I, Aalap Bommaraju, hereby submit this original work as part of the requirements for the degree of Master of Public Health in Public Health - Leadership, Management and Policy.

It is entitled: Determinants of Contraceptive Choice: Factors Affecting Contraceptive Nonuse among Urban Women Utilizing Title X Services

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Determinants of Contraceptive Choice: Factors Affecting Contraceptive Nonuse among Urban Women Utilizing Title X Services

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Abstract

Background: Disparities in unintended pregnancy are partially due to ineffective contraceptive method choice among vulnerable populations. Improved understanding of the ecological, individual, and health system related determinants of contraceptive choice can provide guidance for how to reduce ineffective contraceptive method choice among women at high risk for unintended pregnancy.

Objectives: Secondary data analysis is performed on visit data from women utilizing Title X Family Planning services at the Cincinnati Health Department’s Reproductive Health & Wellness Program (RHWP) to determine the significance of predisposing factors (age, African-American race, education), enabling factors (income, health insurance status, socio-behavioral risks), need factors (having had a recent birth, number of living children) on choosing an ineffective contraceptive method. Mediation analysis is performed to determine if health system factors mediated the effect of these explanatory variables.

Methods: Using data from 1,119 RHWP clients who were not seeking pregnancy, multinomial logistic regression is used to compare pill, patch, and ring users, depot medroxyprogesterone acetate (DMPA) users, and long-acting reversible contraception (LARC) users with a reference group of ineffective method users. Multinomial logistic regression is first performed with all independent variables except health system mediation. Then, it is performed with inclusion of health system mediation. Multiple linear regression analysis is performed to determine significant relationships between independent factors and health system mediation. Mediation analysis is performed for any independent variable that is significantly correlated with both contraceptive method choice and health system mediation for the purpose of determining if any witnessed mediation effect is statistically significant.

Results: The model including health system mediation is found to account for more variance in the data than the model excluding health system mediation (Nagelkerke R-squared = 0.195 and 0.158, respectively). Through both models, and in all three comparisons, higher age is found to reduce the odds of choosing a more effective method with only minor mediation effects. Having more children results in higher odds of both DMPA and LARC uptake in both models and is unmediated by the health system. Being of African-American race results in lower odds of LARC use in both models – a finding that is also not mediated by the health system. Health system mediation effects are found in the LARC and DMPA comparisons and not in the pills, patch, or ring comparison. In the DMPA comparison, inclusion of health system mediation eliminates income and insurance status as significant explanatory variables. In the LARC comparison, inclusion of health system mediation eliminates the explanatory significance of having a recent birth.

Conclusions: Analysis of the role of health system mediation suggests that health system level factors play a large role in explaining contraceptive choice among contraceptive methods that require increased health care utilization. The impact of health system mediation on the significance of other predisposing, enabling, and need variables implies that health care access, utilization, and quality are important factors that should be included in future models for understanding contraceptive choice.
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Chapter 1 – Introduction

Unintended pregnancy is an important health outcome that is closely linked with critical indicators of community health – infant death and preterm birth (U.S. Department of Health & Human Services, 2012). The United States suffers from higher rates of unintended pregnancy than nearly every other nation of similar economic status (Finer & Zolna, 2011; Singh, Sedgh, & Hussain, 2010). Numerous attempts have been made to address the high rate of unintended pregnancy in this country, but progress has been isolated to affluent groups that command the requisite social and economic resources required for preventing unintended pregnancy (Mosher, Jones, & Abma, 2012). While incidence of unintended pregnancy remains stagnant among racial and ethnic minority women, rates of unintended pregnancy have reduced significantly only among white, educated women (Dehlendorf, Rodriguez, Levy, Borrero, & Steinauer, 2010). The reasons underlying these disparities are complex and involve psychological, sociological, and trans-historical processes; however, these disparities are preventable if vulnerable women are afforded the opportunity to choose effective contraceptive methods. Ensuring access to effective contraception for all women is not merely a public health concern; it is a moral imperative that protects a basic human right – that all women should have choice in whether, or when, they will reproduce (Nussbaum, 1999).

This study delves into the factors that drive effective contraceptive choice by performing secondary data analysis on the individual characteristics and health care experiences of a group of 1,119 women who utilized public health services at the Cincinnati Health Department’s Reproductive Health and Wellness Program (RHWP) – a program funded through the Department of Health & Human Services’ (DHHS) Title X Family Planning program (Public Law 91-572). Through the use of a health care access model for understanding contraceptive
choice, this study examines the interplay between ecological context (culture, health system organization), individual determinants, and health system mediation (access, utilization, and quality) in relation to contraceptive choice. Findings from this study can be used to inform future interventions to reduce unintended pregnancy through promotion of contraceptive use.

Chapter 2 of this study reviews the relevant literature that has been published on unintended pregnancy and contraceptive choice. Discussion of unintended pregnancy includes coverage of the methodological problems associated with defining the unintended pregnancy, the consequences associated with it, rates and disparities associated with it, and will end with discussion of the causes of unintended pregnancy. Then, information about efficacy and accessibility of the many different types of contraception available to women is provided. Discussion of theoretical approaches to contraceptive decision-making occurs next. After reviewing the relevant behavioral models for contraceptive choice, a novel health care access model for understanding contraceptive choice in vulnerable populations is unveiled and described.

Chapter 3 describes the methodology used for this study. It begins with a description of the RHWP and explains the data collection methods used in this study. Then, it goes on to discuss each measure used in the study. A statement of hypotheses follows this and the analytic strategy for examining the data is presented. This study uses a mediation model for understanding the effect of health system factors on individual correlates of contraceptive choice.

Chapter 4 illustrates the results of the analysis, providing descriptive, bivariate, and multivariate analysis. Chapter 5 interprets these results and provides explanations for results on a variable-by-variable basis. Implications and limitations of the current study are outlined and
directions for future research are described. Chapter 6 concludes the study and summarizes the findings therein.
Chapter 2 – Review of Related Literature

This literature review has three major goals: (1) to elucidate the importance of unintended pregnancy as an indicator of maternal and child health, (2) to describe the effect of contraceptive choice on the incidence of unintended pregnancy, and (3) to examine the individual and ecological determinants of contraceptive choice using a novel analytical framework.

Section 1 – Unintended Pregnancy

Reducing the rate of unintended pregnancy in the United States is the primary family planning objective in Healthy People 2020 because unintended pregnancy is intimately tied to Healthy People 2020’s leading health indicators for maternal and child health – infant death and preterm birth (U.S. Department of Health & Human Services, 2012). In this section, unintended pregnancy is defined, current trends in unintended pregnancy are described, the consequences of unintended pregnancy to the mother, child, and society are discussed, and possible causes of unintended pregnancy are presented.

Defining Unintended Pregnancy

The study of unintended pregnancy is hampered by the ambiguous nature of the concept itself. The standard measure of pregnancy intention in the United States, embraced by the National Survey of Family Growth (NSFG), involves retrospective classification of a woman’s pregnancy intention after a live birth into one of four types: (1) intended, (2) mistimed by less than 2 years, (3) mistimed by more than 2 years, and (4) unwanted (Mosher, Jones, & Abma, 2012). Mistiming, with respect to pregnancy intention, refers to the amount of time by which the woman would have liked her pregnancy to have been delayed. Within this typology, mistimed and unwanted pregnancies are understood to fall under the umbrella of unintended pregnancy.
The NSFG measure of pregnancy intention is impacted by several kinds of response bias. First, the timing of the response in relation to the individual’s progression through pregnancy affects the reported intention of the pregnancies. Research has shown that individuals later in pregnancy are more likely to report their pregnancy as intended (Bachrach & Newcomer, 1999). Second, the degree of pregnancy mistiming reported by the respondent also has important implications on classification of a pregnancy as unintended. Pulley and colleagues (2002) categorized individuals from the 1995 NSFG into groups according to their degree of pregnancy mistiming and found significant differences between these groups in terms of maternal characteristics, behaviors, and pregnancy outcomes (Pulley, Klerman, Tang, & Baker, 2002). The implication of this study is that collapsing categories of pregnancy intention into the binary of intentional and unintentional does not render an accurate illustration of pregnancy intention. Third, ambivalence or having contradictory feelings towards pregnancy is common among young women before they get pregnant. In a nationally representative sample, Higgins and colleagues (2012) found that over one-third of young women aged 18-29 reported ambivalence towards pregnancy (Higgins, Popkin, & Santelli, 2012). Finally, there are cultural influences in how different communities understand and express the concept of unintentional pregnancy (Gipson, Koenig, & Hindin, 2008).

Since pregnancy intention is ambiguous at the outset of pregnancy, shifting during the course of the pregnancy, resistant to simple dichotomy at the end of pregnancy, and often defined differently by different cultures, finding associations between pregnancy intention and other health outcomes is difficult. It is enough to note that more research into defining and measuring this health outcome should be pursued in the future. For the purposes of this study,
unintended pregnancy will be defined in accordance with the NSFG classification, as retrospective self-reporting of a mistimed or unwanted pregnancy.

Consequences of Unintended Pregnancy

Unintended pregnancy affects individuals, families, and communities in ways that produce tangible effects on health and well-being. Before discussing the individual consequences of unintended pregnancy, it is important to discuss the methodological difficulties in studying the effect of unintended pregnancy.

First, studies of consequences of unintended pregnancy suffer from selection bias. Most large studies of the consequences of unintended pregnancy focus on the pregnancy intention of women who have chosen not to terminate their pregnancy. They also exclude examination of the pregnancy intention of women’s partners despite research showing that the preferences of partners are important in understanding the effect of unintended pregnancy on children (Gipson, Koenig, & Hindin, 2008).

Second, due to the large number of confounding variables involved with analysis of perinatal health outcomes, these studies also suffer from difficulties in establishing causality between unintended pregnancy and downstream health outcomes (Ní Bhrolcháin & Dyson, 2007). Designs to control for these confounding effects have included case-control models that match for numerous socio-demographic factors and fixed effect models using twin babies or intended and unintended siblings. These studies tend to show the effects of unintended pregnancy to be less dramatic than other, less comprehensive, models (Logan, Holcombe, Manlove, & Ryan, 2007).

It is possible that disentangling the effect of unintended pregnancy from other associated factors such as socioeconomic status, family size, and protective health behaviors may not be a
useful method for understanding its relative importance to various health outcomes. By pursuing evidence for causal inferences using these techniques, the researcher is missing the bidirectional relationship between the independent variable and so-called confounding factors. For example, a study may show that when socioeconomic status is controlled for as a confounding variable, unintentional pregnancy (the independent variable) has no association with slower than average child development (the dependent variable). However, unintended pregnancy is itself a dependent variable that is associated with low socioeconomic status. Thus, the interaction between unintended pregnancy and numerous other factors that produce slower than average child development is hidden when the focus is only on the independent effect of unintended pregnancy. These studies, while valuable, are not necessarily the most effective way to understand the effect of unintended pregnancy on the mother, child, family, and society.

Gibson, et al., in their 2008 review of the consequences of unintended pregnancy, developed a framework for systematically understanding the myriad ways in which health outcomes for infant, child, and parent are impacted by pregnancy intention (Gipson, Koenig, & Hindin, 2008). This framework shows that pregnancy intention affects five separate but highly interrelated domains: (1) maternal behavior during pregnancy, (2) birth outcomes, (3) maternal postpartum behavior, (4) infant and child health, and (5) parental and sibling health and well-being. To this framework we will add a sixth domain in order to understand the effect of unintended pregnancy on the broader economic, social, and political climate.

**Maternal Behavior during Pregnancy**

Once a woman finds out she is pregnant, her feelings towards the pregnancy, her cultural attitudes towards abortion, and the financial and legal barriers to abortion in her community will determine if she terminates the pregnancy or decides to proceed with the pregnancy (Gipson,
Koenig, & Hindin, 2008). In the event that an unintended pregnancy is not terminated, research has shown that women reporting unintended pregnancy (defined here as unwanted or mistimed pregnancy) are less likely to perform health protective behaviors during the pregnancy period than women reporting intended pregnancy (Hellerstedt, et al., 1998). For instance, women reporting unintended pregnancy begin prenatal care for pregnancy later than those with intended pregnancies (D'Angelo, Gilbert, Rochat, Santelli, & Herold, 2002; Gipson, Koenig, & Hindin, 2008). Early initiation prenatal care has been associated with improved birth outcomes for the infant (Klerman, et al., 2001).

Women reporting unintended pregnancy have also been shown in research to be more likely to engage in risky prenatal behaviors such as smoking, alcohol consumption, and illicit drug use (Orr, James, & Reiter, 2008). These prenatal behaviors are concurrently associated with the socio-demographic characteristics of the pregnant women reporting unintended pregnancy (Perreira & Cortes, 2006). They are also associated with depression in pregnant women (Field, et al., 2007). Three rigorous studies that used fixed effect models to control for confounding variables have shown no relationship between pregnancy intention and smoking, illegal drug use, alcohol consumption, or caffeine use during pregnancy (Joyce, Kaestner, & Korenman, 2000; Korenman, Kaestner, & Joyce, 2002; Kost, Landry, & Darroch, 1998). It is likely that unintended pregnancy plays some role in the pathway that leads a woman to participate in unhealthy prenatal health behaviors – alcohol use and illicit drug use, for example, have been shown to be factors that are causative of unintended pregnancy in the first place (Naimi, Lipscomb, Brewer, & Gilbert, 2003).
Birth Outcomes

Evidence for the association between unintended pregnancy and adverse birth outcomes such as prematurity and low birth weight is mixed, but points towards a causal relationship between the two (Gipson, Koenig, & Hindin, 2008). Mohllajee and colleagues (2007) showed that infants of mothers whose pregnancies were unintended are more likely to have lower birth weights, increased odds of preterm birth, and increased odds of premature rupture of membranes – a risk factor for infant death (Mohllajee, Curtis, Morrow, & Marchbanks, 2007). Kost and colleagues used a fixed effect model that controlled for socioeconomic and physical characteristics to examine the odds that an individual would have any one of several adverse birth outcomes (e.g. prematurity, low birth weight, small size for gestational age). They found that mothers reporting unwanted (not mistimed) pregnancies had higher odds of having an adverse birth outcome than mothers reporting intended pregnancies. However, once they incorporated risky prenatal behavior into their model, the effects dissipated (Kost, Landry, & Darroch, 1998). Since risky prenatal behavior itself has been associated with unintended pregnancy in other studies described above, it is difficult to discount the Kost study. The effects of unintended pregnancy on birth outcomes are likely indirect. They are mitigated or exacerbated by additional factors that are simultaneously affected by unintended pregnancy.

Any effects of pregnancy intention on birth outcomes come into greater focus when examined with a more useful measure of the pregnancy intention concept than that provided by the NSFG. Sable, et al. constructed a method of evaluating the wantedness of a pregnancy that included survey questions to capture the feelings the woman was having during the pregnancy. These measures of affect towards the pregnancy coupled with the traditional measures of intention created a more nuanced picture of pregnancy intention. The researchers then analyzed
birth outcomes with respect to these new measures of wantedness. Comparing Medicaid recipients to non-Medicaid recipients and black women to white women, they found that pregnancy wantedness was significantly related to very low birth weight among Medicaid recipients and black women, while it was not significantly related among non-Medicaid recipients and white women (Sable, et al., 1997). By enhancing Sable and colleagues (1997) model to focus on smaller populations of more homogenous groups and by paying attention to vastly different cultural and economic understandings of pregnancy, research into unintended pregnancy can yield more useful results. Further research should strive to understand the cultural and socioeconomic processes that define the concept to a given community.

Maternal Postpartum Behavior

Unintended pregnancy is associated with a lower likelihood of breastfeeding and with breastfeeding for a shorter duration in the postpartum period – an effect that remains even when controlling for sociodemographic and physical characteristics of mothers (Gipson, Koenig, & Hindin, 2008). The health protective benefits of breastfeeding to infant and child health have been well documented (American Academy of Pediatrics, 2012; Eidelman & Schanler, 2012). Although no major studies have found an association between pregnancy intention and a mother’s propensity to seek health care services for infants and children, the predominance of unintended pregnancy in low-income minority communities that lack adequate access to quality health care means that cost-effective health protective behaviors such as breastfeeding take on even more importance in these populations (Dehlendorf, Rodriguez, Levy, Borrero, & Steinauer, 2010; Gipson, Koenig, & Hindin, 2008).
Infant and Child Health

There have been only two known prospective cohort studies in the United States (one in 1994 and one in 1980) that tracked neonatal mortality as an effect of unintended pregnancy (Bustan & Coker, 1994; Laukaran & van den Berg, 1980). Both studies focused on the same population of married, privately insured, pregnant women in San Francisco. Increased risk of neonatal mortality was found in women who reported having feelings about their pregnancy that were not positive (Bustan & Coker, 1994; Gipson, Koenig, & Hindin, 2008; Laukaran & van den Berg, 1980).

Beyond the first year of life, the secondary effects of unintended pregnancy through the life course are profound. For example, infants that are born with low birth weights often experience higher incidence of serious medical conditions later in life, suffer from less resilience in the face of stress, and, in certain cases, have poorer educational performance as adolescents (Hack, Cartar, Schluchter, Klein, & Forrest, 2007; Odberg & Elgen, 2011).

The negative effect of unintended pregnancy on child development in the U.S has been shown to exist in at least two studies. Hummer and colleagues (2004) examined data from the 1991 longitudinal follow-up to the National Maternal and Infant Health Survey. They found that unintended pregnancy (as defined in the NSFG), even when adjusting for sociodemographic factors, resulted in poorer parent-reported child health status, lower levels of child activity, and lower scores on the Denver Development Screening Test (Hummer, Hack, & Raley, 2004). Crissey (2005), using the same data set, found similar results despite using a more nuanced formulation of pregnancy intention that included both birth control use and pregnancy intention. In this study, children born of unintended pregnancies had poorer health, displayed less activity, and showed slower development than those born of intended pregnancies (Crissey, 2005).
Unintended pregnancy also has been shown to have serious effects on the prevalence of child abuse (Gipson, Koenig, & Hindin, 2008). In the United Kingdom, Sidebotham, et al. (2003) found 115 victims of child abuse before the age of 6 in a sample of more than 14,000 children. The odds of being a product of unintended pregnancy were nearly three times higher among victims of child abuse than in the non-abused population (Sidebotham & Heron, 2003). It is not altogether surprising that child abuse is more prevalent in situations where pregnancy intention is lacking. The physical, mental, economic, and social impacts of unintended childbearing on parents can disrupt positive relationships between mothers, fathers and their children (Ispa, Sable, Porter, & Csizmadia, 2007).

Parental and sibling health and well-being

Unintended pregnancy can result in serious consequences for mothers, fathers, older siblings, and families. Mothers experiencing births from unintended pregnancies have been shown to experience a higher incidence of postpartum depression than mothers who report intended pregnancies (Christensen, Stuart, Perry, & Le, 2011). These mothers also report physical abuse around the time of pregnancy more often than mothers who had intended pregnancies (Goodwin, et al., 2000). Children experience more deterioration in the home environment and more behavioral problems after the birth of an unintended sibling than they do after an intended sibling is born (Barber & East, 2011). Individuals who have a birth resulting from an unintended pregnancy are more likely to have lower educational attainment and lower income over their lifetime than individuals who do not experience a birth from an unintended pregnancy (Bailey, 2006; Grogger & Bronars, 1993; Logan, Holcombe, Manlove, & Ryan, 2007; Olausson, Haglund, Weitoft, & Cnattingius, 2001). This socioeconomic outcome associated with unintended pregnancy is perhaps one of the most important outcomes for an individual’s health.
Unintended pregnancy can lead to an escapable spiral of increasing costs and decreasing labor supply due to the demands of child rearing. This results in inability to escape from poverty and, as a result, poorer health outcomes over the life course (Shi & Stevens, 2010). It is likely that the socioeconomic impacts of unintended pregnancy to the mother affect every other domain discussed above.

