THE IMPACT OF A DIRECT PHARMACY ACCESS POLICY ON WOMEN'S ACCESS TO HORMONAL CONTRACEPTIVES IN INDIANA

by

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A Dissertation

Submitted to the Faculty of Purdue University

In Partial Fulfillment of the Requirements for the degree of

Doctor of Philosophy

Department of Pharmacy Practice

West Lafayette, Indiana

December 2020

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For all women and all pharmacists

ACKNOWLEDGMENTS

I would like to thank…

- My husband, for encouraging and supporting me as I follow my dreams, for better or worse
- My daughter, for driving me to set an excellent example
- My committee, for patiently weathering my ambitiousness as well as my realistic, (NOT pessimistic) pragmatic approach to everything
- My fellow graduate students, for commiserating with and teaching me, in equal parts
- My former chain community pharmacy employer, for inspiring me to quit, take the leap, and attempt to do all I can to improve patient care and the pharmacy profession
- All the little things that helped to make the difficult parts less difficult:
  - My dogs (Bogart and Isis)
  - Spotify's™ extensive collection of punk and emo rock (<3 MCS, b182, FOB, etc.)
  - Chocolate – especially dark chocolate
  - Long bicycle rides on warm, sunny Indiana summer evenings

"*Always up or down/But never down and out*" – TAI…

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ABSTRACT

Background/Objective: Several states have implemented Direct Pharmacy Access (DPA) policies, allowing pharmacists to prescribe hormonal contraceptives. Previous work has examined pharmacist and patient perceptions of this service, but none have comprehensively evaluated the impact on access to care. Therefore, the objective of this study was to assess the impact of DPA policies on women's access to hormonal contraceptives by comparing access between three groups: 1) women in Indiana (i.e., a state without DPA), 2) women in a state with DPA, but not using DPA, and 3) women in a state with DPA, using DPA.

Methods: A perceived access scale was created based on Levesque et al.'s model of access to care, which includes five dimensions: 1) approachability, 2) acceptability, 3) availability and accommodation, 4) affordability, and 5) appropriateness. After pilot-testing the scale, items were reduced using exploratory and confirmatory factor analysis. The final scale included 31 items using a five-point Likert response format and was included in a survey containing sociodemographic measures. The pilot and final surveys were distributed via Amazon's MechanicalTurk. Eligibility criteria for the final survey included being a woman, aged 18 to 44 years, having lived in Indiana or a state that has a DPA policy and having been interested in using hormonal contraceptives within the past year. Linear regression (alpha=0.05) was used to determine the relationship between dimensional access, group, education, income and age.

Results: Factor analysis revealed six factors, five of which mapped to the dimensions from Levesque's model. The sixth factor measured privacy. When controlling for education, income, and age, women not using DPA, whether in Indiana or a state with a DPA policy, reported significantly higher levels of approachability ($p<0.001$, $p<0.001$ respectively), acceptability ($p<0.001$, $p<0.001$ respectively), availability and accommodation ($p<0.001$, $p=0.009$ respectively), affordability ($p<0.001$, $p<0.001$ respectively), and appropriateness ($p<0.001$, $p<0.001$ respectively) access than women who used direct pharmacy access. Women using DPA reported significantly lower levels of privacy access than those not using DPA in a state with a DPA policy ($p=0.004$) when controlling for education, income and age. However, 78.9% of women who used DPA agreed DPA made

obtaining hormonal contraceptives easier. The majority who had never used DPA were previously unaware of DPA (81.1% in DPA states, 86.2% in Indiana) but felt it would improve access (82.8%, 80.0% respectively).

Discussion/Conclusion: Understanding the effects of DPA policies on women's access can inform future policies and support implementation of DPA. Women using DPA reported the lowest levels of access; poorer access may have motivated these women to seek alternatives to access contraceptives, and therefore be drawn to DPA. Currently, few states require insurance to pay for pharmacists' assessment and/or the medication, such as would be paid for if a patient received hormonal contraceptives from a physician, which leaves patients to shoulder the cost. The persistence of lower levels of access across all six dimensions among those using DPA may be influenced by imperfect policy implementation and failure to legislatively enable the sustainability of this service rather than pharmacists' ability to improve women's access to hormonal contraceptives.

CHAPTER 1. INTRODUCTION

It may be argued that nothing has had a greater impact on the lives of women than the invention of the hormonal contraceptive. Increased levels of educational attainment (Goldin and Katz 2002; Hock 2008; Ananat and Hungerman 2012), increased participation in the workforce (Bailey 2006), and improved financial security (Bailey 2006; Loughran and Zissimopoulos 2009) among women in the United States over the past 50 years have largely been attributed to access to hormonal contraceptives. Today, approximately 99% of all women of childbearing age who have ever been at risk of pregnancy have used contraceptives, 88% of which used a hormonal contraceptive method (Daniels, Mosher, and Jones 2013).

Oregon was the first state to implement a direct pharmacy access policy to improve hormonal contraceptive access for women (H.R. 2879 2015). Direct pharmacy access policies allow pharmacists to prescribe, or furnish, certain forms of prescription-only hormonal contraceptives to women without a prescription from a prescriber. Restrictions vary from state to state, but can include forms of contraceptive and age of the women eligible. Currently, 11 states and Washington DC have passed direct pharmacy access bills, but three states have not yet implemented the policy (Rafie and Landau 2019). This proposed study will examine the impact of direct pharmacy access policies on women's perceived access to hormonal contraceptives, using a scale based on Levesque et al.'s (2013) theory of access to care.

1.1 Specific Aims

Inconsistent or nonuse of contraceptives has caused 95% of unintended pregnancies in the United States (Sonfield, Hasstedt, and Gold 2014), which has largely been attributed to poor access, such as lack of affordability (76%) or lack of ease of attainment (74%) (Lessard et al. 2012). For the purposes of this project, access will be defined as including approachability, acceptability, availability and accommodation, affordability, and appropriateness as set forth in Levesque et al.'s (2013) conceptual framework of access to care. Prescribers, pharmacists, and women in need of contraceptives are largely in favor of direct pharmacy access (Rafie, Haycock, Rafie, Yen, and Harper 2012; Landau, Besinque, Chung, Dries-Daffner, and Maderes 2009; Landau, Tapias, and McGhee 2006), which allows pharmacists to prescribe, or furnish, hormonal contraceptives

without a prescription from a prescriber. However, the impact on women's perceived access to hormonal contraceptives in states which have implemented direct pharmacy access policies and the potential impact in states that have not implemented direct pharmacy access policies is unknown. Direct pharmacy access policies currently only exist in states with political and religious climates dissimilar to Indiana. Therefore, it is necessary to explore the impact of a direct pharmacy access policy on women's perceived access to hormonal contraceptives in Indiana, since state legislators in Indiana, who ultimately determine which policies to enact, often look to states similar to Indiana (Kaiser Family Foundation 2018).

