can choose how much provider input they feel is necessary to make their decision.

The results of this study should be considered in light of several limitations. First, given the sample size and purposive recruitment strategy, the findings of our study cannot be

generalized to the larger population of patients within integrated health care system. Nevertheless, we believe we obtained important information that can be used to enhance the tool and inform future tool development. Although these findings are generated in the context of a specific tool, they offer insight into what young women value and seek in contraceptive tools in general. Further our study demonstrates the way in which women would use web-based contraceptive tools in relation to their provider interactions. Another limitation of our study is that the contraceptive decision support tool was not examined in "real time", that is, at the moment patients were making a decision about which contraceptive method to use. Although this would have been ideal, it was not feasible to recruit patients actively choosing a method in the clinical setting where the research occurred. Instead, we interviewed participants who had experience and/or familiarity with choosing a contraceptive method and asked them to review the tool as if they were choosing a method, which may limit ecological validity. Finally, due to limited resources, only one researcher coded and analyzed the data. While reliability would be enhanced by having multiple coders, our use of a systematic and transparent approach to coding and analysis enhances the rigor of this research. Despite these limitations, we believe this study contributes to the limited body of research on contraceptive decision support tools and is among the first to describe the mechanisms through which tools may have an impact on contraceptive method choice. Further, we believe our study provides valuable insight in the processes women use when navigating decision support tools, which is critical for developing new interventions.

The findings from this study have important implications for practice and policy as it relates to the implementation of contraceptive decision support tools into clinical settings. Our finding that the contraceptive decision support tool can play a preparatory role suggests that it is important to ensure patients can review the tool prior to a doctor's visit. Implementation strategies to ensure that patients review the tool at the most ideal time are needed. For example, it may be important to provide patients with access to the tool when they are scheduling an appointment to discuss birth control. Second, while a few participants mentioned the tool contained more information they would receive from a provider, we believe it is unlikely that this tool could replace an interaction with a health care provider. Many participants had questions for their providers following use of the tool and/or felt like the tool would prepare them to speak with their doctor. Theory suggests decision support tools are not designed to replace communication with a health care provider; rather, they should play a complementary role.[22] Our findings from the patient perspective corroborate this. However, we do believe contraceptive decision support tools have a place in clinical settings and can serve as a positive enhancement to patient services.

For example, our findings suggest DSTs can provide comprehensive information that may not be fully addressed during a time-limited clinical encounter. Future research should assess provider and administrator perspectives on integration as they may differ from patient perspectives and will provide additional insights needed for the implementation of DSTs into clinical care.[31,40]

Decision support tools offer a possibility of evolution and innovation within the field of contraceptive care. Use of contraceptive decision support tools can play an important role in assisting women with choosing contraceptive methods that best meet their needs. Ultimately, this may increase patient satisfaction and correct and consistent use of contraception. To increase the effectiveness of these patient-centered interventions, it is important to ensure patients can use them in a way that is most valuable and useful for their specific needs.

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Table 1.

Selected Questions from the Semi-Structured Interview Guide

1. What are your initial impressions of the tool?
2. Can you describe your experience using the tool?
3. Are there aspects of the tool that you particularly liked? Explain.
4. Are there aspects of the tool that you didn't like or thought could be improved? Explain.
5. How do you feel this tool could be helpful to you if you wanted to select a birth control method to use?
6. What, if anything, did you learn from using this tool that you didn't know before?
7. Did using the tool provide you with the information that you were looking for? How so? What aspect of the tool provided you with that information?
8. Overall, do you feel like using this tool would be useful to you if you wanted to use it to choose a birth control method? Why or why not?
9. What, if anything, could be done to make this tool more useful to you if you wanted to use it to choose a birth control method? How so?

Table 2.
Characteristics of participants in semi-structured interviews

	n (%)
Age	
Mean (years)	22.8
18-19	4 (31)
20-24	5 (38)
25-29	4 (31)
Race/Ethnicity	
Hispanic/Latina	3 (23)
non-Hispanic white	1 (1)
non-Hispanic black	3 (23)
Multiracial/multiethnic	6* (46)
Educational Attainment	
High school grad	3 (23)
Some college	5 (38)
College grad	3 (23)
Graduate degree	2 (15)
Currently in school	4 (31)
Living with partner	3 (23)
Have children	4 (31)

* Of the 6 multiracial participants: 1 identified as Latina, Black, Russian, 2 identified as Hispanic and White, 1 identified as Arab and Black, 1 identified Black and Native Hawaiian/Pacific Islander, and 1 identified as White, Latina and American Indian/Alaskan Native

Conclusion

This dissertation examined women's contraceptive method choice in the United States, with a focus on better understanding factors involved in the decision-making process and examining aspects of health care system that influence method choice. The ultimate goal of this dissertation was to conduct research that could contribute to the development of evidence-based, patient-centered interventions designed to assist women with contraceptive method choice in clinical settings. I conducted three interrelated studies, each using different methodologies, to achieve these goals. Below, I present a summary of key findings and offer suggestions for future research. I conclude by discussing the public health implications of this work.