**Economic, social, political consequences**

It is important to remember that losses in socioeconomic status due to unintended pregnancy do not only impact the individual, they also have serious implications for communities, cities, states, and nations as well.

Unintended pregnancy directly results in large public expenditures on prenatal and postpartum care because the highest rates of unintended pregnancy are found among those populations that are uninsured or covered by public health insurance plans such as Medicaid and the Children’s Health Insurance Program (CHIP) (Sonfield, Kost, Benson, & Finer, 2011). In 2006, public entities funded 64% of 1.6 million births resulting from unintended pregnancies. This amounted to $11.1 billion in state and federal government payments for births resulting from unintended pregnancies (Sonfield, Kost, Benson, & Finer, 2011). These expenditures are critical, minimum payments required to preserve the basic human functioning of the mother and child, but they are at risk of being arbitrarily cut due to fiscal austerity on the local, state, and federal level. Interventions to reduce unintended pregnancy can help to minimize public expenditures on unintended births, but must be buttressed by public support to preserve the health of those who experience unintended births.

Perhaps more important than the direct effect of unintended pregnancy on expenditures associated with pregnancy are the important indirect impacts that unintended pregnancy has on
communities. Due to numerous structural changes that have reduced funding for public assistance in the United States since the Reagan era, having a child as an individual in poverty has become a predisposing factor for staying in poverty (Rodgers, Jr. & Payne, 2007). The most important policy change to occur to influence this outcome was the Personal Responsibility and Work Opportunity Reconciliation Act of 1996, also known as welfare reform, which replaced the Aid to Families with Dependent Children (AFDC) program with the Temporary Assistance for Needy Families (TANF) program (O'Connor, 2001). This act makes the task of taking care of a child as a single woman in poverty much more difficult because it places strict limitations on the period of time for which an individual can be on welfare, requiring that a single mother find work or get married within a short time period after having given birth (Johnson & Honnold, 2011). It also makes sure, through reducing welfare payments, that the long-term costs of unintended pregnancy (e.g. child care costs, education costs, health care costs) must be managed on the local and state level. The high variability in socioeconomic conditions across the country means that effective management of these costs to produce less poverty is dependent on the affluence of the community in which an individual resides. Thus, while the means to combat the consequences of unintended pregnancy are spread thinly across the country, the consequences themselves aggregate in the most afflicted communities.

*Rates and Disparities of Unintended Pregnancy*

The United States is unique in its placement as a high-income nation that suffers from a disproportionately high rate of unintended pregnancy when compared to other high-income nations. In 2006, in the U.S., there were 52 unintended pregnancies per 1000 women aged 15-44; in 2008, in Western Europe, there were 32 unintended pregnancies per 1000 women aged 15-44 (Finer & Zolna, 2011; Singh, Sedgh, & Hussain, 2010). Despite numerous public health
interventions to address unintended pregnancy in the U.S., the overall proportion of births attributed to unintended pregnancy has not declined significantly since 1982 (Mosher, Jones, & Abma, 2012). During this period of stagnation, racial and ethnic disparities in unintended pregnancy rates have expanded and the burden of unintended pregnancy in the U.S. has become localized in low-income and minority groups (Dehlendorf, Rodriguez, Levy, Borrero, & Steinauer, 2010).

Disparities between racial and ethnic groups are especially pronounced. From 2006 to 2010, one-fifth of births to non-Hispanic white women were unwanted or mistimed by more than two years. Meanwhile, more than one-third of births to Hispanic women and nearly half of births to black women were similarly unintended (Mosher, Jones, & Abma, 2012). Intersections of minority status with low socioeconomic status and less social support further compound the differences between social groups. Finer & Zolna (2011), using data from the 2006-2008 and 2002 NSFG combined with abortion data from the National Center for Health Statistics, found rates of unintended pregnancy to be highest among women 20 to 24 years of age, women with lower educational status, women with low income, women in cohabiting relationships, women with one previous birth, and women without religious affiliation (Finer & Zolna, 2011). The data shows unambiguously that unintended pregnancy in the U.S. is predominantly a problem for low-income women with weak social supports.

Causes of Unintended Pregnancy

Assembling evidence to rigorously measure causality with respect to unintended pregnancy is difficult due to the multifactorial nature of the health outcome. That being said, unintended pregnancies are likely the product of numerous upstream individual, social, and infrastructural factors that form reinforcing feedback loops – high rates of unintended pregnancy
are correlated with race, income, family size, marital status, and many other factors (Dehlendorf, Rodriguez, Levy, Borrero, & Steinauer, 2010). However, despite the complexity of deriving ultimate causes of unintended pregnancy, the proximate cause of becoming pregnant unintentionally is, in nearly every case, the non-use or inconsistent use of effective contraception (abstinence is a form of contraception).

There are numerous reasons why an individual would not use contraception. Research has shown that individuals participate in unprotected sex because of barriers to accessing contraception, lack of preparation before having sex, and attitudes about the quality of sex when using contraception (Biggs, Karasek, & Foster, 2012). In addition, individuals may not use contraception because they are victims of rape or domestic violence or because their community dictates that contraception is morally inappropriate. All of these reasons are more proximately related to contraception than to choosing whether or not to become pregnant. When a woman who does not have positive intention toward pregnancy is not using effective contraception, her risk of unintended pregnancy is predetermined. Thus, contraceptive choice should be understood as a health behavior that directly affects unintended pregnancy.

If the goal is to prevent unintended pregnancy, focus need not be on understanding the indirect factors that are correlated with unintended pregnancy; instead, it should be on understanding the factors that influence the contraceptive choices that individuals make. In this way, risk of unintended pregnancy can be conceptually understood as being a product of ineffective contraceptive use.

**Section 2 – Contraception**

The previous section has described the numerous negative consequences associated with unintended pregnancy and the link between unintended pregnancy and contraceptive decision-
making. This section focuses on providing background on the different types of contraception currently available to women. It then goes on to expound upon the benefits of effective contraceptive use to individual and community health.

_Contraceptive Efficacy_

Contraception is any method by which pregnancy is prevented. There are many forms of contraception, but some methods of contraception are unequivocally more effective at preventing pregnancy than others. Trussel (2007) sets forward a useful schema for understanding and ranking contraceptive efficacy that involves two concepts – inherent efficacy and user error. Inherent efficacy is the effectiveness of the method in preventing pregnancy if used perfectly, meaning properly and during every sexual encounter. User error is the probability that the contraceptive method will be used improperly, inconsistently, or both. A contraceptive’s efficacy is expressed using these concepts in terms of unintended pregnancy rates among women using the contraceptive with perfect use or with typical use (Trussel, 2007). Typical use unintended pregnancy rate is the most important measure of contraceptive efficacy because it takes into account the probability for user error associated with the method. It is used as the primary metric by which contraceptive effectiveness will be evaluated in this study. In addition to this measure, continuation rates for a contraceptive over time serve as a proxy measure of the acceptability of the contraceptive to the individual user. This rate is used to distinguish between methods with similar typical use pregnancy rates.

Estimates of perfect use efficacy, typical use efficacy, and discontinuation rates in this section come from the seminal work of Hatcher and colleagues (2007) – *Contraceptive Technology, 19th Revised Edition*, an extensive literature review on the various different types of contraceptives.
Types of Contraception

This discussion proceeds to explicate the various different types of contraceptive categories and their relative efficacy in preventing unintended pregnancy. There are a number of contraceptive methods available for women. Examining each method individually is unnecessary for the purposes of this project; instead, the types of contraceptives are considered in terms of several broad categories: (1) ineffective contraceptive methods, (2) hormonal pills, patches and rings, (3) depot medroxyprogesterone acetate (DMPA), (4) long-acting reversible contraception (LARC), and (5) irreversible contraception.

Ineffective Contraceptive Methods

These methods include two main groups of contraception: natural family planning methods and non-hormonal barrier methods.

Natural family planning methods include such contraceptive practices as abstinence, coitus interruptus (withdrawal), and fertility awareness. These methods do not require a client to interact with the medical system in any way and are, as such, much more easily accessible than other methods of birth control. They also are far less stigmatized in conservative communities than pharmaceutical measures for preventing pregnancy likely due to their long history of existence. However, these methods are generally much less effective at preventing unintended pregnancy than pharmaceutical means of preventing pregnancy due to the high levels of human error attributed to the practices.

Non-hormonal barrier methods are methods of birth control that physically block sperm from fertilizing the ovum. These methods include spermicide, the male condom, the female condom, the cervical cap, diaphragm, and the sponge. This discussion focuses on the use of spermicide, male condoms, and female condoms – the other barrier methods that exist have
fallen out of popularity, likely due to the fact that they require a prescription and are often not provided in family planning clinical settings where hormonal methods dominate.

No Method

Individuals that lack any contraceptive method fall into the category of “no method”. Obviously, since there is no method of contraception being used, the probability of pregnancy is high. If they are sexually active, 85% of fertile women who use no method of contraception would become pregnant within one year (Trussel, 2007). If an individual lacks pregnancy intention, having no method of contraception puts one at high risk for unintended pregnancy.

Abstinence

Abstinence, defined here as avoidance of vaginal intercourse, is a commonly prescribed contraceptive method that public policymakers in the United States have wholeheartedly embraced. Despite lacking a strong evidence basis and despite numerous studies exhibiting its deleterious effects on adolescent sexual health outcomes, federal funding for abstinence-only education in secondary schools is appropriated on a regular basis and state governments are moving towards outright bans on more comprehensive sex education for adolescents. Kirby’s (2007) systematic review of abstinence-only education programs versus comprehensive sex education programs illustrated the ineffectiveness of abstinence as a method of contraception. Kirby examined 56 studies which evaluated the effect of abstinence-only and comprehensive sex education programs on adolescent sexual behavior and found that comprehensive sex education programs result in longer delays in sexual initiation and more frequent use of contraception during sexual encounters than abstinence-only programs (Kirby, 2007).

Abstinence is often ineffective in preventing pregnancy because in order for the method to be useful at all it must be used perfectly – that is an individual must always abstain from
vaginal intercourse. Typical use effectiveness rates for individuals reporting abstinence have not been studied due to methodological issues with pursuing this kind of research (Dailard, 2003). Nonetheless, when an abstinence user fails to use abstinence and has vaginal intercourse, they become an individual that is having vaginal intercourse with no contraceptive method. In addition, abstinence (as well as any other natural family planning method) does not protect against pregnancy in cases of rape. This is important to note because of the prevalence of rape in U.S. society – the Bureau of Justice Statistics (2013) estimates that women in the U.S. experienced 270,000 rape or sexual assault victimizations in 2010 (Planty & Krebs, 2013).

Since abstinence is not an effective method of preventing pregnancy in cases of voluntary and involuntary sex, this study will understand the contraceptive method of abstinence to be equivalent to having no method of contraception. A method such as this, which is subject to so many sources of error, cannot be segregated from having no method among women not seeking pregnancy.

**Coitus Interruptus (Withdrawal)**

Coitus interruptus, or the withdrawal method, involves the man pulling his penis out of the woman’s vagina prior to ejaculation. The effectiveness of this method is dependent upon the man’s ability to sense when he will ejaculate. As such, this method is entirely dependent upon the male partner. With perfect use, the withdrawal method can be as effective as most non-hormonal barrier methods – 4% of women using this method perfectly can expect an unintended pregnancy within the first year of use. However, user error can be very high using this method – the typical use unintended pregnancy rate in the first year is 27% (Kowal, 2007). Withdrawal is not effective method because it does not allow for female reproductive control and is prone to user error.
Fertility Awareness

Fertility awareness-based methods involve tracking the menstrual cycle closely to determine periods of infertility. The individual identifies infertile periods and has sex only during those infertile periods. These methods have high effectiveness if used perfectly with between 3%-5% of women experiencing an unintended pregnancy within initial year of use. However, effectiveness of the method is hindered by user error associated with correct identification of fertile periods and abstinence during those periods. The typical use unintended pregnancy rate during the first year of use is 25% (Jennings & Arevalo, 2007). Thus, fertility awareness is a method whose effectiveness is highly dependent upon user error – it is not an effective contraceptive method.

Male and Female Condom

The male condom is a synthetic sheath that is worn over the penis to prevent ejaculate from entering the woman’s reproductive system during vaginal intercourse. This barrier method is highly effective at preventing pregnancy during the first year of use: only 2% of women are estimated to have an unintended pregnancy with perfect use. The male condom also protects against sexually transmitted infections and, as such, should be used simultaneously with other non-barrier contraceptive methods. The male condom has low typical use efficacy because it must be used during every sexual encounter and requires male cooperation in order to be used. Often condoms are not used consistently because they must be put on immediately preceding sex and may be believed to interfere with the intimacy of the sexual encounter. Typical use rates of unintended pregnancy are 15% within the first year of use (Warner & Stieiner, 2007). The female condom is a synthetic sheath that is inserted into the woman’s vagina that blocks sperm from fertilizing the ovum. It functions similarly to the male condom and has similar perfect and typical
use unintended pregnancy rates: 5% and 21% respectively (Gates Jr. & Raymond, 2007). Due to their high typical use unintended pregnancy rates, condoms are best used in conjunction with other better contraceptive methods.

Spermicide

Spermicides are gels, foams, creams, films, or suppositories infused with chemicals that kill sperm on contact. Spermicides are highly ineffective even with perfect use: 18% of women using this method are estimated to experience an unintended pregnancy during the first year of use. With typical use, spermicides are on par with withdrawal and fertility awareness in terms of efficacy – the estimated unintended pregnancy rate for typical use is 29% (Gates Jr. & Raymond, 2007).

Hormonal Pills, Patches, and Rings

Since regulatory approval of the oral contraceptive or “the pill” by the FDA in the late 1960s, it has been clear that, among U.S. women, control over reproduction is best achieved through the use of hormonal contraception (Bailey, 2006). These contraceptives offer women reproductive control that does not require the extensive sexual negotiation, the reduced feelings of sexual pleasure, or the diminished feelings of sexual intimacy that are associated with many barrier methods. However, they are less accessible than barrier methods and natural family planning methods because they often require a prescription from a health care provider. There are many forms of hormonal contraception, but three main categories are discussed here: pills, patches, and vaginal rings.

The Pill

Although there are numerous brands of birth control pills available in the United States, they can be divided into two major classes: progestin-only pills (POPs) and combined oral
contraceptive pills (COCs). Both of these types of pills must be taken daily, at the same time every day. They function to prevent pregnancy through numerous different mechanisms including inhibition or suppression of ovulation, thickening of cervical mucus, and reduced fallopian tube activity. COCs, because of their higher hormonal load, carry more contraindications than POPs. The requirement that these pills be taken every day accounts for the large differential between perfect and typical use unintended pregnancy rates. With perfect use, the first year unintended pregnancy rate is 0.3%; with typical use, the first year unintended pregnancy rate is 8% (Nelson, 2007). Thus, the contraceptive pill is much more effective than barrier and natural family planning methods, but still suffers from a large disparity between perfect use and typical use. This suggests that user error is highly probable with this method. Oral contraceptives cost about $25 per month for uninsured individuals (Bedsider.org, 2013).

The Patch

The patch, brand name Ortho Evra™, is a hormonal contraceptive adhesive that is applied to the skin of the buttocks, upper arm, lower abdomen, or upper torso (Nanda, 2007). A single patch is worn for a week at a time and is replaced three times. Then, during the fourth week, the patch is not worn. In opposition to the contraceptive pill, the patch only requires weekly maintenance to ensure adequate pregnancy prevention. It also is a more forgiving method than contraceptive pills: ovulation inhibition is maintained up to 2 days after the patch is removed (Abrams, Skee, Natarajan, & Wong, 2002). One study of women in the United Kingdom found the patch to be more effective than the pill in reducing unintended pregnancy (Jick, Hagberg, Kaye, & Jick, 2009). As such, despite the perceived benefits of the patch, perfect use and typical use pregnancy rate estimates are the same as they are for the pill: 0.3% and 8%,
respectively (Trussel, 2007). A prescription for the patch costs about $55 per month for the uninsured individual (Bedsider.org, 2013).

The Ring

The vaginal ring, brand name NuvaRing®, is a hormonal ring that is inserted into the vagina and left there for 21 days. It is then removed, the individual has a 7 day ring-free period, and then a new ring is re-inserted. Thus, over the course of a month, the vaginal ring requires less maintenance than either the pill or the patch. Just as with the patch, this possible difference in user error does not translate into increases in perfect use or typical use effectiveness. A review of studies examining the effectiveness of the ring, the patch, and the pill showed no differences in typical use effectiveness between these hormonal methods (Lopez, Grimes, Gallo, Stockton, & Schulz, 2013). The perfect use unintended pregnancy rate estimates is 0.3%; the typical use estimate is 8% (Nanda, 2007). For the uninsured, a prescription for the ring costs about $55 per month (Bedsider.org, 2013).

Depot Medroxyprogesterone Acetate (DMPA)

Depot medroxyprogesterone acetate (DMPA) is a hormonal contraceptive that is injected either subcutaneously or intramuscularly by a health care provider every 12 weeks. It functions to prevent pregnancy through ovulatory inhibition and through thickening of the cervical mucus. It is highly effective in preventing pregnancy and requires no maintenance from the user during the 3 month period of protection. Due to its ease of use, DMPA boasts equivalent perfect use and better typical use unintended pregnancy rate estimates than pills, patches, or vaginal rings. The perfect use failure rate in the first year is 0.3%, the typical use rate is 3% (Goldberg & Grimes, 2007). The large disparity between perfect use and typical use can be attributed to failure to
return to the health care provider for the next contraceptive dose in time. DMPA costs about $25 per month for uninsured individuals (Bedsider.org, 2013).

DMPA is also associated with numerous side effects such as weight gain, depression, and decreased bone density over time (Goldberg & Grimes, 2007). These side effects tend to reduce continuation rates for DMPA users over time. Over 50% of women using DMPA continue use after one year compared with 70% of pill, patch, and ring users (Trussel, 2007). DMPA is, as such, a highly effective contraceptive that has a large adverse-effect footprint.

Long-Acting Reversible Contraception (LARC)

Long-acting reversible contraceptives (LARCs) are novel medical devices that are highly effective at preventing unintended pregnancy over long periods of time, but are easily reversible, allowing for pregnancy later in life. These methods function to eliminate the effect of user error on contraceptive failure rates – they can claim virtually no distinction between perfect and typical use failure rates. In a 2012 study, Winner and colleagues (2012) enrolled a prospective cohort of 7,486 women in a 3 year study where participants were provider their choice of hormonal contraception at no cost. Contraceptive failure rates were found to be much higher among those using the patch, pill, and ring compared with LARC methods even after adjusting for age, education, and pregnancy history (Winner, et al., 2012). There are currently two types of LARC methods available in the U.S.: the intrauterine system or device and the hormonal implant.