My long-term goal is to improve equitable and affordable access to contraceptives for all women in the United States through analysis of the impact of health policies regarding contraceptives. The overall objective of this study is to determine the potential impact of a direct pharmacy access policy on women's perceived access to hormonal contraceptives in Indiana. My central hypothesis is that differences exist between the levels of perceived access to hormonal contraceptives between women in Indiana and women in states with direct pharmacy access policies, with women not using direct pharmacy access having lower levels of perceived access than women who use direct pharmacy access. The rationale for this project is to assess how direct pharmacy access policies impact perceived access and how they might affect access in states with similar political and religious climates to Indiana.

The hypothesis will be tested by pursuing the following specific aim:

> Specific Aim 1: To compare women's perceived access between women who use direct pharmacy access and women who use a traditional method to access hormonal contraceptives in Indiana and states allowing direct pharmacy access.

The working hypothesis for this aim is that women who use direct pharmacy access will have higher levels of perceived access than women who use a traditional method of access in Indiana or states allowing direct pharmacy access. The expected outcome of aim 1 is to gain an understanding of the impact of direct pharmacy access policies. The findings of this study are expected to make a positive impact by informing policy decision-making and potentially improving women's equitable and affordable access to contraceptives.

1.2 Innovation

The combination of both political party and religion are important predictors of legislative policies enacted (Layman 1997), including contraceptive access policies. Indiana's political and religious makeup (Pew Research Center 2018; Pew Research Center 2014) aligns with those who typically oppose policies to improve access to contraceptives (Firth, Hamel, and Brodie 2014).

Little research has been conducted on the impact of direct pharmacy access of hormonal contraceptives policies, which aim to improve access to contraceptives by allowing pharmacists to prescribe contraceptives. Existing research has focused on stakeholder interest in direct pharmacy access (Landau et al. 2006; Rodriguez et al. 2018), pharmacist impact on hormonal contraceptive therapy continuation rates (Gardner et al. 2008), and pharmacist participation in early implementation (Rodriguez et al. 2018). In this study, the potential impact of a direct pharmacy access policy in a state with a political and religious climate unlike any state with an existing policy will be examined, and the impact will be explored using Levesque et al.'s (2013) theoretical framework of access to care.

None of the states that currently have direct pharmacy access policies match Indiana's political and religious environment, which can create unique barriers to hormonal contraceptive access. The use of theory in research leads to more rigorous findings that can connect with and build upon existing knowledge (Stewart and Klein 2016).

1.3 Significance

Indiana is one of 21 states that does not require insurance companies to cover any form of contraception or contraceptive-related service (Kaiser Family Foundation 2018), which means women could lose insurance coverage of contraceptives if the Affordable Care Act were repealed. Indiana also has poor contraceptive access relative to other states, with the publicly-funded contraceptives services being offered at a rate significantly lower than the national average (19% versus 26%, and 7% versus 19% for Title X clinics) (Frost, Frohwirth, and Zolna 2016). Indiana's rate of unintended pregnancy (49%) is also above the national average (45%) (Kost 2015).

No states with similar political and religious climates to Indiana have implemented a direct pharmacy access of hormonal contraceptives policy; therefore, a gap exists in the current understanding of pharmacists' potential impact on contraceptive access. This study will address

this gap by studying the potential impact of a direct pharmacy access policy on women's access to contraceptives in Indiana. The contribution of this project is expected to be an improved understanding of the impact of direct pharmacy access of hormonal contraceptives on Indiana women's access, which will enable informed policy decision-making at the state level. This contribution will be significant because the findings can be generalized to other politically and religiously similar states, which are arguably the states in most need of policy reform to improve women's equitable access of contraceptives.

The aim of this study is in line with the Agency for Health Research and Quality's mission to increase equitable, affordable health care access by evaluating the impact of a direct pharmacy access policy on women's access to hormonal contraceptives. This study will determine unique barriers and facilitators to accessing hormonal contraceptives that women face in states with politically conservative and orthodox religious majorities, and how these barriers might be mediated by implementing a direct pharmacy access policy.

CHAPTER 2. LITERATURE REVIEW

2.1 Background

In 2014, approximately 60% of women used at least one method of contraception, including hormonal contraceptives, barrier devices, sterilization, long-acting reversible contraceptives, or natural family planning (Kavanaugh and Jerman 2018). Among women who were at risk of having an unintended pregnancy, the use of contraceptives was even higher, with 90% of women at risk using a form of contraception (Kavanaugh et al. 2018). Despite widespread use of contraceptive methods among women at risk of unintended pregnancies, approximately 45% of all pregnancies in the United States were unintended in 2011 (Finer and Zolna 2016).

The high proportion of pregnancies that were unintended may be due to the use of less reliable methods of contraception (Kavanaugh et al. 2018) or inappropriate or inconsistent use of contraceptives (Sonfield, Hasstedt, and Gold 2014). Less reliable methods include the use of barrier methods, withdrawal, and natural family planning, and are used by 25% of women at risk of unintended pregnancy (Kavanaugh et al. 2018). Inconsistent or inappropriate use of contraceptives includes missed doses of oral contraceptives or incorrect use of contraceptive methods, while nonuse of contraceptives includes those who do not use any method of contraception or a gap in therapy of at least one month in duration. Among women who experienced an unintended pregnancy in 2008, 54% were due to nonuse of contraceptives, 41% were due to inconsistent or inappropriate use, and 5% occurred in women consistently using a contraceptive method (Sonfield et al. 2014).

Unintended pregnancies do not occur equally across socioeconomic, racial, and ethnic groups. Despite slight decreases in unintended pregnancy rates across all socioeconomic and racial groups between 2008 and 2011, disparities persist across different demographic groups (Finer et al. 2016). Both income level and educational attainment have an inverse relationship with unintended pregnancy rates (Finer et al. 2016). Black and Hispanic women also experience higher rates of unintended pregnancies than White, non-Hispanic women; this trend is consistent over the past 30 years (Finer et al. 2016). One possible explanation is that poorer women with lower levels of education receive less reproductive health care than more educated women with higher income levels (Hall, Moreau, and Trussell 2012). The plausibility of this explanation was supported by

findings from another study that found Blacks and Hispanics are less likely to have usual sources of care than Whites (Abdus, Mistry, and Selden 2015).

Unintended pregnancies lead to worse health outcomes, increased spending, and increased abortion rates (Finer et al. 2016). Pregnancy and childbirth are associated with numerous complications, including hemorrhage, eclampsia, trauma, infection, and worsening of preexisting health conditions (Berg, MacKay, Qin, and Callaghan 2009). In 2005, 28.6% of pregnancies resulted in complications (Berg et al. 2009) and 14.5 per 100,000 live births resulted in maternal mortality (Berg, Callaghan, Syverson, and Henderson 2010). Pregnancy-related mortality is another factor that impacts women of different races disparately, with Black women being four times more likely than White women to die from pregnancy-related causes (Berg et al. 2010).