The first study used integrative review methodology to systematically and critically assess the literature on the relationship between factors related to the US health care system and women's contraceptive method choice. With the expansion of family planning services due to the Affordable Care Act and increasing focus on strengthening family planning service delivery, the purpose of this study was to gain a comprehensive understanding of the way in which factors at the health system-level can influence method choice. In this study, I identified and grouped 19 studies into six thematic clusters, synthesized findings, and identified gaps in the literature. The clusters were: 1) contraceptive counseling by a provider, 2) type of clinical setting, 3) service delivery integration models, 4) type of clinical visit, 5) patient financial burden, and 6) computer-based assessment modules. Importantly, this review presented a small body of evidence demonstrating that use of computer-based assessment modules in clinical settings is associated with women's method choice, including the use of more effective methods for pregnancy prevention. This finding directly related to the third paper in my dissertation, which assessed patient perceptions of a computer-based clinical intervention for contraceptive method choice. The critical literature review has a number of strengths, including the novelty of the topic reviewed as well as the systematic search strategy. However, there are also a number of limitations, including the exclusion of qualitative research and the limited time frame of studies included. The findings of this review highlight the need for greater attention to the impact of provider counseling and/or education about contraception. While my findings suggest that women believe their provider influences the choices they make, the nature and "dose" of counseling needed to have an impact remains unclear. Additional research is also needed to determine how characteristics of health care providers, including socio-demographics, influence the contraceptive choices their patients make.

The second paper of my dissertation presented the findings of a secondary data analysis where I examined the importance of several characteristics, or attributes, of contraceptive methods for choosing contraceptive method by several socio-demographics. Further, using explicit hypotheses, I assessed whether the attributes that were important to women were consistent with the contraceptive methods they currently use. Specifically, I hypothesized that women who felt it was important that a method 1) be very effective, 2) doesn't contain hormones, or 3) protects from HIV/STIs would be associated with the corresponding types of methods (i.e. most effective methods, nonhormonal methods, and condoms, respectively). This analysis demonstrated that methods aligned with women's preferences for some attributes but not all. Women who believed it was important that a method didn't contain hormones were less likely to use a hormonal method even after accounting for their preference for a very effective method. Similarly, women who felt it was important that their method be effective at preventing STIs/HIV were more likely to be using condoms, either alone or with another method of

contraception. Contrary to our hypothesis, however, women who believed it was important that a method be very effective at pregnancy prevention were not more likely to use the most effective methods. While there are a number of limitations, including the inability to examined attributes ranked in order of importance, this research provides much needed detail on the role that attributes play in the decision-making process. Further, this study was one of the first linking women's preferences for contraceptive attributes to their method choice. Patient-centered interventions for contraceptive method choice, such as the decision support tool described in my third paper, should have detailed information on the contraceptive attributes women care about. Additional work is needed to describe the complexity of tradeoffs that women make with regards to contraceptive attributes, particularly when to attributes conflict with each other. It is also necessary to assess how accurately women rank methods in terms of the attributes that are important to them. This measurement of women's knowledge can help explain why preferences may conflict with actual behavior.

Lastly, the third study presented in this dissertation was a qualitative exploration of patient perceptions of the value and utility of a contraceptive decision support tool (DST) that can be used in the clinical setting. In this small qualitative study, I conducted semi-structured interviews with female patients of an integrated health care system about their contraceptive decision-making and their thoughts about the DST. The purpose of this project was to better understand how and why the DST could be useful for patients' decision-making. I was particularly interested in identifying the mechanisms through which contraceptive DSTs have an impact in order to develop new and enhance available tools. Based on the thirteen women interviewed, four overarching themes were developed. The first theme was User Friendly, which described the positive user experience provided by the tool, especially as it relates to the way information was organized and categorized in the tool. This theme also covered aspects of the tool that were not completely functional for users. The Educational theme described that the tool increased user's contraceptive knowledge, but did not have all the information that participants were looking for. The third theme, Personalization, described the ability for participants to use the tool in a way that made it personally relevant for them. This included locating information in the tool that was most important to them and finding a method that meet their specific needs and preferences. Finally, the Preparatory theme described how the tool could serve as preparation for a interaction with a health care provider. This study is one of the first to qualitatively assess patient perceptions of a contraceptive DST and describe the utility of the tool. Limitations of the study included the small sample size and recruitment strategy, which does not allow for generalizations to be made. However, the findings about mechanisms of and preferences for use of this tool will help to develop new DSTs. Future studies should consider conducting interviews with a larger sample of women. In this study, it was challenging to identify patterns in the responses to some interview questions. This may reflect the highly individualized nature of contraceptive-decision-making, but could also suggest saturation was not reached. Finally, additional research is needed to determine the essential components of a contraceptive DST as the tools that have been studied have all differed.

The research presented in this dissertation is timely given current research and service delivery agendas highlighting the importance of patient centeredness in contraceptive care. There are a number of important programmatic and policy implications of this work. The findings presented in this dissertation can be used in efforts to improve and increase access to family planning services. For example, based on the findings in Paper #1, an important strategy to increase access to family planning is to create service delivery models that bundle contraceptive

care services with other health care or social services. This may lead to use of more effective contraceptive methods. This research also has implications for the development and implementation of patient-centered interventions. For example, the findings from Paper #2 suggest that some women may be misinformed about the relative effectiveness for contraceptive methods, which may lead them to have a preference for a very effective method for pregnancy prevention but not use one. This has implications for strengthening contraceptive education and counseling interventions to ensure that the concept of effectiveness is presented in a way that women understand. Similarly, the findings from the third study suggest that DSTs should be used prior to an interaction with a health care provider. This information can be used to develop appropriate implementation strategies within clinics that allow DSTs to be most effective for their users. In this way, the completed research can help inform clinical policy. Ultimately, this dissertation research provides information needed to develop and implement clinical interventions that can help women make an informed choice about contraceptive methods, which will help them avoid unintended pregnancy and meet their personal reproductive goals.