Intrauterine Device/Intrauterine System (IUD/IUS)

There are three brands of IUD/IUS available in the U.S. as of 2013: Mirena®, Skyla®, and ParaGard®. Mirena® and Skyla®, both intrauterine systems, contain the pharmaceutical levonorgestrel and function to prevent pregnancy by thickening the cervical mucus, inhibiting
sperm from functioning adequately for fertilization, and suppressing the endometrium from fully developing. ParaGard®, the sole intrauterine device, functions by increasing the immune response in the uterus and fallopian tubes so as to inhibit sperm function (Grimes, 2007). All three of these devices are T-shaped and are inserted by medical service providers into the woman’s uterus. The IUD/IUS, once inserted, remains in the uterus for several years with little to no maintenance until it must be removed and reinserted. Mirena® lasts for 5 years, Skyla® for 3 years, and ParaGard® for 10 years. The devices are highly effective during their protective period: the perfect use rate of unintended pregnancy in the first year after insertion is 0.6% for ParaGard® and 0.2% for Mirena®. The typical use rate is 0.8% and 0.2% for ParaGard® and Mirena®, respectively. The lack of difference between perfect use and typical use sets these devices apart from the previously discussed contraceptive methods. In addition, continuation rates for these devices are significantly higher than they are for other methods of contraception. For ParaGard® and Mirena® continuation rates after one year of use are 78% and 80%, respectively. The evidence is clear that IUDs are a top tier form of protection against unintended pregnancy. For Mirena®, including the insertion procedure, costs for uninsured women are over $600; for ParaGard®, these costs are closer to $500 (Bedsider.org, 2013).

Hormonal Implants

Hormonal implants are tubes or rods that slowly release the hormone progestin into the body to prevent pregnancy. Currently, the most common hormonal implant in the U.S. is known as Nexplanon®. This contraceptive device is the same as an older hormonal implant known as Implanon®, but it includes a next generation applicator that allows for easy insertion. The implant is inserted into the upper arm and remains there for 3 years providing highly effective protection against pregnancy. There is no difference between typical use and perfect use failure.
rates for the device, in either case 0.05% of users experience an unintended pregnancy within one year of insertion (Raymond, 2007). Hormonal implants are as effective as IUDs and boast similarly high continuation rates after one year with 84% of women continuing use after one year (Trussel, 2007). The cost of Nexplanon, including the insertion fee, is near $550 for an uninsured woman (Bedsider.org, 2013).

Irreversible Contraception

Permanent contraception for women comes in the form of female sterilization. Sterilization is achieved through manipulation of the fallopian tube to prevent sperm from reaching the egg. This method of contraception requires inpatient or outpatient surgery and is often done under short-acting general anesthesia. There are numerous techniques that are used to produce the effect of sterilization, but these are beyond the scope of this review. Reported failure rates of tubal sterilization are similar to failure rates for IUDs with 0.5% of sterilized women becoming pregnant within one year of the procedure (Trussel, 2007).

Benefits of Effective Contraceptive Use

This discussion of the various categories of contraception shows the importance of contraceptive choice in predicting an individual’s risk of experiencing an unintended pregnancy. The more effective a method is, the more protection from unintended pregnancy is offered. Lower probability of unintended pregnancy translates to reduced risks for outcomes that are the product of unintended pregnancy.

In addition to avoiding negative outcomes, effectively used contraception provides a woman with control over her reproductive ability. This capability to control reproduction is defined by Nussbaum (1999) as one of several central human functional capabilities – capabilities that are preconditions for “a life in which the dignity of the human is not violated by
hunger or fear or the absence of opportunity” (Nussbaum, 1999, p. 40). For Nussbaum, “having opportunities for sexual satisfaction and for choice in matters of reproduction” is critical to preserving an individual’s bodily integrity (Nussbaum, 1999, p. 41). Thus, when capability to control reproduction is operationalized for the individual, an intrinsic good is realized.

The freedom provided by reproductive control results in extrinsic benefits accruing to the individual, community, and even to the state. The importance of reproductive control to human flourishing is evident through analysis of what has occurred in the United States since the introduction of sexual liberation in the 1960s. After the wide acceptance of the birth control pill in 1960, dramatic increases were seen among women in terms of educational attainment, age at first marriage, and income over the lifetime (Goldin & Katz, 2002). Although all of these associations may not necessarily be causal, it is not unbelievable to intuit a causal framework by which increased reproductive control results in increased economic, political, and social freedom.

Section 3 – Understanding Contraceptive Decision-Making

Due to the varying effectiveness of different contraceptive methods, contraceptive decision-making is a critical health behavior that directly affects individual risk of unintended pregnancy. Despite this, the theoretical basis necessary for understanding this health behavior is not cohesive. Nearly all of the theoretical frameworks and models explaining contraceptive decision-making describe the proximate factors affecting an individual’s choice concerning pregnancy prevention. This narrow focus does not take into account the important structural determinants that set the parameters for these individual decision-making processes. Furthermore, these models cannot describe the consequences of contraceptive decision-making on individual health over the life-course, on community health, or on population health. The
relevant theories and models that have been used in the past to discuss contraceptive choice are presented here. Then, more comprehensive, systems-based theories that can be used to understand contraceptive choice are discussed.

Individual-Focused Theories and Models

Theory of Reasoned Action

Perhaps the most prevalent model for understanding contraceptive behavior is the Theory of Reasoned Action (TRA). The TRA, proposed by Azjen and Fishbein (1980), states that health behaviors are the direct product of an individual’s intentions. These intentions are formed by two constructs – the person’s attitude towards the behavior in question and the perceived social norms surrounding that behavior (Azjen & Fishbein, 1980). All other factors that might affect the performance of a given behavior are extrinsic to these two constructs and are, as such, only affecting the behavior indirectly. Both the attitudes and the perceived social norms connected to the behavior are formed from various beliefs that the individual holds. Beliefs underlying attitudes have two components: likelihood of an important outcome coming to pass and evaluation of the effect of that outcome if it were to come to pass. Beliefs underlying perceived social norms are related to what the external party wants the individual to do and the individual’s motivation to comply with that external party’s wishes (Gilmore, et al., 2002). The TRA has been expanded to include a third construct, perceived behavioral control, because many behaviors that are performed by people are not under complete volitional control (Azjen, 1991). This expansion is the product of the work of Bandura (1986), who showed that feelings of self-efficacy have strong value when predicting individual decisions to take up a given behavior (Bandura, 1986).
The TRA and TPB have been shown to be effective in predicting contraceptive use in small, homogenous populations. The individual constructs of the TRA have been evaluated and have yielded positive results suggesting that this behavioral model for understanding contraceptive use has value (Jaccard, 1990). Jorgenson (1980) found that an individual’s attitude towards contraception is a reliable predictor of contraceptive use in young women (Jorgenson, 1980). Thompson and Spanier (1978) showed that external parties, like sexual partners and friends, significantly affect a woman’s decision to use contraception (Thompson & Spanier, 1978). Herold and McNamee (1982) tied these strands of research together in a study that evaluates both attitude towards contraception, manifested in the concept of sexual guilt, and the effect of perceived social norms, manifested in partner, parental, and peer beliefs. They found that both of these constructs were significant in predicting contraceptive use patterns (Herold & McNamee, 1982).

In one recent study, Hodgson and colleagues (2012) used the TPB as a model for understanding low-income, African-American women’s contraceptive decision-making processes. African-American adult women were asked to speak openly in focus groups about their attitudes about contraception, perceived societal norms surrounding contraception, and about their perceived control over the decision to use contraception. With respect to attitudes, many women in this study expressed negative feelings towards contraception, mistrusting its effectiveness. Family and friends were seen as important sources of information, but male partners were generally believed to be barriers to effective contraceptive choice (Hodgson, Collier, Hayes, Curry, & Fraenkel, 2012). In a different study that focused on adolescent intentions to use the pill, condoms, or both for pregnancy prevention, Craig, et al. (2000) surveyed 705 secondary school students to identify intention to use these various methods. They
found significant associations between contraceptive uptake and variables associated with positive attitudes towards contraceptives (Craig, et al., 2000).

**Health Belief Model**

Another common model that is used to understand contraceptive choice has a similarly narrow focus to the TRA and TPB. The Health Belief Model (HBM) focuses on individual decision-making as the determinative factor leading to acceptance or rejection of preventive health behaviors. It states that individuals rationally or intuitively engage in a cost-benefit analysis of a health behavior before deciding whether or not to accept it (Rosenstock, 1974). The constructs in this model relate to the perceived benefit of the health protective action, the perceived threat of the illness that the action precludes, and the ease by which the individual can perform the behavior.

Proposed in 1966, the HBM held great popularity until recently. It had been shown in numerous studies to be effective in predicting adherence to preventive health behaviors. Janz & Becker (1984) performed a literature review of studies using the HBM model and found that most constructs in the model were predictive of engagement in the health behavior in question (Janz & Becker, 1984). However, a more recent meta-analysis performed by Carpenter (2010) refuted these results, showing that only two of the HBM’s many constructs displayed predictive power in a longitudinal analysis of health behavior compliance (Carpenter, 2010). Within the context of contraceptive choice, the HBM has been shown to be moderately effective at predicting pill use compared with diaphragm use in a population of women attending a suburban family planning clinic (Condelli, 1986). However, since the diaphragm is no longer a common form of birth control, it is unclear if the HBM would be as effective in predicting contraceptive choice.

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Social Cognitive Theory

Similar to the TRA/TPB and HBM, social cognitive theory (SCT) is an individual-choice focused model that has been proposed to study contraceptive use. Social cognitive theory places primary focus on the concept of self-efficacy to the achievement of a positive health behavior. An individual cognitively appraises the health behavior using their knowledge about the health outcome to be avoided, their social influences, and the outcome expectancy associated with adoption or non-adoption of the health behavior. Their sense of self-efficacy is derived from this appraisal and is intimately tied to their performance or non-performance of the health behavior (Bandura, 1986).

Langmore and colleagues (2003) focused on the effect of self-efficacy on adolescents’ contraceptive use using the social cognitive approach. Using data from a sample of 3,577 adolescents from the National Longitudinal Study of Adolescent Health, they found that higher self-efficacy was associated with higher contraceptive use (Longmore, Manning, Giordano, & Rudolph, 2003).

Critiques of Individual-Focused Theories and Models

Traditional critiques of these types of models when they are used to examine health behaviors are centered on a few major issues.

First, the distinction between constructs in these models can be arbitrary. For example, in the case of the TRA/TPB, differences between individual attitudes and social norms (which are considered to be separate constructs by the model) are likely non-existent since individual attitudes and the attitudes of peers, family members, and parents are associated with one other (Park, 2000). Disentangling these entities into discrete variables is not easily accomplished.
Second, individual-choice focused theories are limited in their understanding of the concepts that might influence performance of a health behavior. These theories presuppose that their constructs are the only directly influencing concepts on the health behavior, with all other factors only indirectly influencing behavioral performance (Hale, Householder, & Greene, 2002). Although they allow for the inclusion of indirect variables that may account for environmental factors that affect the health behavior outcome, the fact that these variables are not explicitly included in every formulation of the model reduces the consistency of the model into taking into account environmentally produced influences. As a result, most work done using these kinds of models is centered on the individual’s decision-making process and the influence of their family, friends, and peer group.

Third, the variations between the different approaches outlined above are not altogether clear. Weinstein (1993) argues that each of these models "contain at least a grain of truth [so that] empirical tests typically yield some degree of confirmation, enough to keep the theory under scrutiny from being rejected" (Weinstein, 1993, p. 324). Once reviewed, it becomes clear that each of these models is testing the effect of the same kinds of variables while naming the constructs differently. In a comparative study by Wulfert and Wan (1995), the three theories described above were compared in their efficacy at predicting adolescent intentions to use condoms and practice safer sex. They discovered that each model had the same three conceptually analogous concepts – individual affect towards the behavior, social influence on the behavior, and self-efficacy concerning performing the behavior (Wulfert & Wan, 1995). Thus, it can be argued that these models are not distinct frameworks for understanding behavior. They are only useful in providing evidence for which individual-level constructs affect contraceptive choice.
Individual choice models are not useful comprehensive models for understanding contraceptive choice because they do not explicitly take into account the economic, political and social context in which the behavior is being attempted. The focus on individual behavioral intention and its interpersonal determinants does not take into account the larger social structures that define the parameters in which decisions can be made. When a framework demands that the constructs being measured have close proximity to the outcome of interest, a body of literature cannot be built to evaluate the importance of contextual factors that influence the outcome. Additionally, it is important to evaluate the importance of context because it is often these larger-scale factors that can be affected through public policy. These models would be better utilized if their significant constructs were detached and included within a larger systems-based theory of contraceptive choice.

*Exploring Contraceptive Choice through the Study of Health Care Access*

The study of contraceptive choice as a health behavior is most optimally examined through a health care access framework. These frameworks tend to focus on distilling the factors that cause gross differences in health between racial, ethnic, and socioeconomic groups. This is a valuable pursuit when examining contraceptive choice due to the fact that burden of unintended pregnancy is so highly concentrated in low-income and minority groups (Dehlendorf, Rodriguez, Levy, Borrero, & Steinauer, 2010). Frameworks for studying health care access include explanation of the systemic political, economic, and social antecedents to health outcomes. This is especially important in the case of contraceptive choice because it is a highly charged moral issue within American society. Public understandings of contraception have important effects on political, social, and economic policy concerning contraceptive choice and are important to be included in any model of contraceptive choice. Moreover, using a health care access framework
for understanding contraceptive choice is important because of the medical nature of this particular health behavior. Unlike many other preventive health behaviors, contraceptive choice is a process that occurs primarily in the health care setting because the most effective forms of female contraception require prescriptions or procedures from health care providers. Due to this confluence of factors, any examination of contraceptive choice should occur within the context of a health care access model.

The most well-known model for understanding inequality in health outcomes as a product of health care access was put forward by Aday (2001). This framework is known as the access-to-care framework and takes into account both factors associated with the individual and factors associated with the community in which the individual lives (Aday, 2001). Aday proposes that factors on both the community and individual level interact to determine an individual’s vulnerability to poor health care access and quality (Aday & Andersen, 1981).

Shi and Stevens (2010) improved upon the model put forward by Aday by taking what they call “the next logical step” and making the concept of vulnerability central to their theoretical framework (Shi, Stevens, Lebrun, Faed, & Tsai, 2008, p. S46). In their schema, vulnerability implies susceptibility to a poor health outcome. In the case of contraceptive choice among women without intentions of becoming pregnant, vulnerability to unintentional pregnancy can be defined as susceptibility to choosing an ineffective contraceptive method. The rationale for this definition rests on the understanding that (1) choosing no method of contraception results in a very high risk for unintended pregnancy among sexually active individuals and (2) the various available contraceptive methods carry vastly different typical use effectiveness and discontinuation rates.
The Shi and Stevens model expands upon Aday’s model by centralizing vulnerability as a product of multifaceted ecological and individual antecedents. Their model, unlike Aday’s, allows for the analysis of layered individual and social disadvantages to be understood in context. This approach is consistent with intersectional approaches to social justice that defend against universalizing understandings of minority groups (Cho, Crenshaw, & McCall, 2013). In addition, this approach allows for public policy to be operationalized towards alleviating vulnerability as a means to resolve health inequalities.

Figure 1. Theoretical Framework for Studying Contraceptive Choice in Vulnerable Populations
Components of the General Framework to Study Vulnerable Populations

The multifactorial Shi and Stevens framework (applied to contraceptive choice in Figure 1) contextualizes and analyzes vulnerability to a given health outcome. There are two levels of risk factors in this model – the ecological (or community) level and the individual level. The three categories of risk factors in each of these levels interact with one another. Ecological level risk results in increased individual risk and eventually contributes to individual vulnerability to a negative health outcome. Vulnerability then interacts with the health care system so that both access to care and quality of care received are affected. The intersection of these three concepts (vulnerability, health care quality, and health care access) results in individual health outcomes. These aggregated individual health outcomes then manifest as community health outcomes. This section proceeds to describe each part of this framework in detail with examples of these factors as they relate to contraceptive choice.

Defining Predisposing, Enabling, and Need Risk Factors

Before engaging with the complexity of the framework itself, it is important to start with some basic definitions of predisposing, enabling, and need risk factors. These definitions establish the basis of the following discussion and are based on the work of Aday and Andersen (1974). Predisposing factors are those which are associated with individual propensity to use preventative health services. Enabling factors are factors associated with the resources available to the individual or community to combat poor health. Need factors are those which are associated with the pressing need for medical care in the individual or the community (Aday & Andersen, 1974).
Ecological-Level Predisposing Factors

On the ecological level, predisposing factors are defined as those factors that incline a population to higher incidence of a given negative health outcome. These factors are far less easily measurable than individual-level predisposing factors, but they are of critical value nonetheless. Ecological-level factors are best understood as methods for giving context to the study of vulnerability. Attributes that can be understood as ecological predisposing factors can include the area’s political and social milieu, concentration of vulnerable populations, or level of environmental exposure intrinsic to the built environment (Shi & Stevens, 2010).

Ecological-Level Enabling Factors

Enabling factors within the ecological level include those factors that militate against predisposing factors to allow an individual to prevent negative health outcomes. Examples include community resources available to combat the health issue, socioeconomic status of the community at-large, and health care delivery system factors (Shi & Stevens, 2010).

Ecological-Level Need Factors

Ecological-level need factors are analogous to the community’s health risks. When community health risks are prevalent, they tend to influence individuals to seek out and access medical care. Examples need factors might include pollution levels in the community, the number of health promotion activities that occur in a given community, or the level of violent crime within a community (Shi & Stevens, 2010).

Individual-Level Predisposing Factors

Individual predisposing factors for poor health outcomes include many factors that people generally have little to no control over. These factors include demographic factors (age,
gender), inherited belief systems (religion, culture), and factors associated with social position (access to social resources, race or ethnicity) (Shi & Stevens, 2010). When looking at the health outcome of poor contraceptive choice, sexually conservative belief systems, manifest through high degrees of individual sexual guilt, detract from effective use of contraception (Herold & McNamee, 1982). Race and ethnicity, as well as education, have been shown in numerous studies to be critical variables in predisposing individuals to poorer contraceptive choices (Borrero, Schwarz, Creinin, & Ibrahim, 2009; Dehlendorf, et al., 2011; Hodgson, Collier, Hayes, Curry, & Fraenkel, 2012).

**Individual-Level Enabling Factors**

Individual-level enabling factors are characteristics of the individual that can work to mitigate against poor health outcomes. These factors include those closely associated with socioeconomic status such as income, education level, health insurance status and employment status (Shi & Stevens, 2010). Individual-level enabling factors in the study of contraceptive choice include income level, health insurance status, and socio-behavioral characteristics. Research has shown that having low-income is associated with choosing less effective contraceptive methods (Dehlendorf, Rodriguez, Levy, Borrero, & Steinauer, 2010; Frost & Darroch, 2008; Gaydos, Neubert, Hogue, Kramer, & Yang, 2010). In addition, lack of health insurance has been shown to be a strong predictor of choosing a less effective contraceptive method (Culwell & Feinglass, 2007).