With 68% of unintended pregnancies being covered under Medicaid in 2010, it is estimated that government expenditures on health care related to prenatal, delivery, postpartum, and infant care totaled over $21.0 billion (Sonfield and Kost 2015). After excluding miscarriages, 42% of unintended pregnancies were terminated in 2011 (Finer et al. 2016). Healthcare costs associated with abortions totaled $67.9 million in public expenditures alone in 2010 (Sonfield and Gold 2012).

Ever-growing health care costs in the United States necessitates health insurance coverage to defray the costs associated with contraceptives and pregnancies. In 2008, Hall et al. (2012) found that women who were uninsured or underinsured had lower rates of reproductive health service utilization, according to the data from the National Survey of Family Growth (NSFG). With the passage of the Affordable Care Act (ACA) in 2010 (HealthCare.gov 2018), the expectation was that insurance coverage would be obtainable for all American citizens. A study conducted by Abdus et al. (2015) evaluated data from the Medical Expenditure Panel Survey (MEPS), and found that minority groups, including Blacks and Hispanics, made up a disparate proportion of the people who would most likely benefit from the ACA. This was due to the greater number of Blacks and Hispanics with a lower socioeconomic status, which made them newly eligible for Medicaid coverage under the ACA.

After implementation of the ACA, data from the American Community Survey (ACS) revealed that the percentage of the population without insurance coverage decreased from 32.4% in 2011-2013 to 18.8% in 2015 in states that expanded Medicaid coverage, while decreases in states without Medicaid expansion were much smaller (Wehby and Lyu 2018). Nationwide, the uninsured rate fell to 8.9% in 2016, which was the lowest rate since 1972 (Kaiser Family

Foundation 2016). Medicaid expansion helped to decrease racial and ethnic disparities seen in insurance coverage among Hispanics and Blacks, and a greater number of women became insured through Medicaid due to the expansions as compared to men (Wehby and Lyu 2018). However, women still had higher uninsured rates than men, due to fewer women receiving coverage through private insurance (Wehby and Lyu 2018). Despite these improvements, disparities still exist for minority groups and women.

With the inauguration of Republican President Trump in 2016, the ACA has been under fire. The progress in insurance coverage rates that the ACA has created could be reversed if the act were to be repealed (Glied and Jackson 2017). Without specific provisions included in a proposed replacement bill, repeal of the ACA would directly, negatively impact women's access to hormonal contraceptives, due to the ACA's inclusion of private health insurance mandates to cover prescription contraceptives (Becker 2018). Since implementation of the ACA, insurance claims for hormonal contraceptives have increased by 4.9%; yet, out-of-pocket costs have dropped precipitously (Becker 2018).

The rate of unintended pregnancies, the costs associated with unintended pregnancies, and the disparities in outcomes demonstrate the importance of contraception. In these next sections, the legislative history of access to contraceptives, the different forms of contraception available, and ways to access contraceptives will be explored.

2.2 Legislative and Social History of Contraceptives

The road to ensuring access to safe and effective contraceptives through health policy has been long and contentious; yet, equitable access has not yet been achieved. The first law enacted in the United States dealing with access to contraceptives was the Comstock Law of 1873.

The Comstock Law (1873), entitled the "Act for the Suppression of Trade in, and Circulation of, Obscene Literature and Articles of Immoral Use", forbade the possession of any drug or instrument that could prevent conception or cause abortion. The intent of this law was to protect the moral integrity of society by prohibiting what were seen as vices at the time (Goldin and Katz 2002). The punishment, if found guilty under this law, was hard labor for six months to five years and a fine of $100 to $2,000 (Comstock Law 1873).

Just over four decades later, Margaret Sanger opened the first contraceptive clinic in the United States in open defiance of the law, in 1916 (Michals 2017). Although the clinic was shut

down and Sanger was arrested within a month of opening, the publicity surrounding her trial prompted the passage of an amendment allowing physicians to prescribe contraceptives for medical needs (Michals 2017). This led Sanger to open another clinic in Manhattan in 1923 which later became the Planned Parenthood Federation of America (Planned Parenthood 2018). In 1936, the Comstock Law was amended to permit the distribution of information and education on contraceptive methods in three states (Goldin and Katz 2002). This amendment was due in part to the continuing work of Sanger (Planned Parenthood 2018).

In 1937, scientists discovered progesterone and its ability to prevent ovulation, and therefore, prevent pregnancy (Goldin and Katz 2002). This discovery was not intentional (Asbell 1995) and it would be another 20 years before the Food and Drug Administration (FDA) approved the first hormonal contraceptive in 1957 (Goldin and Katz 2002). Discovery of the oral hormonal contraceptive pill was first financially funded by Katharine McCormick at the prompting of Margaret Sanger in 1951 (Asbell 1995). Approval by the FDA did not guarantee women access to safe and reliable birth control, because many states still outlawed the sale and use of contraceptives.

It was in 1937 that the United States Court of Appeals ruled that contraceptives could be sent through the mail in the *United States v. One Package of Japanese Pessaries* ruling (Asbell, 1995). Over the next two decades, individual states permitted the sale and use of contraceptives first to only married couples, and eventually to single women (Goldin and Katz, 2002). In 1965, the executive director of Planned Parenthood in Connecticut, Estelle Griswold, brought her case against the state of Connecticut to the United States Supreme Court (*Griswold v Connecticut* 1965). Griswold contested the Connecticut statute that made use of any contraceptive illegal in the state of Connecticut, arguing that the law violated the Fourteenth Amendment, which protects the privacy of married couples. The Supreme Court ruled in her favor, overturning the Connecticut law later that same year (*Griswold v Connecticut* 1965).

The US Supreme Court ruled on another case regarding access to contraceptives in 1972. William Baird was charged with a felony after giving a single woman a vaginal foam contraceptive. He was not a doctor or pharmacist, and the Massachusetts law only allowed married women to receive contraceptives (*Eisenstadt v. Baird* 1972). Baird's counsel argued that the Massachusetts law failed to respect an individual's right to privacy, just as had been ruled in *Griswold v. Connecticut* with regards to married couples. The Supreme Court ruled in Baird's

favor, but stated that the basis for their decision was not a finding of violation of privacy, but rather the fact that it was irrational to legally allow married couples to obtain and use contraceptives, but not allow single individuals the same right (*Eisenstadt v. Baird* 1972). This ruling only overturned the law in Massachusetts. Other states later overturned laws barring unmarried individuals' access to contraceptives into the late 1970s (Bailey, Guldi, Davido, and Buzuvis 2011).