Socio-behavioral factors also have a strong influence on the individual to choose more or less effective contraceptive methods. These factors, which are often embodied as constructs of individually-focused decision-making models like those described above, are undoubtedly significant determinants of an individual’s choice to use effective contraception. Poor mental
health, manifest in terms of depression, has been shown to negatively affect an individual’s interest in preventing an unwanted pregnancy through contraception (Kowaleski-Jones & Mott, 1998). Substance abuse, a critical presence in many sexual experiences, has been shown to play an important role in degrading consistent contraceptive method use (Wilson, et al., 1999). The effect of sexual coercion and domestic violence against women seeking contraception has been shown to retard contraceptive use (Gutierres & Barr, 2003). Lack of social support for contraceptive use from family, friends, or partners is correlated with higher rates of non-use of contraception (Hodgson, Collier, Hayes, Curry, & Fraenkel, 2012; Wilson & Koo, 2008). Finally, having multiple partners, described as having casual partners, has been shown to be significantly correlated with non-use of contraception (Norris, Ford, Shyr, & Schork, 1996).

**Individual-Level Health Need Factors**

Individual-level health need factors describe the effect of an individual’s health status on their likelihood of having a negative health outcome. These factors can include such health risks such as positive STI/HIV/AIDS status, mental illness in the form of depression, recent birth of an infant with low birth weight, or intimate partner violence. For example, among African-American youth, poor contraceptive choice and ineffective contraceptive use has been associated with previous sexually transmitted infection (Miller, Boyer, & Cotton, 2004). Clinical depression among low-income, urban post-partum mothers has also been associated with poor contraceptive choice (Garbers, Correa, Tobier, Blust, & Chiasson, 2010). Finally, intimate partner violence has been shown to reduce the odds of an abused woman using her preferred form of contraception (Williams, Larsen, & McCloskey, 2008).
Vulnerability as a Result of Individual and Ecological Factors

Ecological-level predisposing, enabling, and need factors interact with one another to produce a context that sets the parameters for individual predisposing, enabling, and need factors to interact. These individual-level factors produce vulnerability to poor contraceptive choice. Dependent upon the interaction of individual vulnerability with the health system’s organization and financing, vulnerability will either be translated into the outcome of poor contraceptive choice or it will be overcome and result in effective contraceptive choice.

Health Care Delivery System Factors

Entry into the health care system and quality of care provided are two factors that are part of the health care delivery system with which the individual interacts. The health care delivery system can result in abatement of vulnerability to allow for positive health outcomes, or vice-versa. Access and quality are two factors that are the product of the health system’s resources and organization. Resources refer to the availability of providers and clinics that are accessible to the individual in question, or in other words, what is available to clients. Organization refers to the way in which resources are operationalized – what do clients get when they access health care resources (Aday & Andersen, 1974).

Health care system factors are of great importance to mitigating vulnerability to poor contraceptive method choice. Two distinct U.S. interventions have shown increases in client acceptance of more effective contraception that are attributable to increased accessibility to care, standardized quality of care, and increases in the range of contraceptives available at clinical sites (Brindis, et al., 2003; Peipert, Madden, Allsworth, & Secure, 2012). Furthermore, it has been shown that lack of cultural competence in the family planning setting, evidenced through
provider-client language discordance, pushes individuals to choose less effective contraceptive methods (Thiel de Bocanegra, Rostovtseva, Cetinkaya, & Rundel, 2011).

**Individual-Level Health Outcomes**

Within this framework, the interaction between vulnerability and health system related factors produces physical, mental, and social health outcomes for the individual. In this application of the theoretical framework, the health behavior of contraceptive choice is the determinative factor that measures the health outcome of interest – risk of unintended pregnancy. Choice of ineffective contraceptive methods is directly linked to increased risk of unintended pregnancy and, as described in the section on the consequences of unintended pregnancy, unintended pregnancy is associated with myriad deleterious health outcomes for the mother, the child, and the family.

**Ecological-Level Health Outcomes**

Ecological-level health outcomes include population health indicators such as infant mortality for a given community as well as community cohesion indicators such social participation (Shi & Stevens, 2010). When discussing the ecological-level outcomes related to contraceptive choice, it is important to keep in mind the indicator of infant mortality as an important measure of community health. Through the pathways discussed above, increased adherence to effective contraception results in reduced incidence of unintended pregnancy which thereby results in reductions in the community’s infant mortality rates.

**Section 4 – Conclusion**

This literature review provides a broad overview of the relevant research related to unintended pregnancy, contraceptive choice, and theories for understanding the determinants of
contraceptive choice. Unintended pregnancy is an important health indicator for maternal and child health, directly influenced by contraceptive choice, that is difficult to evaluate through research because of its malleable definition. Despite this difficulty, numerous poor health outcomes, ranging from prenatal behavior of mothers to educational attainment of children, have been associated with unintended pregnancy. Unfortunately, these consequences are primarily allocated to those least able to compensate for them – rates of unintended pregnancy are unusually high in the United States among disadvantaged, vulnerable populations. Since the proximate cause of unintended pregnancy is either the non-use or inconsistent use of contraception, understanding the determinants of contraceptive use is the key to reducing these rates of unintended pregnancy. Numerous contraceptive choices, each with varying typical-use effectiveness, are now available to women in the United States, but decision-making about contraception is constrained by numerous individual-level and system-level factors. In the past, behavioral models of contraceptive choice have left out system-level factors concerning access to health care. This literature review challenges those models and proposes a theoretical framework that can be used to understand the systemic effects on individual contraceptive choice. This framework is simplified to ease statistical analysis and is used to analyze the contraceptive choices of women participating in the Cincinnati Health Department’s Reproductive Health and Wellness Program (RHWP) as outlined in the methodology to follow.
Chapter 3 – Methodology

This chapter provides background on the study site then goes on to describe the data collection procedures, and research participants. It continues by describing the measures to be used for the analysis and by explicating the specific hypotheses that form the research question. It concludes with discussion of the analytic strategy that will be used to answer the research hypotheses.

Section 1 – The Cincinnati Health Department Reproductive Health and Wellness Program (RHWP)

The Cincinnati Health Department Reproductive Health and Wellness Program (RHWP) is a grant funded program administered by the Cincinnati Health Department that provides low-cost reproductive health services to low-income men and women in Hamilton County, Ohio – the county in which the city of Cincinnati exists. Funding for the RHWP comes from the Ohio Department of Health by way of the U.S. federal government through the Department of Health & Human Services’ (DHHS) Title X Family Planning program, or Public Law 91-572. Title X Family Planning is the only federal program in the United States whose sole concern is the provision of reproductive health services to men and women. The national program provides family planning services to five million people each year through grants to reproductive health care facilities (Office of Population Affairs, 2011).

Federal regulations governing Title X grantees are stringent and include several critical components. Recipients of Title X funds must ensure that low-income individuals are treated with priority, that family planning services are provided without coercion, and that abortion is not funded as a birth control method (Napili, 2008). Due to the fractured nature of the American health care system, the Title X program plays a critical role in the lives of low-income women in
the United States every day. Publicly funded family planning clinics provide contraceptive services to half of all poor women who use contraception (Gold, Sonfield, Richards, & Frost, 2009). Although many of the lowest income women in the country are covered by public insurance through programs like Medicaid, limited access to reproductive health care due to lack of specialists in underserved communities results in Title X clinics being a primary source of health care (Gold, 2001). In 2008, Title X clinics served some 4.7 million women across the nation with an estimated 1 million unintended pregnancies being avoided due to the program (The Guttmacher Institute, 2012).

Within the realm of publicly funded family planning clinics, there are, broadly speaking, two types of publicly funded clinics that provide contraceptive services: (1) specialized family planning clinics and (2) primary care-focused family planning clinics. Specialized family clinics generally focus on providing the full-range of contraceptive services to their clients with referrals for non-reproductive health related problems. Primary care-focused family planning clinics generally provide fewer contraceptive choices, but provide more comprehensive service for non-reproductive health related problems (Frost, Gold, Frohwirth, & Blades, 2012). Women seeking contraceptive care are more likely to choose specialized family planning clinics than primary care-focused family planning clinics because they often allow for same-day access to contraceptives and more time for contraceptive counseling (Frost, Gold, & Bucek, 2012).

The RHWP is unique in its situation as a system of publicly funded family planning sites that provide specialized family planning services in a primary care focused setting. Operating out of the Cincinnati Health Department’s primary care health centers, the RHWP provides the full gamut of contraceptive methods and detailed contraceptive counseling as part of every gynecological visit with a woman who is capable of becoming pregnant. These health centers
form the bedrock of Cincinnati’s health care infrastructure for vulnerable individuals – thus, they are important sites for the provision of contraceptive services.

When an individual is eligible for RHWP services, they are provided with access to and information about the full-range of contraceptive options along with an option to have a comprehensive gynecological visit. In order to reduce financial barriers to contraceptive access for uninsured individuals, discounts for services are issued based on a sliding scale that assesses the individual’s income and family size as a percent of the federal poverty guideline. This sliding scale allows many clients to qualify for completely free services. In addition, within the Cincinnati Health Department, fees assessed to individuals who are required to pay partial or full amounts are often negotiable and are not collected through formal mechanisms such as collection services. Thus, barriers to contraceptive use due to financial reasons are ideally minimized.

Section 2 – Data Collection & Participants

This study uses a pre-existing, de-identified dataset compiled by the Cincinnati Health Department’s Reproductive Health and Wellness Program (RHWP). Both the University of Cincinnati Institutional Review Board and the Cincinnati Health Department Institutional Review Board approve this study (see Appendix A and B).

The data were obtained by medical service providers from clients of the RHWP through the period 3/23/2012 to 2/28/2013. They were then entered into a database by RHWP personnel. The data were then exported into a de-identified Excel spreadsheet. This de-identified Excel spreadsheet is used for secondary data analysis.

Individuals are included in this study if they: (1) received services from the Cincinnati Health Department’s Reproductive Health and Wellness Program (RHWP) during the period 3/23/2012 through 2/28/2013, (2) were female, and (3) were 16 years old or older. Individuals
are excluded if they: (1) were seeking pregnancy or were pregnant when they received services through the RHWP, (2) were not capable of becoming pregnant at the time of their visit, or (3) do not match the inclusion criteria.

Section 3 – Measures

This study uses the vulnerability framework for understanding contraceptive choice described above (see Figure 1) as the basis for understanding the significant factors affecting contraceptive choice in the RHWP population. Since ecological factors were static during this study period, this analysis focuses on individual-level factors. Thus, ecological-level factors are discussed for the purpose of providing context to the study. Then, the primary foci of the analysis, individual-level factors, are discussed in detail.

Ecological-Level Predisposing Factors

Ecological predisposing factors to vulnerability to poor contraceptive choice include the increased stress on the health system attributable to poor maternal and infant health outcomes within the Cincinnati community and the cultural disposition of the community to contraception.

Increased stress on Cincinnati’s health system due to poor reproductive health outcomes reduces opportunities for individuals to access contraceptive services. Infant mortality in the city of Cincinnati has been well-documented to be far above the national rates, 6.3 deaths per 1,000 births with an infant mortality rate of 13.4 deaths per 1,000 births in 2009 (Folger, Carlson, Besl, & Lordo, 2012; Mathews & MacDorman, 2012). In addition, both the rate of premature births and the percentage of infants born with low birth weight (less than 2,500 grams) are much higher in Cincinnati than in the outlying county communities (Carlson & Bush, 2013). The presence of these community health indicators has resulted in an increased emphasis on advanced obstetric care for preventing poor birth outcomes. This focus results in less ability for medical service
providers in women’s health to take on new gynecological clients who require preventive services, such as contraception. For example, within the CHD system, clients who are seeking preventive gynecological care are often told that wait times for new appointments at the health center nearest to them are three months away. However, if these clients are found to be pregnant, they do not have to wait for an appointment and are often provided same-day access to an obstetrician. Thus, the focus of the health system on dealing directly with proximate factors associated with poor birth outcomes comes at the expense of preventing unintended pregnancies in the first place.

Due to the large presence of the Roman Catholic Church in the area, and because of this institution’s historical opposition to contraception, Cincinnati’s cultural milieu predisposes individuals to poor contraceptive choice as well. In one 2002 survey of religious congregations in Hamilton County, Catholics were found to make up more than 55% of all religious congregations (Jones, et al., 2002). Predisposition towards poor contraceptive choice likely stems from the effect of religiosity on provider discretion concerning provision of contraceptive counseling. In the Cincinnati area, this process is exemplified by anecdotal reports of certain local birthing hospitals deciding not to provide contraception to women who desire it after delivery on religious principles.

Additional evidence of negative cultural disposition to contraception comes from the lack of comprehensive sex education in the Cincinnati Public School (CPS) system. Although local boards of education in Ohio are required to have policies explaining that any sexual health taught by instructors must be focused on preventing venereal disease through abstinence-only education, education involving sexual health is not required to be taught to all students (33 Ohio Rev. Code., 2009). Thus, in the face of budget shortfalls, sexual health education, even that
involving abstinence-only curriculum, is usually given short shrift in Ohio public schools like CPS. Individuals attending or graduated from CPS schools – which forms the majority of the vulnerable population involved in this study – are less likely to have a knowledge base that would predispose them to contraceptive use because of this factor.

Ecological-Level Enabling Factors

Ecological enabling factors related to contraceptive choice in Cincinnati involve interplay between the iniquitous spatial distribution of health services and public policy initiatives that mitigate this effect.

An ecological enabling factor that inhibits more efficacious contraceptive choice is related to the high level of racial and economic residential segregation that permeates Cincinnati (Stradling, 2003). According to one segregation statistic that measures the evenness of the racial distribution of a given geographic area, Cincinnati was ranked as the 12th most racially segregated city in the U.S (Logan & Stults, 2011). Due to long-term historical processes of oppression, minority individuals living in communities that are segregated from white communities tend to have lower socioeconomic status and economic opportunity (Ludwig, et al., 2012; Sampson, Raudenbush, & Earls, 1997). This results in health care resource imbalances which manifest in egregious ways. Research has shown that neighborhood segregation results in reduced access to health services through spatial maldistribution of medical service providers as well as through provider preference to serve individuals of higher socioeconomic status (Gaskin, Dinwiddie, Chan, & McCleary, 2012; Ko & Ponce, 2013). In the absence of more specific data about the absolute spatial distribution of medical services in Cincinnati, it is possible to make sense of Cincinnati’s medical service distribution through a proxy measure of neighborhood segregation. Using neighborhood segregation scores in this way, it is logical to infer that
minority individuals, living in communities that are highly segregated, will have less access to medical services than their white counterparts. Thus, for minority women seeking to avoid unintended pregnancy, residential segregation means fewer opportunities receive contraceptive counseling services that could lead to an effective contraceptive method.

Limiting the effect of the above negative enabling factor is the prevalence of numerous federally qualified health centers (FQHCs) in the Cincinnati area. As described earlier, the CHD’s five health centers are all FQHCs that provide both primary care and specialized family planning services to any individual in the Cincinnati city limits. Further enabling successful contraceptive choice is the sliding scale of discounts offered to CHD clients through Title X funding. These are infrastructural enabling factors that allow an individual easier access to contraceptive services.

Ecological-Level Need Factors

The critical ecological need factor that affects contraceptive choice in the Cincinnati community is the high burden of sexually transmitted infections in the community. STI incidence in Cincinnati is higher than any other city or county in the state of Ohio (see Table 1). When compared to the surrounding county’s STI burden, it is clear that the majority of cases are localized to the city. These high rates of sexually transmitted disease would likely influence an individual to seek testing and treatment more often, meaning that the individual would have more interaction with the health system. More interaction with the health system increases the likelihood of receiving contraceptive counseling and choosing an effective contraceptive method. Thus, this ecological need factor would be expected to improve contraceptive choice.
Table 1. Comparison of STI Incidence between Cincinnati, Hamilton County, Ohio, and the United States

<table>
<thead>
<tr>
<th></th>
<th>Chlamydia (new infections/1000 population)</th>
<th>Gonorrhea (new diagnoses/1000 population)</th>
<th>Syphilis (new diagnoses/1000 population)</th>
<th>HIV (new diagnoses/1000 population)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cincinnati</td>
<td>2,147.2a</td>
<td>912.0c</td>
<td>119.9d</td>
<td>N/A</td>
</tr>
<tr>
<td>Hamilton County</td>
<td>803.9a</td>
<td>338.9c</td>
<td>45.1d</td>
<td>17.7e</td>
</tr>
<tr>
<td>Ohio</td>
<td>456.6c</td>
<td>145.1c</td>
<td>8.3d</td>
<td>9.6e</td>
</tr>
<tr>
<td>U.S.</td>
<td>457.6b</td>
<td>104.2b</td>
<td>4.5b</td>
<td>19.1f</td>
</tr>
</tbody>
</table>

a Estimates for 2011 (Ohio Department of Health, STD Surveillance Program, 2013)
b Estimates for 2011 (Centers for Disease Control and Prevention, 2013)
c Estimates for 2011 (Ohio Department of Health, STD Surveillance Program, 2013)
d Estimates for 2011 (Ohio Department of Health, STD Surveillance Program, 2013)
e Estimates for 2011 (Ohio Department of Health, 2012)
f Estimates for 2011 (Centers for Disease Control and Prevention, 2013)

The next section shifts focus from the ecological level to the individual level. Discussion of the measures of individual determinants of contraceptive choice that are used in quantitative analysis of contraceptive choice begins. Specific measures of constructs are discussed and their use in this study is justified.

**Individual-Level Predisposing Factors**

Individual-level predisposing factors are usually socially derived factors that influence an individual towards one health behavior over another.

**Age**

Age (in years) is a continuous numerical variable determined on the date of the client’s last visit to the RHWP. This study proposes that with increased age comes decreased use of more effective contraceptive methods. This hypothesis is in opposition to other research which has shown that with increased age and improved decision-making ability comes increased likelihood of contraceptive use (Commendador, 2007; Phipps, Rosengard, Weitzen, Meers, & Billinkoff, 2008). Since much of this research focuses on adolescent populations and due to the importance of knowledge of the available contraceptive methods in determining contraceptive choice, it is
likely that poor experience with older contraceptive methods coupled with lack of knowledge about new contraceptive options results in higher rates of non-adherence to any contraceptive method in older populations (Frost, Lindberg, & Finer, 2012).

Race/Ethnicity

Race or ethnicity is a categorical variable that is self-reported by the client when they are registered at the clinic. In this study, the focus of analysis of race and ethnicity is on self-identification by the client as African-American/Black or not. Although information is gathered on Hispanic origin and affiliation with other racial and ethnic categories, this information is not detailed enough to be useful in understanding the predisposing influence of Hispanic origin on contraceptive method choice. African-American racial identification is important to contraceptive method choice because of meta-analyses which illustrate the disparity in effective contraceptive method choice between African-Americans and whites in the United States (Dehlendorf, Rodriguez, Levy, Borrero, & Steinauer, 2010; Mosher, Jones, & Abma, 2012). The processes that lead to these disparities are complex, but may be rooted in African-American distrust of a predominantly non-African-American medical establishment (Benkert, Hollie, Nordstrom, Wickson, & Bins-Emerick, 2009; Kennedy, Mathis, & Woods, 2007; Nicoladis, et al., 2010). Medicalized family planning may also have a particularly poor reception in this community due to the heinous crimes perpetrated against the African-American community through systematic forced sterilizations that occurred in the southern United States during the last century (Largent, 2011). Thus, it is expected that individuals with African-American race will be less likely to choose the more effective contraceptive method given the invasive, medically driven nature of choosing more effective contraceptive methods.
Education

Education is measured as the highest grade the individual has completed. It is a continuous numerical variable that ranges from 0 to 16. As other studies have shown, increased education usually translates into more effective contraceptive use (Gaydos, Neubert, Hogue, Kramer, & Yang, 2010; Littlejohn, 2012). However, in the case of contraceptive choice, because the knowledge required for contraceptive choice is highly specific and not widely dispersed (Frost, Lindberg, & Finer, 2012), it is possible that education may not be helpful in predicting contraceptive choice. In addition, due to the fact that family planning is not discussed in Cincinnati Public Schools (CPS), it is likely high school graduates from CPS (much of the population served by the RHWP), probably do not have more knowledge of family planning than individuals who did not attend or who dropped out of high school.

Individual-Level Enabling Factors

Individual-level enabling factors are meant to enable an individual to overcome their predisposing reasons for avoiding medical care. If enabling factors are lacking, they can work against an individual’s ability to access care.

Income

Income is a continuous numerical variable that is calculated as a percentage of the federal poverty guideline (FPL). This calculation involves an individual’s annual income and family size (see equations 1 & 2). Clients must provide proof of income within 15 days of their first visit in order to receive sliding scale discounts for services through the RHWP. Individuals lacking proof of income have missing values for income. These missing values were replaced using mean replacement. Fifty-four cases had missing income values replaced through mean replacement.
Higher income is believed to affect contraceptive choice positively due to the fact that increased financial resources allow for easier access to health care services (Aday, 2001). However, because of the interplay between income and health insurance status in the American health care system, having only marginally higher income may predispose individuals to poorer contraceptive choice. This is due to the fact that low income may qualify an individual for Medicaid coverage, while only moderately higher income may disqualify another individual. As a result, minor differences in income can result in major differences in health care access. Research into the plight of low-income, uninsured Americans provides evidence to support this understanding (Shi & Stevens, 2010).

Insurance Status

Insurance status is measured as a binary categorical variable coded as “Uninsured” or “Insured”. Within the RHWP population, most clients are either publicly insured through Medicaid or uninsured. As a result, it is unnecessary to make distinctions between publicly and privately insured individuals in this analysis.

Having health insurance improves accessibility to medical care and allows individuals to receive contraceptive services at no cost through the RHWP (Dehlendorf, Rodriguez, Levy, Borrero, & Steinauer, 2010). As such, it is believed that having health insurance contributes to more effective contraceptive choice.
Socio-Behavioral Risk

Socio-behavioral risk is measured as a binary categorical variable coded as “Has one or more documented socio-behavioral risks” or “Has no documented socio-behavioral risks”. This variable is a composite measure of socio-behavioral risk. A client is determined to have one or more documented socio-behavioral risks if the provider has denoted any of the following risk factors during the client’s term in the RHWP: mental health issues, substance abuse problems, reports of sexual coercion, reports of domestic violence, determination that the client lacks social support, reports of having multiple partners. Although these risk factors are certainly disparately related to one another, they are each individually correlated with inconsistent use or non-use of contraception (Gutierres & Barr, 2003; Hodgson, Collier, Hayes, Curry, & Fraenkel, 2012; Norris, Ford, Shyr, & Schork, 1996; Kowaleski-Jones & Mott, 1998; Wilson, et al., 1999). Thus, the presence of one or more factors as identified by the health care provider, allows for at least minimal understanding of the client’s socio-behavioral risk to no method. Due to the limitations of the pre-existing dataset that this analysis is based, this study must rely on this measure of socio-behavioral risk in place of rigorous survey tools for understanding the construct.

Individual-Level Need Factors

Individual-level need factors describe attributes about an individual’s medical need to seek out health services. The presence of need factors increases an individual’s likelihood to access medical care.

Birth within the Last 18 Months

Birth within the last 18 months is a binary categorical variable coded as “Yes” or “No” that is collected during the client encounter. During their interview with the client, providers in the RHWP note if the individual experienced a birth within the last 18 months. This piece of the
client’s reproductive history is relevant because it implies that the client has a pressing need for contraceptives. Indeed, research has shown that women experiencing a recent birth are more likely to use contraceptives than women who have not ever experienced a birth (Ahluwalia, Whitehead, & Bensyl, 2007). Thus, having a birth within the last 18 months of the visit is predicted to positively affect the client’s contraceptive method choice.

**Number of Living Children (Born to Client)**

Number of living children born to client is a continuous numerical variable. It is collected during the client encounter as well. Just as with the preceding variable, the number of living children that a client has is likely to result in the need to prevent further pregnancy – clients with high numbers of living children are more likely to seek out and get effective contraceptive services than women with low numbers of living children. This construct is important to be considered separately from having a recent birth because it provides information about the woman’s stage in her reproductive life course.

**Health Care System Mediation**

In order to understand the effect of health system level factors in mitigating the vulnerability profile that is produced by individual-level predisposing, enabling, and need factors, a score is created that defines the level of health system mediation that is offered to the client. Instead of treating access to care and quality of care as separate entities, as shown in Figure 1, this analysis of the effect of the health system on contraceptive choice depends upon a calculated score – health care system mediation. This score is a continuous numerical variable ranging from 0 to 3. The three constituent components of the score are (1) source of pay – whether or not the client was asked to pay out of pocket for services, (2) realized health care access – whether or not the client had more than one visit to the RHWP during the study period,
and (3) reproductive life counseling – whether or not the client received specific family planning counseling during the clinical encounter.

**Source of Pay**

Source of pay is coded as 1 for clients who did not have to pay out of pocket at all and 0 for clients who were asked to pay for their services. Individuals coming into the RHWP are not required to pay for services if their income as a percent of FPL is below 100%. Insured individuals are not required to pay for services either because preventive gynecological services usually lack co-pays. Individuals that pay out of pocket are only those uninsured individuals who have incomes above 100% of FPL. Although the CHD health system does not turn away individuals who cannot pay for services, the threat of being asked for payment may dissuade individuals from seeking out more expensive gynecological or family planning services. Indeed, payment of any kind of co-payment has been shown in other vulnerable populations to forego accessing medical care in a meaningful way (Fisher & Hatton, 2010). Thus, having to pay out of pocket is believed to result in poorer contraceptive outcomes for clients.

**Realized Health Care Access**

Realized health care access is coded as 1 if the client had more than one visit and 0 if the client had only one visit. This measure may suffer from some selection bias because all clients did not spend the same amount of time enrolled in the program over the study period. Thus, one might assume that individuals enrolling later in the study period would have a lower probability of having more than one visit. However, analysis shows that by far most individuals returning for a second appointment to the RHWP did so within one week of their initial appointment. As such, by excluding new entrants to the RHWP who enrolled during the final week of the study period, this source of bias can be limited. Since the dataset does not include measures of other barriers to
health care access, this measure of actual access to care can serve as a proxy measure of those other barriers. Individuals with more visits can be said to have fewer barriers to access than individuals with fewer visits. Clients having more visits are expected to choose more effective contraceptive methods.

**Reproductive Life Plan Counseling**

Reproductive life plan counseling is coded as 1 for clients who had one of these counseling sessions and 0 for clients who were not counseled. When a RHWP provider encounters a client, if they have a discussion that involves talking about family planning and contraception, they indicate that the client received a reproductive life plan. These counseling sessions have been shown to be important in reducing negative birth outcomes and improving contraceptive decision-making in clients (Malnory & Johnson, 2011). Having a reproductive life plan counseling session during any visit through the client’s participation in the RHWP is believed to result in improved contraceptive choice.

**Creating the Health Care System Mediation Score**

The health care system mediation score is calculated through adding together the client’s scores for source of pay, realized health care access, and reproductive life plan counseling. For example, if the client experienced all three mediating effects, they would have a health care system mediation score of 3. If the client did not experience any mediating effects, they would have a score of 0.

**Contraceptive Method Choice**

Contraceptive method choice is the dependent variable in this study. It is the contraceptive method that the client has after leaving their final visit to the RHWP during the
study period. Methods are divided into four categories: (1) ineffective contraceptive methods – no method, natural family planning methods, and barrier methods; (2) hormonal pills, patches, and rings; (3) depot medroxyprogesterone acetate (DMPA); and (4) long-acting reversible contraception (LARC) – intrauterine devices, intrauterine systems, and hormonal implants.

Natural family planning and condom use are collapsed into the ineffective contraceptive methods category because, although they can be moderately effective at preventing pregnancy if used consistently, research definitively shows that natural family planning methods are often ineffective and that condom use, even when self-reported as consistent, is rarely so (Trussel, 2007). Thus, in order to understand the determinants of effective family planning methods these individuals using various ineffective methods will be used as a reference group.

Additionally, due to the nature of the population served by the RHWP, injectable contraception, in the form of DMPA, is categorized on its own in this schema despite having similar typical use effectiveness to oral, patch, and ring contraceptives. This is due to the fact that DMPA confers three months of no-maintenance protection from pregnancy and is, as such, more effective among populations with poor access to health services. The added burden of seeking out affordable pharmaceutical supplies for other methods that require more frequent maintenance, such as the oral contraceptive, renders them much more difficult to use than DMPA.

Section 4 – Statement of Hypotheses

This study compares the “Ineffective Family Planning Methods” group with each of the other contraceptive method groups. For each of these comparisons, the following hypotheses were tested.
H1: The predisposing, enabling, and need factors described by the proposed theoretical model are significant in predicting whether or not the client chooses the more effective contraceptive method.

H1a: Individuals with higher age are less likely to choose the more effective contraceptive method.

H1b: Individuals with African-American race are less likely to choose the more effective contraceptive method.

H1c: Individuals with less education are less likely to choose the more effective contraceptive method.

H1d: Individuals with lower income as a percent of federal poverty are less likely to choose the more effective contraceptive method.

H1e: Individuals who are uninsured are less likely to choose the more effective contraceptive method.

H1f: Individuals who have a socio-behavioral risk factor are less likely to choose the more effective contraceptive method.

H1g: Individuals who experienced a birth within the last 18 months of one of their visits are more likely to choose the more effective contraceptive method.

H1h: Individuals who have more living children that were born to them are more likely to choose the more effective contraceptive method.

H2: The significance of the individual-level predisposing, enabling, and need factors in predicting more effective contraceptive method choice reduces for individuals who experience more health system mediation effects.
Section 5 – Analytic Strategy

Analysis of the determinants of contraceptive choice involves (1) univariate analysis of each variable outlined above, (2) bivariate analysis of these predictors with respect to the dependent variable, contraceptive choice, (3) multivariate analysis of these predictors using multinomial logistic regression, and (4) a test for mediation of individual-level predictors by the health care system mediator in the prediction of contraceptive choice. Figure 2 illustrates the analytic framework that is used in this study.

Figure 2. Analytic Framework for Studying Contraceptive Choice among Urban Women Utilizing Title X Services

Univariate analyses include descriptive statistics for all independent and dependent variables. Bivariate analyses between independent variables and contraceptive method choice are performed using t-tests and chi-square tests as appropriate.
Mediation analysis is used in this study in order to determine the mediating effect health system factors. A product of the seminal work by Baron & Kenny (1986), mediation analysis strives to determine the effect of an outside variable on a relationship between two other variables. There are several conditions that must be proven if mediation is believed to be in effect for a given variable. First, the independent explanatory variable must be correlated with the dependent variable of interest. Next, the independent explanatory variable must be shown to be correlated with the mediator. Then, the mediator must be shown to significantly affect the dependent variable when controlling for the independent explanatory variable (Baron & Kenny, 1986).

Once these conditions are met, the change to the independent explanatory variable in the presence of the mediator must be evaluated in terms of its significance in predicting the dependent variable. If a significant independent variable becomes non-significant in these conditions, or if a significant independent variable remains significant but changes in terms of effect size, it is possible that this change is attributable to the mediation effect. In these cases, it is necessary to confirm the presence of the mediation effect using significance testing.

Techniques for performing this sort of significance testing have been plagued with problems due to the difficulties of dealing with continuous mediating and categorical dependent variables (MacKinnon & Dwyer, 1993). Iacobucci (2012) developed a method for detecting the significance of a mediation effect when dealing with data that has categorical dependent variables and continuous numerical mediating variables. This approach requires computing standardized elements from logistic regression and linear regression separately and then combining them to produce a z-score that can be used to determine the significance of the mediation effect (Iacobucci, 2012).
The mediation analysis presented employs multinomial logistic regression as well as multivariate linear regression (see Figure 3). First, multinomial logistic regression is performed using all independent variables described by the analytic framework except for the health system mediation variable. This regression is presented as Model I. The reference group for this analysis is individuals with an ineffective contraceptive method. This group is separately compared to the three remaining contraceptive method groups. Regression coefficients and their attendant standard errors are collected for each parameter used at this stage. Adjusted odds ratios, 95% confidence intervals, and significance are then determined and reported. Independent variables that are not correlated to contraceptive method choice are not included in subsequent mediation analysis.

Next, multivariate linear regression to predict health system mediation score (hereby known as Model II) is performed using all of the independent variables. These regression coefficients with standard errors are collected. Independent variables that are not correlated to the mediator during this regression are not included in subsequent mediation analysis.

After this linear regression, a final multinomial logistic regression (called Model III) is performed using all independent variables and including the mediation variable. Regression coefficients and standard errors are collected with adjusted odds ratios, 95% confidence intervals, and significance being reported.

Z-scores are calculated to determine the significance of any relevant mediation effects using Iacobucci’s method (see equation 3) (Iacobucci, 2012). The regression coefficient \( a \) of the independent variable during the linear regression analysis to predict health system mediation is divided by its standard error \( s_a \) to give \( z_a \). The regression coefficient of the mediation variable \( b \) during the final multinomial logistic regression to predict contraceptive method
choice is divided by its standard error ($s_b$) to give $z_b$. The $z$-score used for significance testing, \( z_{Mediation} \), is calculated using the following equation:

\[
z_{mediation} = \frac{z_a z_b}{\sigma_{zab}} = \frac{a \sqrt{b}}{s_a s_b} \sqrt{z_a^2 + z_b^2 + 1}
\]  

(3)

If the absolute value of \( z_{mediation} \) is greater than 1.96, then the mediation effect is significant. Among those independent variables with significant \( z_{mediation} \) scores, the kind of mediation occurring is determined and reported upon.
Figure 3. Steps to Analyze the Effect of Health System Mediation on Individual-Level Determinants of Contraceptive Choice

**Step One**
- Predisposing
  - Age
  - African-American Race
  - Highest Grade Comp.
- Enabling
  - Income as % of FPL
  - Uninsured Status
  - Socio-Behavioral Risk
- Need
  - Birth within the Last 18 Months
  - Number of Living Children

CONTRACEPTIVE METHOD CHOICE
- No Method vs. Pills/Patch/Ring
- No Method vs. DMPA
- No Method vs. LARC Method

Obtain coefficients, standard error, and significance for each term in each logistic regression function.

**Step Two**
- HEALTH SYSTEM MEDIATION SCORE
  - No Payment for Services (+1)
  - More than one Visit to RH WP (+1)
  - Reproductive Life Plan Counseling (+1)

Obtain coefficient ($a$), standard error ($s_a$), and significance for each term in this multiple linear regression.

**Step Three**
- Predisposing
  - Age
  - African-American Race
  - Highest Grade Comp.
- Enabling
  - Income as % of FPL
  - Uninsured Status
  - Socio-Behavioral Risk
- Need
  - Birth within the Last 18 Months
  - Number of Living Children

Obtain coefficient ($b$), standard error ($s_b$), and significance for the mediating variable in each logistic regression function.

CONTRACEPTIVE METHOD CHOICE
- No Method vs. Pills/Patch/Ring
- No Method vs. DMPA
- No Method vs. LARC Method

Obtain coefficients, standard error, and significance for each term in each logistic regression function.
Chapter 4 – Results

This chapter presents results from the analysis of the determinants of contraceptive choice among women seeking reproductive health services from the RHWP during the period 3/23/12 to 2/2/2013. Since multivariate analysis in this study is based on multinomial logistic regression with women with an ineffective contraceptive method serving as the reference group, this chapter is divided into three separate sections. First, an explanation of excluded cases and a descriptive analysis of the entire study population is presented. Then, results from the comparison of women using the pill, patch, or ring with the reference group are presented. After that, results from the comparison of women using depot medroxyprogesterone acetate (DMPA) with the reference group are presented. Finally, results from the comparison of women using long-acting reversible contraception (LARC) with the reference group are presented. Each of these sections elucidates bivariate comparisons between independent and dependent variables, then goes on to describe the results of multivariate analyses. Evaluation of the mediating effect of health system factors on individual contraceptive choice is presented in those multivariate analyses where it is applicable.

Section 1 – Excluded Cases

In the original dataset of all female clients to the RHWP from the period 3/23/12 to 2/28/13, there were 1,422 female participants and 2,119 visits to the program. Forty-seven participants and 66 visits were excluded because these women were under the age of 16. An additional 91 participants and 109 visits were removed because these women were already sterilized prior to receiving RHWP services. Ninety more participants and 113 more visits were removed because these women were seeking pregnancy. Seventeen participants and 23 visits were removed because the individuals lacked a contraceptive method due to a positive pregnancy
finding during their visit. Finally, 58 participants and 65 cases were removed because these clients either had their first visit to the RHWP during the last week of the study period or because these clients had their first visit to the RHWP before the beginning of the study period. The final study population includes 1,119 female participants and 1,743 visits. All of these clients are 16 or older, not sterilized, not seeking pregnancy, and not pregnant.

**Section 2 – Description of the Study Population**

Participants in the study population have a mean age of 27.3 years (range: 16-53). Nearly three quarters (72.5%) of the population is African-American, 14.4% of participants are of Hispanic origin, and 11.0% are white. The median highest grade completed for the participants is 12 (range: 0-16). Most participants have incomes that situate them well below the federal poverty guidelines – the median income as a percentage of federal poverty is 44.0% (range: 0 – 283.2%). In 2013, this income translates to $5,033.60 per year for a single woman, $6,802.40 per year for a family of two, and $8,571.20 per year for a family of three. Individuals in the study population are predominantly either uninsured (49.5%) or publicly insured (47.6%), with privately insured clients making up only 2.9% of the population. The median number of children that were born to the participants is 1 (range: 0-8) with 13.2% of these women reporting a birth within the last 18 months. Risk factors such as mental health issues, substance abuse, sexual coercion, domestic violence, lack of social support, or multiple partners are present in 11.3% of the population. The vast majority of participants were not charged for the services they received during their visit with only 10.5% paying out of pocket. During the study period, only about one-third (34.3%) of participants had more than one visit to the RHWP. Nearly half (47.5%) of all participants received a counseling session focused on reproductive life planning during the study period. The distribution of contraceptive method choice is relatively uniform – 22.2% of women
use an ineffective method (no method, natural family planning, or barrier method), 23.8% use pills, patches, or vaginal rings, 33.3% use DMPA, and 20.7% use LARC. Table 2 depicts the descriptive results discussed above.