In more recent history, laws regarding access to contraceptives have focused on insurance coverage for contraceptives. In 2012, the ACA mandated private and publicly-funded insurance coverage of all FDA-approved contraceptive methods (Sobel, Salganicoff, and Gomez 2018). The ACA not only included provisions for requiring contraceptive coverage, but also mandated that contraceptives be provided at no cost to the insured (Sobel et al. 2018). The FDA-approved contraceptives in the ACA include: sterilization surgeries for women, implants, intrauterine devices (IUDs), injections, oral contraceptives, patches, vaginal rings, diaphragms, sponges, cervical caps, female condoms, spermicides, and emergency contraceptives (Health Resource and Services Administration [HRSA] 2017). Initially, the only groups exempt from providing contraceptives free of cost-sharing, were not-for-profit, religious employers categorized as a "house of worship" (Sobel et al. 2018).

In 2012, the owners of Hobby Lobby Stores, Inc. sued the Secretary of the Department of Health and Human Services, Kathleen Sebelius, on the grounds that the contraceptive mandate violated the First Amendment and the Religious Freedom Restoration Act (RFRA) of 1993 (*Burwell v. Hobby Lobby Stores* 2014). Secretary Sebelius later stepped down, and Sylvia Burwell became the new Secretary of Health and Human Services (Late 2014), which led to the case being renamed *Burwell v. Hobby Lobby Stores* by the time it reached the United States Supreme Court (*Burwell v. Hobby Lobby Stores* 2014). The Supreme Court ruled in Hobby Lobby's favor by one vote in 2014, stating that for-profit corporations were considered synonymous with individuals under the RFRA (Burwell v. Hobby Lobby Stores 2014). Justice Ruth Bader Ginsburg was among those who were not in favor; in her dissent, Justice Ginsburg wrote that the judicial precedent had already been set that religious beliefs do not permit the violation of a third party's rights (*Burwell v. Hobby Lobby Stores* 2014).

President Obama's administration responded the following year in 2015 with an accommodation that would allow employees of for-profit organizations claiming a religious exemption to contraceptive access at no-cost (Leonard 2015). The process of reimbursing

employees for their contraceptives was separated from religious, for-profit employer's provision of insurance, which effectively allowed employees to access contraceptives at no-cost as originally intended by the ACA (Leonard 2015). Not-for-profit places of worship were still permitted an exemption precluding them from providing contraceptive coverage to their employees (Sobel et al. 2018).

In 2017, President Trump signed regulations broadening the definition of who was eligible for exemption from the ACA's contraceptive coverage mandate (Newkirk 2017). Although the regulation left the accommodations put in place under President Obama's administration intact, by expanding who can claim an exemption, the regulation effectively increased the number of employees who would no longer receive contraceptives at no-cost through the ACA provision (Office of the Federal Register 2017). After President Trump's regulations, two federal court judges filed injunctions which prevented the regulations from taking effect (Wolf 2017). Federal judges from Pennsylvania and California were the two driving forces behind the lawsuits which prompted the injunctions, claiming that President Trump did not follow the proper procedure for enacting such regulations (Schmidt 2018). The Trump administration responded by appealing both injunctions, and the case has not yet been settled, although many believe that President Trump will try to pass the regulations again (Schmidt 2018).

2.3 Forms of Contraception

Contraceptive methods can be divided into two main categories: non-emergency and emergency. Emergency contraceptives refer to methods employed to prevent pregnancy after an individual has had unprotected sex, whether due to lack of use of a contraceptive method, or the failure of the chosen contraceptive method. Non-emergency contraceptives include any method used prior or during intercourse to prevent pregnancy.

Emergency contraceptive methods include oral medications and copper-bearing intrauterine devices (IUDs) (Trussell, Raymond, and Cleland 2014). Plan B® is the brand name of a single-ingredient levonorgestrel-containing emergency contraceptive oral medication that comes in either one or two doses to be taken within 72 hours of unprotected sex (Levonorgestrel - Micromedex 2018). Ella® is another brand name single-ingredient oral pill that can be taken within 120 hours of unprotected sex to prevent pregnancy (Ulipristal acetate - Micromedex 2018). Finally, copper-bearing IUDs may be used as emergency contraception. Although IUDs are typically preventive,

if a copper IUD is inserted within five days post-ovulation, then the device can prevent pregnancy (Trussell et al. 2014). All three methods are considered safe and effective and have been used by approximately 11% of women of childbearing age (Daniels, Jones, and Abma 2013).

Emergency contraceptives are not considered an abortive method, since they prevent pregnancy by preventing fertilization or implantation (Raviele 2015). However, emergency contraceptives are not appropriate for chronic or repetitive use (Raviele 2015), and therefore will not be the focus of this dissertation. Instead, this dissertation will examine access to hormonal contraceptives used prior to intercourse.

Non-emergency contraceptive methods can be categorized by effectiveness: high, moderate, or minimally effective methods. Sterilization, whether or male or female, and long-acting reversible contraceptive (LARC) methods are considered the most effective at preventing pregnancy (Kavanaugh and Jerman 2018). Sterilization has decreased in recent years from 36.6% in 2008 to 28.2% in 2014, while rates of LARC usage have over doubled since 2008, from 6.0% to 14.3% of women at risk of unintended pregnancy (Kavanaugh and Jerman 2018). LARC methods include intrauterine devices and the subdermal implant, Nexplanon, which can prevent pregnancy for several years, but require insertion by a healthcare provider (Micromedex – Etonogestrel 2018).

Moderately effective methods include hormonal contraceptives such as oral medications, transdermal patches, vaginal rings, and injections (Kavanaugh and Jerman 2018). Hormonal contraceptive pills have remained the single most popular method of contraception among women of childbearing age in recent years, with 25.3% of women using any contraceptive method opting to use contraceptive pills to prevent pregnancy in 2014 (Kavanaugh and Jerman 2018). Together, patches, vaginal rings, and injectables made up 6.5% of contraceptive usage in 2014 (Kavanaugh and Jerman 2018). Hormonal contraceptives are only available via prescription, and are therefore the focus of this proposed study.

Minimally effective methods include barrier methods, withdrawal, natural family planning, and other methods such as spermicidal foams and jellies. Natural family planning involves timing intercourse to avoid the woman's fertile time in each cycle to avoid pregnancy (Smoley and Robinson 2012). Barrier methods include condoms, diaphragms, cervical caps, suppositories, and sponges. Condom usage is the most prevalent contraceptive choice among women who use minimally effective methods, with 14.6% of women using contraceptives choosing to use condoms

in 2014 (Kavanaugh and Jerman 2018). Aside from condom use, all other minimally effective methods combined made up only 10.5% of contraceptive use in 2014 (Kavanaugh and Jerman 2018). Minimally effective methods are available without prescription, and therefore will not be the focus of this study.