Table 2. Distribution of Predisposing Factors, Enabling Factors, Need Factors, Health System Mediation Factors, and Contraceptive Method Choice among RHWP Clients (n=1119)

<table>
<thead>
<tr>
<th></th>
<th>N or mean (% of Total or Standard Deviation)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total</strong></td>
<td>1119 (100%)</td>
</tr>
<tr>
<td><strong>Predisposing Factors</strong></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>27.32 (6.89)</td>
</tr>
<tr>
<td>African-American Race</td>
<td>811 (72.5%)</td>
</tr>
<tr>
<td>Highest Grade Completed</td>
<td>10.67 (3.46)</td>
</tr>
<tr>
<td><strong>Enabling Factors</strong></td>
<td></td>
</tr>
<tr>
<td>Income as Percent of FPL</td>
<td>51.38 (48.02)</td>
</tr>
<tr>
<td>Uninsured Status</td>
<td>554 (49.5%)</td>
</tr>
<tr>
<td>Presence of at least one risk factor</td>
<td>127 (11.3%)</td>
</tr>
<tr>
<td><strong>Need Factors</strong></td>
<td></td>
</tr>
<tr>
<td>Had a Birth within Last 18 Months</td>
<td>148 (13.2%)</td>
</tr>
<tr>
<td>Number of Living Children</td>
<td>1.47 (1.40%)</td>
</tr>
<tr>
<td><strong>Health System Mediation</strong></td>
<td></td>
</tr>
<tr>
<td>Health System Mediator Score</td>
<td>1.71 (0.80)</td>
</tr>
<tr>
<td>Paid Out of Pocket</td>
<td>117 (10.5%)</td>
</tr>
<tr>
<td>More than One Visit</td>
<td>384 (34.3%)</td>
</tr>
<tr>
<td>Reproductive Life Plan Counseling</td>
<td>532 (47.5%)</td>
</tr>
<tr>
<td><strong>Contraceptive Method Choice</strong></td>
<td></td>
</tr>
<tr>
<td>Ineffective Contraceptive Method</td>
<td>248 (22.2%)</td>
</tr>
<tr>
<td>Pills, Patches, or Rings</td>
<td>266 (23.8%)</td>
</tr>
<tr>
<td>DMPA</td>
<td>373 (33.3%)</td>
</tr>
<tr>
<td>Long-Acting Reversible Contraceptive</td>
<td>232 (20.7%)</td>
</tr>
</tbody>
</table>

**Section 3 – Pill, Patch, or Ring vs. Ineffective Contraceptive Method**

Results from the comparison of the “Ineffective Contraception Method” group with the “Pill, Patch, or Ring” group are segregated into results from bivariate analysis and results from multivariate analysis.
Bivariate Analysis

Chi-square and t-tests in this model of contraceptive choice show that very few independent explanatory variables are significantly associated with choosing the pill, patch, or ring over an ineffective method. Table 3 contains the results of this bivariate analysis.

Table 3. Differences across Predisposing, Enabling, and Need Factors between Clients Choosing Ineffective Contraceptive Methods and Clients Choosing Pills, Patches, or Rings

<table>
<thead>
<tr>
<th></th>
<th>Ineffective Contraceptive Method (n=248)</th>
<th>Pill, Patch, or Ring (n=266)</th>
<th>t or χ² Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Predisposing Factors</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>29.16 (7.58)</td>
<td>26.38 (6.30)</td>
<td>4.54***</td>
</tr>
<tr>
<td>African-American Race</td>
<td>194 (78.2%)</td>
<td>196 (50.3%)</td>
<td>1.45</td>
</tr>
<tr>
<td>Highest Grade Completed</td>
<td>11.38 (2.75)</td>
<td>11.10 (3.31)</td>
<td>1.03</td>
</tr>
<tr>
<td><strong>Enabling Factors</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Income as Percent of FPL</td>
<td>55.39 (53.46)</td>
<td>57.74 (54.35)</td>
<td>-0.49</td>
</tr>
<tr>
<td>Uninsured Status</td>
<td>137 (55.2%)</td>
<td>145 (54.5%)</td>
<td>0.03</td>
</tr>
<tr>
<td>Presence of at least one risk factor</td>
<td>38 (15.3%)</td>
<td>22 (8.3%)</td>
<td>6.19*</td>
</tr>
<tr>
<td><strong>Need Factors</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Had a Birth within Last 18 Months</td>
<td>19 (7.7%)</td>
<td>24 (9.0%)</td>
<td>0.31</td>
</tr>
<tr>
<td>Number of Living Children</td>
<td>1.29 (1.44)</td>
<td>1.11 (1.26)</td>
<td>1.52*</td>
</tr>
<tr>
<td><strong>Health System Mediation</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Health System Mediator Score</td>
<td>1.49 (0.74)</td>
<td>1.56 (0.79)</td>
<td>-1.07</td>
</tr>
<tr>
<td>Paid Out of Pocket</td>
<td>39 (15.7%)</td>
<td>38 (14.3%)</td>
<td>0.21</td>
</tr>
<tr>
<td>More than One Visit</td>
<td>46 (18.5%)</td>
<td>63 (23.7%)</td>
<td>2.03</td>
</tr>
<tr>
<td>Reproductive Life Plan Counseling</td>
<td>115 (46.4%)</td>
<td>125 (47.0%)</td>
<td>0.02</td>
</tr>
</tbody>
</table>

Notes: *** (p < .001); ** (p < .01); * (p < .05)

Among predisposing factors, only age is strongly correlated with choosing pills, patches, or rings over no method (p<.001). Women choosing the pill, patch, or ring (n=266) are significantly younger than women choosing an ineffective method (n=248). African-American race and highest grade completed did not show significant differences between groups. Within the category of enabling factors, individuals with an ineffective contraceptive method are significantly more likely than individuals using pills, patches, or rings to have a socio-behavioral risk factor (p<.05). Uninsured status and income as a percent of the federal poverty line are not significantly different between groups. In terms of need factors, number of living children is significantly lower in clients using pills, patches, or rings than in the reference group (p<.05).
Having a birth within the last 18 months is not significantly different between groups. No health system mediation variables are found to be significantly different between the two groups.

**Multivariate Analysis**

Multivariate analysis illustrates the effect of individual factors while accounting for the effect of other contributing factors. As described in the methodology, several different multivariate analyses have been performed to evaluate the effect of health system mediation on mitigating individual risk factors. Model I uses all independent variables except the health system mediator score to predict pill, patch, or ring choice over ineffective method choice. Model III uses all independent variables including the health system mediator score to predict contraceptive choice. However, since the health system mediator score is not significantly associated with contraceptive choice in Model III, analyzing the effect of health system mediation in this multivariate analysis is not relevant. Table 4 illustrates the results of the multivariate analyses.
Table 4. Independent Correlates of Choosing Pills, Patches, or Rings over Choosing an Ineffective Contraceptive Method

<table>
<thead>
<tr>
<th></th>
<th>Model I (n=1119)</th>
<th>Model III (n=1119)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>AOR (95% CI)</td>
<td>AOR (95% CI)</td>
</tr>
<tr>
<td><strong>Predisposing Factors</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>0.9433***</td>
<td>0.9443***</td>
</tr>
<tr>
<td></td>
<td>(0.9163 – 0.9711)</td>
<td>(0.9172 – 0.9722)</td>
</tr>
<tr>
<td>African-American Race</td>
<td>0.7725</td>
<td>0.7728</td>
</tr>
<tr>
<td></td>
<td>(0.4849 – 1.2307)</td>
<td>(0.4846 – 1.2325)</td>
</tr>
<tr>
<td>Highest Grade Completed</td>
<td>0.9873</td>
<td>0.9842</td>
</tr>
<tr>
<td></td>
<td>(0.9254 – 1.0534)</td>
<td>(0.9222 – 1.0502)</td>
</tr>
<tr>
<td><strong>Enabling Factors</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Income as Percent of FPL</td>
<td>1.0009</td>
<td>1.0013</td>
</tr>
<tr>
<td></td>
<td>(0.9975 – 1.0044)</td>
<td>(0.9977 – 1.0049)</td>
</tr>
<tr>
<td>Uninsured Status</td>
<td>1.0048</td>
<td>1.0176</td>
</tr>
<tr>
<td></td>
<td>(0.6751 – 1.4954)</td>
<td>(0.6799 – 1.5231)</td>
</tr>
<tr>
<td>Presence of at least one risk factor</td>
<td>0.5053*</td>
<td>0.5003*</td>
</tr>
<tr>
<td></td>
<td>(0.2861 – 0.8923)</td>
<td>(0.2832 – 0.8838)</td>
</tr>
<tr>
<td><strong>Need Factors</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Had a Birth within Last 18 Months</td>
<td>1.1315</td>
<td>1.0727</td>
</tr>
<tr>
<td></td>
<td>(0.5909 – 2.1669)</td>
<td>(0.5562 – 2.0687)</td>
</tr>
<tr>
<td>Number of Living Children</td>
<td>1.0042</td>
<td>0.9996</td>
</tr>
<tr>
<td></td>
<td>(0.8535 – 1.1815)</td>
<td>(0.8492 – 1.1765)</td>
</tr>
<tr>
<td><strong>Health System Mediation</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Health System Mediator Score</td>
<td>1.1217</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.8815 – 1.4274)</td>
<td></td>
</tr>
<tr>
<td>-2 Log likelihood</td>
<td>2803.861</td>
<td>2777.361</td>
</tr>
<tr>
<td>Model $\chi^2$</td>
<td>179.460***</td>
<td>225.370***</td>
</tr>
<tr>
<td>Nagelkerke R-Square</td>
<td>0.158</td>
<td>0.195</td>
</tr>
</tbody>
</table>

Notes: *** (p < .001); ** (p < .01); * (p < .05)

Model I and Model III are both statistically significant in predicting method choice (Model I $\chi^2$=179.460, p<.001; Model III $\chi^2$=225.370, p<.001). The Nagelkerke R-Square value for Model III (0.195) is greater than the value for Model I (0.158) implying that Model III accounts for more variance in the logistic regression model than Model I.

In terms of independent variables, this analysis shows that, when controlling for other independent variables, only two of the factors included in the proposed vulnerability model for predicting contraceptive choice have significance. These factors are age and the presence of at least one socio-behavioral risk factor. Both of these factors retain their significance when the health system mediator score is added to the model. In Model I, the odds of choosing the pill,
patch, or ring over choosing an ineffective method are significantly lower with each increasing year of age ($p<.001$). Presence of at least one risk factor results in significantly lower odds of choosing pills, patches, or rings over an ineffective method age ($p<.05$). In Model III, these odds change only slightly. Odds of choosing pill, patch, or ring over an ineffective method remain significantly lower with each year of age ($p<.001$) and with the presence of at least one risk factor ($p<.05$). Again, because the health system mediator score is not significantly correlated with method choice in Model III, mediation analysis is not performed here.

**Section 4 – DMPA vs. Ineffective Contraceptive Method**

Results from the comparison of the “Ineffective Contraception Method” group with the “DMPA” group are segregated into results from bivariate analysis and results from multivariate analysis.

*Bivariate Analysis*

Bivariate analysis through chi-square and t-tests show that most independent explanatory variables are significantly different between women choosing DMPA and women choosing an ineffective contraceptive method. African-American race, presence of at least one risk factor, and reproductive life plan counseling are factors that are not significantly different between these groups. Table 5 contains the results of this bivariate analysis.
Table 5. Differences across Predisposing, Enabling, and Need Factors between Clients Choosing Ineffective Contraceptive Methods and Clients Choosing DMPA

<table>
<thead>
<tr>
<th></th>
<th>Ineffective Contraceptive Method (n=248)</th>
<th>DMPA (n=373)</th>
<th>t or χ² Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Predisposing Factors</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>29.16 (7.58)</td>
<td>26.26 (6.62)</td>
<td>5.05***</td>
</tr>
<tr>
<td>African-American Race</td>
<td>194 (78.2%)</td>
<td>279 (74.8%)</td>
<td>0.96</td>
</tr>
<tr>
<td>Highest Grade Completed</td>
<td>11.38 (2.75)</td>
<td>9.86 (3.80)</td>
<td>5.40***</td>
</tr>
<tr>
<td><strong>Enabling Factors</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Income as Percent of FPL</td>
<td>55.39 (53.46)</td>
<td>42.79 (42.39)</td>
<td>3.27**</td>
</tr>
<tr>
<td>Uninsured Status</td>
<td>137 (55.2%)</td>
<td>158 (42.4%)</td>
<td>9.91**</td>
</tr>
<tr>
<td>Presence of at least one risk factor</td>
<td>38 (15.3%)</td>
<td>45 (12.1%)</td>
<td>1.37</td>
</tr>
<tr>
<td><strong>Need Factors</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Had a Birth within Last 18 Months</td>
<td>19 (7.7%)</td>
<td>58 (15.5%)</td>
<td>8.53**</td>
</tr>
<tr>
<td>Number of Living Children</td>
<td>1.29 (1.44)</td>
<td>1.60 (1.39)</td>
<td>-2.66**</td>
</tr>
<tr>
<td><strong>Health System Mediation</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Health System Mediator Score</td>
<td>1.49 (0.74)</td>
<td>1.80 (0.76)</td>
<td>-4.96***</td>
</tr>
<tr>
<td>Paid Out of Pocket</td>
<td>39 (15.7%)</td>
<td>18 (4.8%)</td>
<td>21.23***</td>
</tr>
<tr>
<td>More than One Visit</td>
<td>46 (18.5%)</td>
<td>146 (39.1%)</td>
<td>2.03***</td>
</tr>
<tr>
<td>Reproductive Life Plan Counseling</td>
<td>115 (46.4%)</td>
<td>169 (45.3%)</td>
<td>0.07</td>
</tr>
</tbody>
</table>

Notes: *** (p < .001); ** (p < .01); * (p < .05)

With respect to predisposing factors, lower age is strongly correlated with choosing DMPA over no method (p<.001) and lower education is significantly associated with choosing DMPA over an ineffective method (p<.001). In terms of enabling factors, there are significant associations between individuals choosing DMPA over an ineffective contraceptive method and having lower income as a percent of FPL (p<.01). There is also a significant association between lacking health insurance and choosing an ineffective contraceptive method over DMPA (p<.01). In terms of need factors, having a higher number of living children and having a birth within the last 18 months are factors that are significantly associated with choosing DMPA over an ineffective method (p<.01 and p<.01, respectively). The health system mediator score is found to be significantly associated with choosing DMPA over an ineffective contraceptive method (p<.001). Examination of the individual of the health system mediator score shows that paying out of pocket is significantly associated with choosing an ineffective method over DMPA.
Having only one visit to the RHWP is associated with choosing an ineffective contraceptive method over DMPA (p<.001).

**Multivariate Analysis**

Multivariate analysis of the independent correlates of choosing DMPA over an ineffective method follows the same methodology described above for the comparison of pill, patch, and ring use versus ineffective method use. Model I uses all independent variables except the health system mediator score to predict DMPA choice over ineffective method choice. Model III uses all independent variables including the health system mediator score to predict contraceptive choice. In this case, however, the health system mediator score is found to be strongly associated with contraceptive choice in Model III. Higher health system mediator scores increase the odds of choosing DMPA over an ineffective method (p<.001). Thus, in this case, mediation analysis is performed using Model II – a multivariate linear regression model employing all predisposing, enabling, and need factors to predict the health system mediator score. Table 6 illustrates the results of these analyses.
Table 6. Independent Correlates of Choosing DMPA over Choosing an Ineffective Contraceptive Method with Multinomial Logistic and Multiple Linear Regressions Testing for Health System Mediation

<table>
<thead>
<tr>
<th></th>
<th>Model I (n=1119)</th>
<th>Model II (n=1119)</th>
<th>Model III (n=1119)</th>
<th>zMediation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>DV: Method Choice</td>
<td>DV: Health System Mediation</td>
<td>DV: Method Choice</td>
<td></td>
</tr>
<tr>
<td></td>
<td>AOR (95% CI)</td>
<td>B (SE B)</td>
<td>AOR (95% CI)</td>
<td></td>
</tr>
<tr>
<td><strong>Predisposing Factors</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>0.9287***</td>
<td>-0.0119**</td>
<td>0.9326***</td>
<td>-2.3090*</td>
</tr>
<tr>
<td>(0.9023 – 0.9559)</td>
<td>(0.0039)</td>
<td>(0.9059 – 0.9601)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>African-American Race</td>
<td>1.0632</td>
<td>-0.1209*</td>
<td>1.0841</td>
<td></td>
</tr>
<tr>
<td>(0.6610 – 1.7101)</td>
<td>(0.0597)</td>
<td>(0.6709 – 1.7516)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Highest Grade Completed</td>
<td>0.8777***</td>
<td>0.0324***</td>
<td>0.8661***</td>
<td>2.7656**</td>
</tr>
<tr>
<td>(0.8263 – 0.9322)</td>
<td>(0.0075)</td>
<td>(0.8148 – 0.9206)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Enabling Factors</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Income as Percent of FPL</td>
<td>0.9962*</td>
<td>-0.0035***</td>
<td>0.9977</td>
<td>-3.2641**</td>
</tr>
<tr>
<td>(0.9925 – 0.9999)</td>
<td>(0.0005)</td>
<td>(0.9939 – 1.0015)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Uninsured Status</td>
<td>0.6619*</td>
<td>-0.1549**</td>
<td>0.6993</td>
<td>-2.2553*</td>
</tr>
<tr>
<td>(0.4496 – 0.9743)</td>
<td>(0.0525)</td>
<td>(0.4728 – 1.0343)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Presence of at least one risk factor</td>
<td>0.6970</td>
<td>0.0390</td>
<td>0.6803</td>
<td></td>
</tr>
<tr>
<td>(0.4252 – 1.1424)</td>
<td>(0.720)</td>
<td>(0.4139 – 1.1181)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Need Factors</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Had a Birth within Last 18 Months</td>
<td>1.5417</td>
<td>0.3946***</td>
<td>1.2938</td>
<td></td>
</tr>
<tr>
<td>(0.8712 – 2.7281)</td>
<td>(0.0687)</td>
<td>(0.7251 – 2.3088)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of Living Children</td>
<td>1.2716**</td>
<td>0.0390*</td>
<td>1.2602**</td>
<td>1.7133</td>
</tr>
<tr>
<td>(1.0975 – 1.4732)</td>
<td>(0.0195)</td>
<td>(1.0866 – 1.4615)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Health System Mediation</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Health System Mediator Score</td>
<td>1.5513***</td>
<td></td>
<td></td>
<td>1.5513***</td>
</tr>
<tr>
<td>(1.2286 – 1.9586)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-2 Log likelihood</td>
<td>2803.861***</td>
<td>2777.361***</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Model χ²</td>
<td>179.460***</td>
<td>225.370***</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nagelkerke RSquare</td>
<td>0.158</td>
<td>0.361</td>
<td>0.195</td>
<td>0.158</td>
</tr>
<tr>
<td>R</td>
<td>0.361</td>
<td></td>
<td></td>
<td>0.361</td>
</tr>
<tr>
<td>R Square</td>
<td>0.130</td>
<td></td>
<td></td>
<td>0.130</td>
</tr>
</tbody>
</table>

Notes: *** (p < .001); ** (p < .01); * (p < .05)

Since multinomial logistic regression is employed, the statistical significance of Model I and Model III remains the same as reported above through all comparison tests. Both models are statistically significant with Model III accounting for more variance than Model I (Model I
$\chi^2=179.460, p<.001$, Nagelkerke R-square=0.158; Model III $\chi^2=225.370, p<.001$, Nagelkerke R-square=0.195. Model II is also found to be statistically significant ($F=20.771$, dF = 8, 1110, $p<.001$). Model II had an R-value of 0.361 and an R-square value of 0.130.

In Model I, numerous independent factors have significance in predicting contraceptive method choice. Higher age decreases odds of choosing DMPA over an ineffective method ($p<.001$). More education reduces odds of choosing DMPA over an ineffective method ($p<.001$). Higher income as a percent of poverty lowers odds of choosing DMPA over an ineffective method ($p<.05$). Having health insurance increases odds of choosing DMPA over an ineffective method ($p<.05$). Having more living children increases odds of choosing DMPA over an ineffective method ($p<.01$). Contraceptive method choice is not significantly associated with being African-American, having at least one socio-behavioral risk, or having a birth within the last 18 months.

In Model III, with the addition of the health system mediator score, some of the significant independent factors found in Model I retain their significance while changing in magnitude. Other significant factors from Model I lose significance altogether. Higher age is still significantly associated with decreased odds of choosing DMPA over an ineffective method in Model III, but effect size is reduced compared to Model I ($p<.001$). Higher education still results in significantly lower odds of choosing DMPA in Model III and effect size is increased as compared with Model I ($p<.001$). Having more living children remains significantly correlated with increased odds of choosing DMPA in Model III, but, just as with age, effect size diminishes when compared to Model I ($p<.01$). Finally, income and uninsured status become non-significant as predictors in Model III.
In order to determine if these differences in effects between Model I and Model III are truly caused by the mediating effect of the health system mediator score, a z-score is calculated using the regression coefficients of significant predictors in Model II. As described in the methodology, mediation is only tested for if the independent variable was correlated to the contraceptive method choice in Model I and also correlated to the health system mediator score in Model II.

Nearly all independent variables are significantly correlated with the health system mediator score in Model II. The only exception is for the enabling factor presence of at least one socio-behavioral risk. Among predisposing factors, higher age is significantly correlated with a lower health system mediator score (p<.01), African-American race is significantly correlated with a lower health system mediator score (p<.05), and having higher educational attainment is significantly correlated with a higher health system mediator score (p<.001). Within the group of enabling factors, higher income is significantly associated with a lower health system mediator score (p<.001) and uninsured status is significantly associated with a lower health system mediator score (p<.01). With respect to need factors, birth within the last 18 months is associated with a higher health system mediator score (p<.001) and number of living children is associated with a higher health system mediator score (p<.05).

The independent factors of importance for mediation testing in this section (age, highest grade completed, income, uninsured status, and number of living children) are all significantly correlated with the health system mediator score in Model II. Thus, mediation analysis of these factors is performed using Iacobucci’s method (Iacobucci, 2012).

The reduction in effect magnitude that occurred to age as a predictor of DMPA choice over ineffective method choice is found to be attributable to health system mediation (p<.05).
This was also the case for education where the increase in effect magnitude is attributable to health system mediation (p<.01). The reduction in effect size that occurred for number of living children between Model I and Model III is not attributable to health system mediation. The loss predictive significance that occurred for income and uninsured status is found to be attributable to health system mediation (p<.01 and p<.05, respectively).

Section 5 – Long-Acting Reversible Contraception vs. Ineffective Contraceptive Method

Results from the comparison of the “Ineffective Contraception Method” group with the “Long-Acting Reversible Contraception (LARC)” group are segregated into results from bivariate analysis and results from multivariate analysis

Bivariate Analysis

Chi-square tests and t-tests are used to evaluate the bivariate relationship between independent variables and choice of LARC over ineffective contraceptive methods. Within the group of predisposing factors, African-American race and highest grade completed are correlated with contraceptive method choice (p<.001 and p<.05, respectively). Age is not correlated with method choice. There are no enabling factors that were associated with choosing LARC over an ineffective contraceptive method. Both need factors, on the other hand, are strongly correlated with choosing LARC over ineffective contraception. Having a recent birth and having more children is associated with increased LARC uptake (p<.001 and p<.001, respectively). In terms of health system mediation, the health system mediation score, not having to pay out of pocket, and having more than one visit re all significantly correlated with choosing LARC over ineffective contraception (p<.001, p<.05, and p<.001, respectively). Table 7 contains the results of this analysis.
Table 7. Differences across Predisposing, Enabling, and Need Factors between Clients Choosing Ineffective Contraceptive Methods and Clients Choosing Long-Acting Reversible Contraception

<table>
<thead>
<tr>
<th></th>
<th>Ineffective Contraceptive Method (n=248)</th>
<th>Long-Acting Reversible Contraception (n=232)</th>
<th>t or χ² Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Predisposing Factors</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>29.16 (7.58)</td>
<td>29.15 (6.74)</td>
<td>1.55</td>
</tr>
<tr>
<td>African-American Race</td>
<td>194 (78.2%)</td>
<td>142 (61.2%)</td>
<td>16.53***</td>
</tr>
<tr>
<td>Highest Grade Completed</td>
<td>11.38 (2.75)</td>
<td>10.71 (3.51)</td>
<td>2.32*</td>
</tr>
<tr>
<td><strong>Enabling Factors</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Income as Percent of FPL</td>
<td>55.39 (53.46)</td>
<td>53.62 (40.40)</td>
<td>0.41</td>
</tr>
<tr>
<td>Uninsured Status</td>
<td>137 (55.2%)</td>
<td>114 (49.1%)</td>
<td>1.79</td>
</tr>
<tr>
<td>Presence of at least one risk factor</td>
<td>38 (15.3%)</td>
<td>22 (9.5%)</td>
<td>3.74</td>
</tr>
<tr>
<td><strong>Need Factors</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Had a Birth within Last 18</td>
<td>19 (7.7%)</td>
<td>47 (20.3%)</td>
<td>16.04***</td>
</tr>
<tr>
<td>Months</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of Living Children</td>
<td>1.29 (1.44)</td>
<td>1.85 (1.42)</td>
<td>-4.27***</td>
</tr>
<tr>
<td><strong>Health System Mediation</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Health System Mediator Score</td>
<td>1.49 (0.74)</td>
<td>1.99 (0.85)</td>
<td>-6.86***</td>
</tr>
<tr>
<td>Paid Out of Pocket</td>
<td>39 (15.7%)</td>
<td>22 (9.5%)</td>
<td>4.21*</td>
</tr>
<tr>
<td>More than One Visit</td>
<td>46 (18.5%)</td>
<td>129 (55.6%)</td>
<td>71.05***</td>
</tr>
<tr>
<td>Reproductive Life Plan</td>
<td>115 (46.4%)</td>
<td>123 (53.0%)</td>
<td>2.12</td>
</tr>
</tbody>
</table>

Notes: *** (p < .001); ** (p < .01); * (p < .05)

**Multivariate Analysis**

Multivariate analysis of LARC choice over choosing an ineffective method closely follows the procedure used for multivariate analysis of DMPA choice over ineffective method choice. As seen before, Model I uses all independent variables except health system mediation to predict LARC choice over ineffective method choice. Model III uses all independent variables including health system mediation to predict contraceptive choice. Since health system mediation is found to be strongly associated with choosing a LARC over ineffective contraception in Model III (p<.001), Model II is employed here as well in order to perform mediation analysis. Model II uses all independent variables to predict health system mediation. Table 8 depicts the results of these analyses.
Table 8. Independent Correlates of Choosing Long-Acting Reversible Contraception over Choosing an Ineffective Contraceptive Method with Multinomial Logistic and Multiple Linear Regressions Testing for Health System Mediation

<table>
<thead>
<tr>
<th>Predisposing Factors</th>
<th>Model I (n=1119)</th>
<th>Model II (n=1119)</th>
<th>Model III (n=1119)</th>
<th>zMediation</th>
</tr>
</thead>
<tbody>
<tr>
<td>DV: Method Choice</td>
<td>AOR (95% CI)</td>
<td>B (SE B)</td>
<td>AOR (95% CI)</td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>0.9541**</td>
<td>-0.0119**</td>
<td>0.9614*</td>
<td>-2.6991**</td>
</tr>
<tr>
<td></td>
<td>(0.9249 – 0.9843)</td>
<td>(0.0039)</td>
<td>(0.9313 – 0.9925)</td>
<td></td>
</tr>
<tr>
<td>African-American Race</td>
<td>0.3991***</td>
<td>-0.1209*</td>
<td>0.4174***</td>
<td>-1.8944</td>
</tr>
<tr>
<td></td>
<td>(0.2493 – 0.6389)</td>
<td>(0.0597)</td>
<td>(0.2581 – 0.6752)</td>
<td></td>
</tr>
<tr>
<td>Highest Grade Completed</td>
<td>1.0076</td>
<td>0.0324***</td>
<td>0.9841</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.9433 – 1.0764)</td>
<td>(0.0075)</td>
<td>(0.9197 – 1.0530)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Enabling Factors</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>DV: Health System Mediation</td>
<td></td>
<td></td>
<td>zMediation</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Income as Percent of FPL</td>
<td>1.0006</td>
<td>-0.0035***</td>
<td>1.0032</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.9667 – 1.0045)</td>
<td>(0.0005)</td>
<td>(0.9991 – 1.0073)</td>
<td></td>
</tr>
<tr>
<td>Uninsured Status</td>
<td>0.7105</td>
<td>-0.1549**</td>
<td>0.7942</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.4630 – 1.0903)</td>
<td>(0.0525)</td>
<td>(0.5133 – 1.2286)</td>
<td></td>
</tr>
<tr>
<td>Presence of at least one</td>
<td>0.5888</td>
<td>0.0390</td>
<td>0.5557</td>
<td></td>
</tr>
<tr>
<td>risk factor</td>
<td>(0.3279 – 1.0572)</td>
<td>(0.720)</td>
<td>(0.3062 – 1.0085)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Need Factors</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>DV: Method Choice</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Had a Birth within Last 18</td>
<td>2.2304***</td>
<td>0.3946***</td>
<td>1.6902</td>
<td>4.1146***</td>
</tr>
<tr>
<td>Months</td>
<td>(1.2343 – 4.0302)</td>
<td>(0.0687)</td>
<td>(0.9233 – 3.0939)</td>
<td></td>
</tr>
<tr>
<td>Number of Living Children</td>
<td>1.3980***</td>
<td>0.0390*</td>
<td>1.3772***</td>
<td>1.8768</td>
</tr>
<tr>
<td></td>
<td>(1.1922 – 1.6394)</td>
<td>(0.0195)</td>
<td>(1.1701 – 1.6209)</td>
<td></td>
</tr>
</tbody>
</table>

| Health System Mediation    |                  |                   |                    |                  |
| Health System Mediator Score |                  |                   | 2.1852***         |                  |
|                           |                  |                   | (1.6914 – 2.8230) |                  |

| -2 Log likelihood          | 2803.861***      | 2777.361***       |                    |                  |
| Model χ²                   | 179.460***       | 225.370***        |                    |                  |
| Nagelkerke RSquare         | 0.158            | 0.195             |                    |                  |
| R                          | 0.361            | 0.361             |                    |                  |
| R Square                   | 0.130            | 0.130             |                    |                  |

Notes: *** (p < .001); ** (p < .01); * (p < .05)

The statistical significance of Model I and Model III is the same as reported above
(Model I χ²=179.460, p<.001, Nagelkerke R-square=0.158; Model III χ²=225.370, p<.001, Nagelkerke R-square=0.195). The statistical significance of Model II also remains the same
because the same model for predicting the health system mediator score used in the above mediation analysis is used here as well (F=20.771, dF = 8, 1110, p<.001, R=0.361, R^2=0.130).

Significant independent correlates of LARC choice over ineffective method choice from Model I include predisposing and need factors, but do not include any enabling factors. Without the influence of health system mediation, higher age is significantly associated with decreased odds of choosing LARC over ineffective contraception (p<.01). African-American racial status is associated with reduced odds of choosing LARC (p<.001). Having a birth within the last 18 months is associated with increased odds of choosing LARC over ineffective contraception (p<.01). Having a greater number of children is also associated with increased odds of choosing LARC (p<.001).

Adding the health system mediator score into Model III changes the effect of these independent variables. Having a recent birth becomes non-significant as an independent predictor in this model. The deleterious effect of increased age on odds of LARC choice is reduced in this model while staying significant as an explanatory variable (p<.05). Reduction in effect size without reduction in significance is found for African-American racial status (p<.001). Number of living children also experiences a reduced effect magnitude in Model III while simultaneously maintaining significance (p<.001).

To determine if these changes in effect magnitude or significance are attributable to health system mediation, a z-score is calculated based on regression coefficients derived from Model II. Higher age, being African-American, higher income, and being uninsured are all significantly associated with a lower health system mediator score in Model II (p<.01, p<.05, p<.001, and p<.01, respectively). Having higher educational attainment, having a recent birth, and having a higher number of living children are all significantly associated with a higher health
system mediator score (p<.001, p<.001, and p<.05, respectively). Having a socio-behavioral risk factor is not significantly associated with the health system mediator score. Since all of the independent factors of significance for the LARC comparison are significantly correlated with health system mediation in Model II, mediation analysis goes forward using Iacobucci’s method (Iacobucci, 2012).

The reduction in effect magnitude occurring to age is found to be significantly attributable to health system mediation (p<.01). The loss of significance that occurred with having a recent birth is also found to be attributable to health system mediation (p<.001). The reduction in effect size that occurred to African-American racial status, on the other hand, is not significantly attributable to health system mediation. Finally, the reduction in effect size that occurred with respect to number of living children is also not significantly attributable to health system mediation.
Chapter 5 – Discussion

This study examines the effect of predisposing, enabling, need, and health system related factors in determining contraceptive choices among urban women utilizing Title X reproductive health services. This chapter interprets the results presented above in order to situate this study within the broader literature concerning the determinants of contraceptive choice. To begin, the unique nature of the study population is described. Then, description and evaluation of the models used to predict contraceptive choice is presented. Following this, there is discussion of multivariate results concerning each individual-level factor. Results from analysis of each factor are couched within the context of mediating health system factors and possible effects due to ecological-level factors. Next, implications of this research for theory and practice are provided. Finally, limitations of this study are addressed and future directions for research are offered.

Section 1 – Study Population

Literature describing the contraceptive choices of women in the United States has often focused on adolescent populations or nationally representative populations (Craig, et al., 2000; Davies, et al., 2006; Frost & Darroch, 2008). This study focuses on an adult population of largely African-American, low-income, urban women within a specified health care context. By specifying a population with documented health disparities (Aday, 2001; Shi & Stevens, 2010) and by describing their ability to access health care within the community context, this study provides an important contribution to the literature on contraceptive choice. In addition, unlike other studies examining family planning specialized clinics, this study is concerned with understanding the effect of the public health infrastructure on contraceptive choices among those receiving gynecological reproductive health services from Title X funded federally qualified health centers (FQHCs).
Section 2 – Models for Predicting Contraceptive Choice

The results of the study show that the model for contraceptive choice that included health system mediation (Model III) is a better predictor contraceptive choice than the model that excludes the mediator (Model I). That health system level factors would have critical influence on contraceptive choice comes as no surprise to researchers coming from disciplines interested in health care access and utilization. However, much of the literature concerning contraceptive choice takes access and utilization of health care for granted – ignoring the reality of health care system for most low-income individuals in the United States (Longmore, Manning, Giordano, & Rudolph, 2003; Weinstein, 1993; Wulfert & Wan, 1995). Although the proposed model of contraceptive choice would likely be enhanced with the inclusion of behavioral information that is relevant to contraceptive decision-making, it is nonetheless useful in understanding the social, economic, and health need determinants that drive individuals to make a choice between an ineffective method and an effective method.

Section 3 – Predisposing Factors

Age

Age is a critical factor in significantly predicting contraceptive choice in each multivariate comparison performed in this study. As hypothesized, individuals who are older have lower odds of choosing effective contraception over an ineffective contraceptive method. This relationship holds true even after inclusion of the health system mediator score into the model for all comparisons. Higher age is significantly associated with lower levels of health system mediation and in Model III the strength of effect attributable to age in predicting contraceptive choice is minutely diminished.
There are several distinct processes that could be responsible for this relationship between age, contraceptive choice, and the health system. The first is related to the life-course perspective that is necessary for understanding a woman’s choice to use contraception. Research has shown that the need for contraception decreases as a woman ages and her intention towards pregnancy becomes more positive (Commendador, 2007; Huber & Huber, 2009; Phipps, Rosengard, Weitzen, Meers, & Billinkoff, 2008). A woman’s need for contraception then increases with age as the financial constraints of child-rearing make the prospect of additional pregnancies unappealing (Bachrach & Newcomer, 1999). Since need for contraception translates directly into need to utilize health services, this explains reduced health system mediation scores being associated with higher age. The health system mediation effect that is observed with respect to age illustrates the effect of the health system in inhibiting positive pregnancy intention, or at least pregnancy ambivalence, among women seeking health services. This understanding is supported by research promoting reproductive life planning as a method for encouraging contraceptive use in populations at risk for unintended pregnancy (Malnory & Johnson, 2011).

A second process that may explain these findings relates to the lack of knowledge of available contraceptive methods among older women. Due to the fact that many contraceptive methods under study here are relatively new, it is possible that older women may have less knowledge of options available to them than younger women (Frost & Darroch, 2008). Under this rationale, health system mediation functions to provide knowledge of the available contraceptive methods to individuals – thereby reducing the independent effect of age on contraceptive choice.

It is also possible that the effect of education on effective contraceptive choice is a result of younger women being more likely to absorb information about contraceptive options than
older women. Older women have been shown to have lower perceptions of risk for becoming pregnant than younger women; thus, messages about using effective contraception are not as important to them and they are more likely to refuse effective contraception (Upson, Reed, Prager, & Schiff, 2010).

**Race/Ethnicity**

Being African-American is a non-significant factor when comparing individuals choosing pills, patches, or rings with individuals choosing ineffective methods in both models. African-American race is also non-significant in the comparison of DMPA users against ineffective method users in both models. It is only in the comparison of LARC users with ineffective method users that being of African-American race is a significant predictive factor. In both models, African-Americans have much lower odds of choosing a LARC method. Being African-American is also significantly associated with lower health system mediation. This relationship between African-American race and LARC uptake is strong and significant even in the presence of the health system mediating factor, which was shown to have no significant mediating influence on this explanatory variable. Thus, being African-American independently results in a reduced level of health care mediation and in a reduced level of LARC uptake.

The finding of lower odds of LARC uptake among African-American women is found elsewhere in the literature on contraceptive choice (Dehlendorf, et al., 2011). The reasons for this occurrence are complex and variegated. One study described reasons for LARC nonuse ranging from ambivalence about pregnancy to faith-based rejection of this invasive contraceptive method (Hodgson, Collier, Hayes, Curry, & Fraenkel, 2012). A possible cultural explanation that may also explain this population’s lower health care mediation scores could be that African-Americans are less inclined to submit to invasive medical procedures due to historical mistrust of
medical service provision related to reproductive health (Benkert, Hollie, Nordstrom, Wickson, & Bins-Emerick, 2009; Kennedy, Mathis, & Woods, 2007; Nicoladis, et al., 2010). In addition, religiosity among African-American women may also play role in African-American women’s cultural understanding of LARC (Bearman & Bruckner, 2001). Further research in understanding the rationale for nonuse of LARC among African-American women would form an important contribution to the current literature. It would also be meaningful for providers counseling African-American clients on available LARC methods.