2.4 Non-Contraceptive Benefits

Oral contraceptives are the most common type of contraception used among women in the United States (Kavanaugh and Jerman 2018), but not all women use oral contraceptives for the purposes of preventing pregnancy (Speidel, Rocca, Thompson, and Harper 2013). Women may use oral contraceptives to treat irregular menstrual bleeding, such as amenorrhea, or disorders such as premenstrual syndrome (PMS) and premenstrual dysphoric disorder (PMDD) (Schindler 2013). Oral contraceptives have also demonstrated effectiveness in treating acne and reducing pain associated with endometriosis (Schindler 2013). Hormonal contraceptives have also been shown to have protective effects against ovarian, endometrial, and colorectal cancers, and the occurrence of ovarian cysts, endometriosis, uterine leiomyomas, and benign breast diseases (Dhont 2011).

2.5 Accessing Contraceptives

As legislative control over contraceptives has generally become less restrictive, the ways in which women can access hormonal contraceptives have grown. Aside from the traditional method of accessing hormonal contraceptives by visiting a physician and obtaining a prescription, several newer points of access have developed in recent years. These newer methods include obtaining hormonal contraceptives through the use of an online health care service through an app or direct pharmacy access, which is summarized in Table 1.

Lemonaid Health, or LMND Medical Group, Inc., launched in 2014 with the goal of providing affordable and easily accessible healthcare to patients across the United States (Lemonaid Health 2018). Lemonaid Health (2018) currently serves 43 states and is working to gain licensure in all 50 states. The only states not currently served include Alaska, Delaware, Hawaii, Louisiana, North Dakota, Vermont, and West Virginia (Lemonaid Health 2018). Three forms of hormonal contraceptives are available through Lemonaid Health (2018): oral contraceptives, vaginal rings, and transdermal patches. As long as it is medically appropriate, the

prescribers at Lemonaid Health (2018) provide year-long prescriptions to their patients. Lemonaid Health (2018) encourages individuals who are under 18 years of age, over 50 years of age, are pregnant, may be pregnant, are experiencing unusual vaginal bleeding, have liver or gall bladder problems, or have had a previous allergic reaction to hormonal contraceptives to seek care from another provider, rather than seek care through an online website.

Nurx (2018) is another online, mobile application-based health service that provides women with access to hormonal contraceptives. Patients using Nurx (2018) are able to have hormonal contraceptives delivered to their home address after completing a short health survey and being approved by a licensed provider. Although Nurx (2018) is working to expand the number of insurance companies with which they are contracted, Nurx is currently only contracted with Medicaid in California, Texas, and Illinois. If Nurx is contracted with a patient's prescription insurance company, then the contraceptives are billed through insurance as normal, with the patient only being responsible for the co-payment. Nurx's (2018) services are currently available in 17 states, including California, Colorado, Florida, Illinois, Indiana, Massachusetts, Michigan, Minnesota, Missouri, New Jersey, New York, North Carolina, Ohio, Pennsylvania, Texas, Virginia, and Washington. Nurx (2018) offers hormonal contraceptives in the form of oral contraceptives, transdermal patches, and vaginal rings. It takes between five and 10 business days for a patient's contraceptives medication to arrive, but Nurx (2018) also provides an automatic refill service so that patients are less likely to go without their contraceptives.

Prjkt Ruby (2018), another online and mobile application-based health service, combines provision of contraceptives with charitable donations towards improving access to contraceptives in developing countries through the Population Services International organization. Prjkt Ruby (2018) offers a limited range of oral hormonal contraceptives, which are all $20 per 28-day supply. North Carolina is the only state that is not served by Prjkt Ruby (2018). Women are given the choice of receiving their contraceptives in one to three business days, and an auto-refill service is also available (Prjkt Ruby 2018). One limitation to this service is that Prjkt Ruby (2018) is not contracted with any insurance plans, which means that all costs are out-of-pocket for patients. Prjkt Ruby (2018) only provides their services to women 18 years or older.

The Pill Club (2018) is another example of telemedicine being used to provide women with access to contraceptives online. Women can either send in a prescription from their provider, ask The Pill Club's (2018) pharmacy to transfer their existing prescription, or receive a new

Table 1. Online access of hormonal contraception

Name	Doctor consultation	Medical Insurance	Rx Insurance	Delivery	Age	Other Services Offered
Lemonaid Health	✓ $25 per consultation	-	✓	✓	18-50 years old	ED, UTI, sinus infections, cold sores, hair loss, smoking cessation, acne, heartburn, influenza, HLD
Nurx	-	-	-	✓	12-50 years old*	HIV Prophylaxis (PrEP)
Prjkt Ruby	-	-	- $20 per 28-day supply	✓	18+ years old	Emergency contraception
The Pill Club	-	-	✓ $15 per 28-day supply if no insurance	✓	12+ years old*	Emergency contraception
Maven Clinic	✓	✓	✓ $18-35 per 28-day supply if no insurance	-	13-17 years with parental approval, 18+ years old	Comprehensive women's health services
PlushCare	✓ $99 per consultation if no insurance	✓	✓	-	Under 18 with parental approval, 18+ years old	HIV Prophylaxis (PrEP), infections, chronic disease state management, laboratory tests
Planned Parenthood Direct	✓ $0-25 per consultation*	-	✓ $20-25* per 28-day supply if no insurance	✓	-	UTI
Pandia Health	✓ $29 per consultation if get Rx through Pandia $49 if use local pharmacy	-	✓ $29 per 28-day supply if no insurance	✓	18+ years old	Emergency contraception

Table 1 continued

Name	Doctor consultation	Medical Insurance	Rx Insurance	Delivery	Age	Other Services Offered
HeyDoctor	✓ $15 per consultation	-	✓	-	18-50 years old	UTI, acne, cold sore, hair loss, STDs, erectile dysfunction (ED), smoking cessation, Tb, Hepatitis C, HIV testing, various testing
Virtuwell	✓ Max $49 per consultation	✓	✓	-	18-34 years old	Emergency contraception, yeast infections, UTI, breast infections, STDs

**varies by state*

prescription online from one of The Pill Club's prescribers. Prescribers can prescribe oral contraceptives, transdermal patches, or vaginal rings, in addition to emergency contraceptives. The Pill Club (2018) offers an auto-refill service. The Pill Club (2018) is available to those living in Arizona, California, Colorado, Florida, Georgia, Illinois, Indiana, Iowa, Kentucky, Massachusetts, Michigan, Missouri, Nevada, New Jersey, New York, Ohio, Pennsylvania, Tennessee, Virginia, and Washington.

Maven Clinic (2018) provides an even more comprehensive set of women's health services online. Maven Clinic's (2018) providers include obstetrician-gynecologists, nutritionists, mental health specialists, pediatricians, pregnancy and postpartum specialists, lactation consultants, physical therapists, and lifestyle coaches. Maven Clinic's (2018) services can be accessed by those who have insurance plans contracted with the clinic, or by individuals interested in individually accessing services. One difference between Maven (2018) and the previously discussed online services, is that women can read about and choose a specific provider from which to receive care. Women can book a virtual appointment to receive a prescription for hormonal contraceptives for $18 to $35, depending on the type of prescriber selected (Maven Clinic, 2018). Prescriptions may be written for any form of self-administered hormonal contraceptive (Maven Clinic 2018).

PlushCare (2018) offers a variety of health care services online, including a complete range of self-administered hormonal contraceptive prescriptions. PlushCare (2018) is available in all 50 states, and serves everyone 18 years of age and older, and those under 18 years of age with parental or guardian approval. Prescriptions are sent directly to the patient's local pharmacy to be billed through prescription insurance (PlushCare 2018). The cost of the online consultation can be billed to the patient's medical insurance, but for those without insurance, the cost is $99 per consultation (PlushCare 2018).

Four other online services providing hormonal contraceptives currently exist: Planned Parenthood Direct (2018), Pandia Health (2018), HeyDoctor (2018), and Virtuwell (2018). These services follow similar protocols as the previously described services, with Planned Parenthood Direct (2018) and Pandia Health (2018) focusing on contraceptive services, and HeyDoctor (2018) and Virtuwell (2018) providing more comprehensive health services. These services are not currently available to women living in Indiana.

Online provision of hormonal contraceptives after completing a health information questionnaire has been studied (Kaskowitz, Carlson, Nichols, Edelman, and Jensen 2007).

Kaskowitz et al. (2007) studied women's knowledge of contraindications and side effects of hormonal contraceptives after a typical, in-person appointment or an online appointment to receive hormonal contraceptives among first-time users. The online appointment provided the participants with the same information provided to participants who saw a provider in-person (Kaskowitz et al. 2007). It was found that participants who used the online service were statistically significantly more likely to have insurance coverage and previously used hormonal contraceptives, and be older, non-Latina, more educated, and have a higher socioeconomic status (Kaskowitz et al. 2007). No significant difference was found between the knowledge levels of the two study groups, which suggests that online provision of hormonal contraceptives may be safe in terms of patient knowledge (Kaskowitz et al. 2007).

These online services are distinctly different from illegal online sites claiming to provide prescription contraceptives without a prescription. Liang, Mackey, and Lovett (2012) found multiple sites advertising "over-the-counter" hormonal contraceptives and hormonal contraceptives without a prescription, including oral contraceptives, emergency contraceptives, injections, vaginal rings, patches, and even intrauterine devices and implants. These illegal services were advertised across social media sites such as Facebook and Twitter, which is additionally concerning due to the high number of adolescents using these platforms and therefore being exposed to these potentially harmful sites (Liang et al. 2012). Liang et al. (2012) argue that without a health care provider in the equation, women may not be aware of contraindications or risks inherent with using hormonal contraceptives when access contraceptives in this manner.

2.6 Direct Pharmacy Access

A more recent method of accessing hormonal contraceptives is direct pharmacy access. Direct pharmacy access refers to the process of women receiving prescription-only hormonal contraceptives directly from a pharmacist, without visiting a medical doctor or other prescriber to receive a prescription (Gardner, Miller, Downing, Le, Blough, and Shotorbani 2008; Landau, Tapias, and McGhee 2006; Rodriguez, Biel, Swartz, Anderson, and Edelman 2018). Laws regarding direct pharmacy access of hormonal contraceptives vary from state to state. Not all states have laws permitting direct pharmacy access of hormonal contraceptives. Among states that do permit direct pharmacy access, notable differences include specific verbiage in the law, the role of

prescription insurance, who is eligible to receive hormonal contraceptives, and what types of hormonal contraceptives are included.

Currently, California, Colorado, Oregon, New Mexico, Maryland, Washington, Tennessee, Utah, Hawaii, New Hampshire, West Virginia, Idaho, and Washington D.C. are the only states with enacted laws allowing direct pharmacy access (National Alliance of State Pharmacy Associations 2017; S.B. 184 2018; H.B. 182 2019). Table 2 lists the states that currently have laws permitting direct pharmacy access. In 1979, Washington was the first state to allow direct pharmacy access (Gardner et al. 2008), and Maryland is the most recent state to enact such a law (H.R. 613 2017).

States place varying restrictions on direct pharmacy access, including the ages served and hormonal contraceptive products offered. Oregon is the most restrictive state, allowing only oral contraceptives and transdermal patches to be prescribed (H.R. 2879 2015). Washington and Hawaii are the least restrictive states, with Washington leaving it open to any contraceptive included in collaborative practice agreements (H.B. 2681 2015) and Hawaii including any FDA-approved medication or device (S.B. 513 2017). All states either restrict direct pharmacy access to contraceptives to patients 18 years of age or older (H.R. 2879 2015; Baer Law 2018; S.B. 1677 2016; S.B. 184 2018; H.B. 2583 2020), or leave it open to any age (S.B. 999 2016; New Mexico Protocol 2016; H.R. 613 2017; S.B. 513 2017; H.B. 2681 2015, Code of the District of Columbia 2020; Chapter Ph 2400 2019). Direct pharmacy access is implemented through either a standing order, a statewide protocol, or collaborative practice agreements, with statewide protocol being the most prevalent option utilized (H.R. 2879 2015; S.B. 999 2016; Baer Law 2018; New Mexico Protocol 2016; H.R. 613 2017; S.B. 513 2017).

The specific language used to describe how a pharmacist may provide hormonal contraceptives in certain states also varies. California law uses the word “furnish” (S.B. 999 2016), while Tennessee uses “provide” (S.B. 1677 2016), New Mexico uses “prescriptive authority” (New Mexico Protocol 2016), West Virginia uses “dispense” (H.B. 2583 2020), New Hampshire uses “initiation and dispensing” (Chapter Ph 2400 2019) and the remaining states use “prescribe” (H.R. 2879 2015; Baer Law 2018; H.R. 613 2017; S.B. 513 2017; H.B. 2681 2015; S.B. 184 2018; Code of the District of Columbia 2020). Aside from furnishing, providing, or prescribing hormonal contraceptives, many states require the patient to have an appointment with a provider within 3 years of receiving a prescription from a pharmacist (Deja and Fink 2016). New Mexico also

requires that the pharmacist notify the patient's primary care physician within 15 days of prescribing contraceptives, if the patient wishes the pharmacist to do so (New Mexico Protocol 2016).