Education

Education, or highest grade completed, is not significantly independently correlated with choosing pills, patches, or rings over an ineffective method nor is it significantly correlated with choosing LARC over an ineffective method in either model. In the case of choosing DMPA over an ineffective method, however, higher education is associated with lower odds of choosing DMPA in both models. Having higher education is also associated with a higher health system mediation score. Health system mediation has a significant effect on education by slightly increasing the deleterious effect of education on DMPA choice.

These findings contradict the hypothesis that increased education would result in uptake of more effective method. However, couching this result within the context of reproductive health education in the City of Cincinnati allows for an explanation that focuses on the irrelevance of formal education on knowledge of contraception. Since reproductive health education in Cincinnati Public Schools is abstinence-only and does not cover contraception as a method to prevent unintended pregnancy, it is likely that formal education through the public school system does not translate to knowledge of reproductive health issues. The de-linking of reproductive health education from public education would explain the lower odds of choosing
DMPA over an ineffective method and the non-significance of education to choosing the effective method in the other comparisons.

The presence of health system mediation in the model may increase the effect size of education on DMPA uptake due to the unique nature of DMPA as a contraceptive choice that carries numerous side effects both short and long-term (Littlejohn, 2012). Individuals with more formal education may be better equipped to understand the side effects associated with DMPA use than individuals with less formal education. This would result in more highly educated clients choosing an ineffective method over DMPA because of their counseling session with the gynecological care provider.

Section 4 – Enabling Factors

Income

Higher income\(^1\) as a percent of the federal poverty guidelines is significantly associated with choosing an ineffective method over DMPA in Model I. In Model III, however, this significant relationship is lost due to health system mediation. This construct is not significant in the other comparison regressions. This relationship between income and DMPA use in Model I is found to be opposed to the hypothesized relationship, that higher income would improve odds of choosing a more effective contraceptive method.

One explanation for these results focuses on income as a measure of socioeconomic status (SES). Since Model II shows that higher income was associated with lower health system mediation, it can be said that individuals with higher income are less likely to receive support from the public health system. Thus, marginally higher income results in an individual’s

\(^1\) It is important to note that the differences in income that are embodied in the client population are not as large as those found in other nationally representative studies. Nearly all clients that are included in this study have extremely limited financial resources; thus, higher income in this context must be understood to mean only marginally higher income.
classification as “working poor” – a group that is traditionally ignored by the public health care system (Shi & Stevens, 2010). Under this rationale, higher income reduces uptake of DMPA because it increases the financial barriers to accessing care – individuals have less chance of qualifying for public insurance or RHWP discounts. Importantly, in the presence of health system mediation (Model III), the significant relationship between income and DMPA use dissipates. Income, as such, is an effect that is mediated by the health system when considering DMPA use over ineffective method use.

**Insurance Status**

Having health insurance is significantly associated with having higher odds of DMPA choice over ineffective method choice in Model I. It is not significantly associated with contraceptive choice in the other comparisons. In Model III, this relationship becomes non-significant due to health system mediation. These results are in line with the study’s hypothesis and other research showing that uninsured status reduces odds of choosing a more effective contraceptive method (Frost & Darroch, 2008). Since uninsured status is also significantly correlated with lower health system mediation, these findings corroborate research showing that uninsured individuals are less likely to seek out preventive health care such as contraception (Aday, 2001). Insurance status and SES are intimately linked in the United States – the implications of this linkage for contraceptive choice are discussed further on.

**Socio-Behavioral Risk**

Presence of at least one socio-behavioral risk factor is significantly associated with lower odds of using pills, patches, or rings over an ineffective method in both models. Presence of a socio-behavioral risk is not significantly associated with method choice in the other analyses examining DMPA use and LARC use. This finding is in line with the study’s hypothesis and
other research describing the effect of various social and behavioral risks on contraceptive use (Gutierres & Barr, 2003; Hodgson, Collier, Hayes, Curry, & Fraenkel, 2012; Norris, Ford, Shyr, & Schork, 1996; Kowaleski-Jones & Mott, 1998; Wilson & Koo, 2008). However, due to the untested nature of this construct, it is inappropriate to assume that non-significance in DMPA and LARC comparisons is a meaningful finding. A more comprehensive study design, one not predicated on secondary data analysis, is required to better understand the effect of socio-behavioral risks on contraceptive decision-making.

Section 5 – Need Factors

Having a Birth within the Last 18 Months

Having a recent birth is significantly correlated with LARC uptake over ineffective method uptake in Model I and for no other comparisons. This finding confirms this study’s hypothesis and other research findings that having a recent birth results in more effective contraceptive method choice (Ahluwalia, Whitehead, & Bensyl, 2007). This relationship becomes non-significant in the presence of the health system mediator in Model III with the loss of significance being attributable to health system mediation. The strong positive relationship in Model II between having a recent birth and health system mediation score shows that having a recent birth is an important factor that promotes the use of preventive reproductive health care.

Number of Living Children

Number of living children born to the woman is a significant factor in both the analysis of DMPA choice versus ineffective method choice and in the analysis of LARC choice versus ineffective method choice. In both cases, for both Model I and in Model III, having more living children results in higher odds of choosing the more effective method. Although the effect size is
reduced in Model III in both cases, health system mediation is not a statistically significant finding. These results support the research hypothesis that a higher number of living children will result in individuals choosing more effective contraceptive methods. Since having higher numbers of living children also resulted in higher health system mediator scores in Model II, the effect of having numerous living children independently impacts health care access and utilization and contraceptive choice. This is in line with other research that has shown that with more children comes reduced intention towards pregnancy and increased likelihood of seeking out contraceptive services (Ahluwalia, Whitehead, & Bensyl, 2007; Frost & Darroch, 2008). In addition, women with higher numbers of living children are likely to have more familiarity with sources of gynecological care due to their experience with the health system during their previous pregnancies (Aday, 2001; Shi & Stevens, 2010).

Section 6 – Implications for Theory and Practice

SES and Contraceptive Choice

The relationships between socioeconomic enabling factors, health system mediation, and DMPA choice suggest that increased vulnerability to contraceptive nonuse is conferred to individuals who are traditionally not considered vulnerable by society. In Ohio, and in the United States at large, individuals who do not qualify for public insurance, chiefly Medicaid, are largely uninsured. These individuals tend to have incomes that qualify them as above poverty, but in practical terms they live in similar poverty to those below the poverty level. Thus, due to their marginally higher SES, they are dissuaded from accessing health care to meet preventive health care needs until they slip into deeper poverty and begin to qualify for public assistance. This process is perhaps more evident in the use of DMPA over other contraceptive methods because
The effective use of DMPA requires visits to the health center every 3 months to receive an injection. Thus, DMPA use is predicated upon having stable, affordable health care access.

The Affordable Care Act (ACA) (Public Law 111-148), passed in 2010, proposes to address the inequities exposed here by increasing access to both public and private insurance and by mandating free contraceptive coverage for women. However, implementation of the ACA is occurring slowly and, at the time of this writing, the Ohio legislature has refused to expand Medicaid coverage in the state (Blackwell, 2013).

**Culture and Contraceptive Choice**

This study indicates that cultural understandings of what constitutes effective and appropriate contraception are of critical value to contraceptive decision-making. This is evidenced in the much lower odds of LARC use among African-American women than non-African-American women. This study reveals that reduced LARC use within this population cannot be attributed wholly to health care utilization. There are other socio-behavioral factors that must be considered when trying to unpack the determinants of contraceptive use. These factors include the individual’s trust in health care providers, the individual’s social support in pursuing a contraceptive method, and culturally derived notions of pregnancy intention.

**Health Care Access, Utilization, & Quality and Contraceptive Choice**

Health system mediation affects many explanatory variables included in this study and, with the exception of the presence of at least one socio-behavioral risk factor, nearly every explanatory variable included in this study is significantly correlated with health system mediation in multivariate analysis. However, due to the unique nature of each contraceptive category, each comparison regression yielded different health system mediation effects.
In the analysis of pill, patch, and ring use over ineffective method use, health system mediation is not a significant factor. The reason for its non-significance in this comparison relates to the fact that these types of contraception do not require medical procedures. When using these types of contraceptives, the individual is usually given a prescription during an annual visit. Then, the woman only has to interact with the health system in so far as she has to refill her prescription from a pharmacy. As a result, there is relatively little role for the health system to play in affecting contraceptive choice beyond the initial visit.

In contrast, when considering DMPA use over ineffective method use, health system mediation affects the explanatory power of numerous variables: age (reduced effect size), education (increased effect size), income (rendered non-significant), and insurance status (rendered non-significant). This occurs because of the fact that DMPA use requires more health system utilization than other methods.

When LARC use is compared with ineffective method use, health system mediation renders having a birth within the last 18 months non-significant and reduces the size of the negative effect of age on LARC uptake. Health system mediation is important to LARC uptake because of the invasive medical procedures involved with insertion of these devices and because of the large costs that must be mitigated by the health system if a low-income individual is to choose one of these methods.

The importance of health system level factors in predicting an individual’s contraceptive choice is highly dependent upon the degree to which the contraceptive method in question depends on health system access and utilization. Nonetheless, health system level factors are critically important to understanding the processes that determine contraceptive choice and should be included in future research on contraceptive decision-making.
Section 7 – Limitations

There are numerous limitations associated with the results of this study. These limitations can be classified into several categories: those associated with data limitations, those associated with response bias, and those associated with the health system mediator score.

Data Limitations

Due to the nature of this project as an analysis of previously collected data, the analytic framework used in this study is not completely comprehensive and cannot be assumed to be as such. There are plausibly other socio-behavioral determinants of contraceptive choice that were omitted because of data limitations including information about the clients’ sexual orientation, number of sexual partners, marital status, attitudes towards contraception, and pregnancy intention. All of these factors are of important to understanding contraceptive choice and should be included in future research on this topic. Although these constructs have been studied in relation to contraceptive choice in the past, including them in the proposed vulnerability model would make the model more comprehensive and allow for more generalizable results to be produced. As such, all results reported here must be understood to be lacking a strong socio-behavioral perspective.

Response Bias

Response bias in collection of the data elements comes from both clients and from providers. Information about educational attainment is self-reported and is collected by a nurse in the health center. As such, this information may be subject to inflation or deflation depending on the client’s belief about how they will be treated if they report their actual educational level. Providers are a larger source of bias as they provide the client’s socio-behavioral risk factors and history of a birth within the last 18 months and also report if they provided the client with a
reproductive life planning session. Providers are less likely to complete these fields during clinic days that were busier. They are also more likely to report that a client had a recent birth or received a reproductive life planning session when an individual chose an effective birth control method.

*Health System Mediator Score*

The health system mediator score suffers from provider response bias concerning reproductive life planning sessions, but also is complicated by the inclusion of the client’s number of visits as part of the score. Although clients were highly unlikely to have more than one visit if they did not have the second visit within one week of the first, the reduced possibility of having more than one visit with later enrollment through the study period may result in individuals enrolled earlier in the study period having artificially high health system mediator scores.

**Section 8 – Directions for Future Research**

Further research into the determinants of contraceptive choice must be dually focused on building a body of quantitative research and on pursuing cultural understanding through qualitative research, especially through community-based participatory research (CBPR).

Quantitative research into the structural and individual determinants of contraceptive choice should focus on developing a more comprehensive analytic model for understanding this critical health behavior. By including measurement of socio-behavioral constructs from individual decision-making focused models into the model proposed here, it would be possible to determine the effect of health system utilization in mitigating socio-behavioral risks for poor contraceptive choice. In addition, by incorporating quantitative methods to measure the ecological effects of culture, community, and the health system, contraceptive choices among
vulnerable populations can be compared between communities. These comparisons would be eminently translatable as they would allow policy makers to see what works and what does not work when developing public health programs to address poor contraceptive choice and unintended pregnancy.

Qualitative research into contraceptive decision-making in order to develop strong socio-behavioral constructs would benefit from the CBPR approach. CBPR empowers communities to develop research questions and policy solutions on their own with aid from trained researchers. In communities that are vulnerable to many poor health outcomes, which are generally distrustful of institutional sources of power, CBPR is often the best way to open productive dialogues (Israel, Eng, Schulz, Parker, & Satcher, 2005). Using CBPR to better understand contraceptive decision-making among African-American women, for example, would allow for researchers to better understand African-American women’s feelings towards LARC use.
Chapter 6 – Conclusion

This research study endeavors to understand the individual and ecological determinants of contraceptive choice among women enrolled in the Cincinnati Health Department’s RHWP. Understanding these determinants is a critical public health concern in the United States due to the strong relationship between poor contraceptive choice and high rates of unintended pregnancy. Due to the numerous proximate and distant negative consequences that result from unintended pregnancy, reducing the incidence of this health outcome is an important public health priority.

Instead of using traditional behavioral models for understanding the determinants of contraceptive choice, this study utilizes a health care access model for understanding this health behavior. By using this kind of model, ecological, individual, and systemic factors that are important to contraceptive access and choice are more easily recognized and analyzed. Furthermore, by using a health care access model that is geared towards understanding health outcomes in vulnerable populations, this study is able to accurately illustrate the social and economic climate in which the study population resides.

Using secondary data collected from women receiving reproductive health and wellness services at the Cincinnati Health Department’s RHWP during the period 3/23/2012 to 2/28/2013, a series of individual-level predisposing, enabling, and need factors were analyzed for their relationship to contraceptive choice. Three separate analyses were performed simultaneously: (1) a comparison of individuals using an ineffective method versus individuals using pills, patches, or rings; (2) a comparison of individuals using an ineffective method versus individuals using DMPA; and (3) a comparison of individuals using an ineffective method versus individuals using LARC. These analyses were then performed again in the presence of a factor representing the
effect of health system mediation. The relationships between individual-level predisposing, enabling, and need factors and contraceptive choice were re-evaluated with respect to health system mediation.

Among predisposing factors, age is a significant predictor in all three comparisons with higher age reducing odds of choosing a more effective method in every case. African-American race is a significant predictor of lower odds of LARC use. Higher education is significantly associated with lower odds of DMPA use over an ineffective method.

In terms of enabling factors, higher income reduces odds of choosing DMPA over an ineffective method, although this effect is totally mediated by the health system. Similarly, the significant effect of uninsured status in lowering odds of DMPA use is also completely mediated by the health system. The presence of at least one socio-behavioral risk is significantly associated with lower odds of pill, patch, or ring use over an ineffective contraceptive method.

Finally, with respect to need factors, having a birth within the last 18 months is significantly associated with higher odds of LARC uptake – a relationship that is completely mediated by the health system. Additionally, having a higher number of children is significantly associated with higher odds of both DMPA and LARC choice.

Analysis of the role of health system mediation suggests that health system level factors play a large role in explaining contraceptive choice among contraceptive methods that require increased health care utilization. The impact of health system mediation on the significance of other independent variables implies that health care access, utilization, and quality are important factors that should be included in future models for understanding contraceptive choice.
Bibliography


http://bedsider.org/methods/iud#costs_tab

http://bedsider.org/methods/the_patch#costs_tab

http://bedsider.org/methods/the_pill#costs_tab

http://bedsider.org/methods/the_ring#costs_tab

http://bedsider.org/methods/the_shot#costs_tab


Appendix A – University of Cincinnati IRB Approval Letter

Institutional Review Board - Federalwide Assurance #00003152

University of Cincinnati

Date: Monday, April 29, 2013

From: UC IRB Committee

To: Principal Investigator: Aalap Bommaraju
COM Molecular Genetics

Study ID: 2013-1548

Re: Study Title: Determinants of Contraceptive Choice among Women Seeking Reproductive Health and Wellness Services

The above referenced protocol and all applicable additional documentation provided to the IRB were reviewed and APPROVED using an EXPEDITED review procedure in accordance with 45 CFR 46.110(b)(1)(see below) on 4/26/2013.

This study will be due for continuing review at least 30 days before: 4/25/2014.

Study Documents
Conflict of Interest Disclosure - Aalap Bommaraju
Conflict of Interest Disclosure - Jennifer Mooney
Conflict of Interest Disclosure - William Mase
Determinants of Contraceptive Choice IRB Protocol
Letter of Permission for Use of Data.pdf

Please note the following requirements:

There are no items to display
There are no items to display
There are no items to display

https://epas.research.cchmc.org/epas_PRD/Doc/0DC8RG6KG4869DR7BC7fwhfmString.html
There are no items to display.

AMENDMENTS: The principal investigator is responsible for notifying the IRB of any changes in the protocol, participating investigators, procedures, recruitment, consent forms, FDA status, or conflicts of interest. Approval is based on the information as submitted. New procedures cannot be initiated until IRB approval has been given. If you wish to change any aspect of this study, please submit an Amendment via ePAS to the IRB, providing a justification for each requested change.

CONTINUING REVIEW: The investigator is responsible for submitting a Continuing Review via ePAS to the IRB at least 30 days prior to the expiration date listed above. Please note that study procedures may only continue into the next cycle if the IRB has reviewed and granted re-approval prior to the expiration date.

UNANTICIPATED PROBLEMS: The investigator is responsible for reporting unanticipated problems promptly to the IRB via ePAS according to current reporting policies.

STUDY COMPLETION: The investigator is responsible for notifying the IRB by submitting a Request to Close via ePAS when the research, including data analysis, has completed.

Please note: This approval is through the IRB only. You may be responsible for reporting to other regulatory officials (e.g., VA Research and Development Office, UC Health – University Hospital). Please check with your institution and department to ensure you have met all reporting requirements.

Statement regarding International conference on Harmonization and Good clinical Practices. The Institutional Review Board is duly constituted (fulfilling FDA requirements for diversity), has written procedures for initial and continuing review of clinical trials: prepares written minutes of convened meetings and retains records pertaining to the review and approval process; all in compliance with requirements defined in 21 CFR Parts 50, 56 and 312 Code of Federal Regulations. This institution is in compliance with the ICH GCP as adopted by FDA/DHHS.

Thank you for your cooperation during the review process.

Research Categories

5. Research involving materials (data, documents, records, or specimens) that have been collected, or will be collected solely for nonresearch purposes (such as medical treatment or diagnosis). (NOTE: Some research in this category may be exempt from the HHS regulations for the protection of human subjects, 45 CFR 46.101(b)(4). This listing refers only to research that is not exempt.)
Appendix B – Cincinnati Health Department IRB Approval Letter

May 22, 2013

Mr. Aalap Bomaraju
343 Ludlow Avenue, Apartment 3
Cincinnati, Ohio 45220

Dear Mr. Bomaraju:

Thank you for your presentation to the Cincinnati Health Department (CHD) Institutional Review Board (IRB) on May 20, 2013 on your project, "Determinants of Contraceptive Choice among Women Seeking Reproductive Health and Wellness Services". With the changes you have made in your project and your receiving a signed data use agreement, the CHD IRB has approved your project. You may begin your data analysis immediately.

As stated in the May 20, 2013 meeting, the CHD expects to receive a copy of your project write up when it is completed. The CHD staff looks forward to continuing to work with you on this project.

Sincerely,

Lawrence Holditch, MD
Medical Director, CHD
Chair, CHD IRB

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