Several states have included specific language mandating insurance coverage for medication received through this mechanism. Oregon and Tennessee require that prescription insurance companies cover the cost of the hormonal contraceptive as if it had been prescribed by a physician (H.R. 2879 2015; S.B. 1677 2016), while California, Hawaii, and Washington go further by requiring insurance companies to cover 12-month supplies of hormonal contraceptives in one visit (S.B. 999 2016; S.B. 513 2017; H.B. 2681 2015). Maryland's law extends mandatory coverage of contraceptives to include over-the-counter emergency contraceptives (H.R. 613 2017). Lawmakers in Washington attempted to raise public awareness of pharmacists' ability to provide contraceptives by enacting a law that require signs or stickers to be displayed in all pharmacies participating in direct pharmacy access (H.B. 2681 2015). Finally, Hawaii's law requires insurance companies to reimburse pharmacists for their contraceptive prescribing services (S.B. 513 2017).

2.7 Perceptions of Direct Pharmacy Access

In 2004, Landau et al. (2006) collected data on women's perceptions of and willingness to obtain hormonal contraceptives directly from a pharmacist. It was found that women prioritized contraceptive options by convenience, simplicity, and affordability, which was likely the reason that 54% of women chose a non-prescription contraceptive (Landau et al. 2006). Another notable reason women chose non-prescription contraceptive options was that 20% of women reported the cost of an appointment to see a prescriber to obtain a prescription was prohibitive (Landau et al. 2006). Lack of prescription insurance coverage was found to be a strong predictor of inability to obtain a prescription for hormonal contraceptives, despite wanting to use hormonal contraceptives (Landau et al. 2006).

When asked about direct pharmacy access of prescription-only hormonal contraceptives, 76% of women reported they would personally benefit from the change (Landau et al. 2006). The women in the study reported that direct pharmacy access would likely improve their access to hormonal contraceptives by offering more convenient hours and geographical locations, in addition to requiring less time and not requiring an appointment with a prescriber (Landau et al.,

Table 2. Direct Pharmacy Access policies

State	Effective Year	Term	Dosage Forms of Hormonal Contraceptives	Implementation	Insurance	Age
California	2016	Furnish	Oral, Transdermal Patch, Vaginal Ring, Injection	Statewide protocol	Allows 12-month supplies	All
Colorado	2017	Prescribe	Oral, Transdermal Patch	Statewide protocol	Allows 12-month supplies	≥ 18 years old
Oregon	2016	Prescribe	Oral, Transdermal Patch	Statewide protocol	Insurance coverage of prescription required, allows 12-month supply, pharmacists reimbursed for consultation	≥ 18 years old
Hawaii	2017	Prescribe	Oral, Transdermal Patch, Vaginal Ring, Injection, Devices	Statewide protocol	Allows 12-month supplies, and must reimburse prescribing pharmacist	All
Idaho	2019	Prescribe	Any, depends on CPA	Collaborative practice agreements		Any, depends on CPA
Maryland	2019	Prescribe	Oral, Transdermal Patch, Vaginal Ring, Injection, Emergency Contraceptives	Statewide protocol	Includes coverage of emergency contraception	All
New Hampshire[2]	2018	Initiation and Dispensing	Oral, Transdermal Patch, Vaginal Ring	Standing order	Allows 12-month supplies	All
New Mexico	2017	Prescriptive authority	Oral, Transdermal Patch, Vaginal Ring, Injection, Emergency Contraceptives	Statewide protocol	-	All
Tennessee	2018	Provide	Self-administered drugs, Transdermal Patch	Collaborative practice agreements	Insurance coverage of prescription required	≥ 18 years old, or emancipated minors

Table 2 continued

State	Effective Year	Term	Dosage Forms of Hormonal Contraceptives	Implementation	Insurance	Age
Utah	2018	Prescribe	Oral, Transdermal Patch, Vaginal Ring	Standing order	-	≥ 18 years old
Washington	1979/ 2015[1]	Prescribe	Any, depends on CPA	Collaborative practice agreements	Allows 12-month supplies, requires signs to be displayed in participating pharmacies	Any, depends on CPA
Washington DC	2019	Prescribe	Self-administered[2]	Collaborative practice agreements	Insurance coverage of prescription required, allows 12-month supply	All
West Virginia[2]	2019	Dispense	Self-administered[2]	Standing order	-	≥ 18 years old

1 WA permitted collaborative practice agreements in 1979, which could include contraceptive prescribing, but a law specific to contraceptive prescribing came about in 2015. 2 Pending protocol or standing order

2006). Offering direct pharmacy access to hormonal contraceptives was perceived by African-American and Latina women to be significantly more personally beneficial than White women (Landau et al. 2006), which suggests that direct pharmacy access may help to address disparities observed in contraceptive access. Being uninsured, younger, having experienced a pregnancy scare, and currently facing barriers to accessing contraceptives were all significantly and positively associated with supporting direct pharmacy access (Landau et al. 2006). Among those who were not in favor of direct pharmacy access, most reported fear of serious side effects of hormonal contraceptives as the reason (Landau et al. 2006). Overall, Landau et al. (2006) found that women in the United States were eager for direct pharmacy access.

Since many unintended pregnancies are experienced by teenagers (Finer et al. 2014), Wilkinson, Miller, Rafie, Landau, and Rafie (2018) studied older teenagers' attitudes towards and perceptions of direct pharmacy access of hormonal contraceptives by conducting in-depth qualitative interviews. The term, older teenagers, was defined as women being 18 or 19 years of age (Wilkinson et al. 2018). Ninety-seven percent of the participants were in favor of direct pharmacy access (Wilkinson et al. 2018). Five themes emerged from the interviews, including perceptions of the traditional model without direct pharmacy access, pharmacy environment, service preferences, benefits and concerns, and social impact (Wilkinson et al. 2018).

With regards to the traditional model of obtaining hormonal contraceptives, most teenagers were satisfied with the provider-patient relationship, but noted that barriers, such as time and cost, did exist (Wilkinson et al. 2018). For the second theme, although teenagers reported trusting pharmacists' knowledge and benefitting from the convenience of pharmacy hours of operation, they reported concern with pharmacies' lack of privacy (Wilkinson et al. 2018). Wilkinson et al. (2018) also found that teenagers were interested in receiving education and counseling from pharmacists but were concerned about costs that could be associated with direct pharmacy access. Most benefits mentioned centered around the perceived increased autonomy afforded by direct pharmacy access (Wilkinson et al. 2018). Finally, the participants felt that direct pharmacy access would help remove the stigma attached to contraceptive use among young adults and consequently improve health outcomes (Wilkinson et al. 2018).

In 2015, Irwin, Stewart, Nguyen, and Bzowyckyj (2018) analyzed online comments to determine public perceptions of direct pharmacy access of hormonal contraceptives. Irwin et al. (2018) found that the public was generally supportive of direct pharmacy access and identified

three major themes. The first theme was that commenters saw direct pharmacy access as a way to address access to care issues (Irwin et al. 2018). The second theme identified by Irwin et al. (2018) dealt with commenters' opinions of the appropriateness and ability of pharmacists to prescribe hormonal contraceptives. Some commenters felt that physicians should maintain some role in patient's access to contraceptives (Irwin et al. 2018). Finally, the third theme identified had to do with the logistics of implementing direct pharmacy access, such as ensuring that insurance coverage of hormonal contraceptives would still be available (Irwin et al. 2018).

Rafie, Haycock, Rafie, Yen, and Harper (2012) used qualitative interviews to explore physician and advanced practice clinician perceptions of direct pharmacy access. Physician perceptions of direct pharmacy access of hormonal contraceptives is of special interest because a prior study (Landau, Besinque, Chung, Dries-Daffner, and Maderes 2009) had found that pharmacists felt that a potential barrier to the implementation of direct pharmacy access was physician resistance. From the interviews, it was determined that physicians generally supported direct pharmacy access and felt that pharmacists were well-qualified to provide these services, with the main concern being that some pharmacists may refuse to provide contraceptive services due to personally held religious beliefs (Rafie et al. 2012). Rafie et al. (2012) identified five major themes, including models of access to hormonal contraceptives, impact on patient care, impact on current providers, implementation, and pharmacy access to additional services.

Under the first theme, it was discovered that the majority (80%) of physicians and clinicians did not think the current model of prescription-only access was appropriate. However, participants were split over the best model, with 33% preferring pharmacy access and 28% preferring over-the-counter status for hormonal contraceptives (Rafie et al. 2012). The second theme identified focused mainly on how direct pharmacy access could improve access to contraceptives, but also included concerns such as insurance coverage for pharmacist-prescribed contraceptives (Rafie et al. 2012). The impact of direct pharmacy access on prescribers currently providing hormonal contraceptives was the third theme identified (Rafie et al. 2012). Perhaps surprisingly, the majority of participants supported direct pharmacy access because they felt their own roles as clinicians would be simplified, and therefore, improved (Rafie et al. 2012). The fourth theme identified had to do with recommendations regarding implementation of direct pharmacy access, such as requiring blood pressure checks and supporting pharmacist reimbursement for services rendered (Rafie et al. 2012). Finally, participants suggested that pharmacists expand beyond hormonal

contraceptive prescribing. However, some participants felt pharmacists should be able to have full prescriptive authority for all prescription medications while others suggested more modest expansions limited to antibiotics for sexually-transmitted infections (Rafie et al. 2012).

Finally, the perceptions of those most directly impacted by direct pharmacy access were studied: pharmacists. Rodriguez et al. (2018) studied the perceptions and attitudes towards direct pharmacy access of pharmacists actually participating in hormonal contraceptive-prescribing in Oregon. The top three motivators identified for pharmacists to participate in direct pharmacy access include, in order: helping to increase access to contraceptives, helping to reduce unintended pregnancies, and increasing pharmacists' scope of practice (Rodriguez et al. 2018). The majority of pharmacists reported that providing direct pharmacy access to hormonal contraceptives could feasibly fit into their workflow and that providing direct pharmacy access increased their job satisfaction (Rodriguez et al. 2018). However, pharmacist motivations and perceptions did not significantly change between six- and 12-month follow-ups (Rodriguez et al. 2018).

Landau et al. (2009) surveyed community pharmacists throughout the United States to determine their attitudes towards direct pharmacy access. The majority of pharmacists (85%) reported being interested in providing direct pharmacy access to hormonal contraceptives (Landau et al. 2009). The most common reasons cited for wanting to provide direct pharmacy access included viewing access to contraceptives as an important issue (98%), increasing patient interaction (97%), improving physician-pharmacist relationships (96%), and improving professional development (97%) (Landau et al., 2009). The vast majority of pharmacists also reported confidence in assessing the patient, educating the patient, and monitoring the patient; however, many pharmacists expressed an interest in additional training to help select appropriate hormonal contraceptive products for individual patients, to learn more about preventative services, and to be made aware of all the hormonal contraceptive products currently available (Landau et al. 2009).

Consistent with other studies on direct pharmacy access (Rafie et al. 2012; Irwin et al. 2018; Landau et al. 2006), one major concern pharmacists reported was the uncertainty about reimbursement for services rendered (Landau et al. 2009). Pharmacists also reported concerns related to not having time to incorporate direct pharmacy access into their current workflow (Landau et al. 2009). It is important to note that this study included participants from states that do not currently allow direct pharmacy access (Landau et al. 2009), whereas the study by Rodriguez

et al. (2018) included only pharmacists who have been prescribing hormonal contraceptives, which may explain the discrepancy in reported perception of ability to incorporate direct pharmacy access into the pharmacy workflow. In response to the clinicians' concerns about pharmacists refusing to provide hormonal contraceptives to women on the grounds of religious beliefs (Rafie et al. 2012), Landau et al. (2009) found that only approximately 7% of pharmacists reported being uninterested in providing direct pharmacy access due to personal or religious beliefs. Another common reason for reporting a lack of interest in providing direct pharmacy access was that many pharmacists (88% of those reporting a lack of interest) thought that physical examinations were necessary to safely prescribe hormonal contraceptives, even though this is not the case (Landau et al. 2009).

A study was conducted to assess the perceptions of pharmacists practicing in Ohio regarding direct pharmacy access of hormonal contraceptives in 2016 (Hilverding and DiPietro Mager 2017). Pharmacists reported supporting pharmacist-prescribing of oral (57%), transdermal (54%), vaginal (44%), and injectable (37%) hormonal contraceptives (Hilverding et al. 2017). Motivators for providing direct pharmacy access to hormonal contraceptives included increased access for patients (62%), convenience (59%), fewer unintended pregnancies (46%), and better medication adherence (39%) (Hilverding et al. 2017), which is similar to previous findings (Rafie et al. 2012; Landau et al. 2009). Between 85 to 93% of pharmacists reported wanting to learn more about how to appropriately select a hormonal contraceptive and when to refer a patient to be seen by another provider (Hilverding et al. 2017). Hilverding et al. (2017) also collected data on what tools or procedures pharmacists felt were necessary to properly implement direct pharmacy access, and found that guidelines, patient education materials, and access to medical records were the most commonly requested items.

As found by Landau et al. (2009), 49% of pharmacists reported concerns about the lack of time available to implement hormonal contraceptive provision and 45% reported concerns about perceived physician resistance (Hilverding et al. 2017). Hilverding et al. (2017) also found that 44% of pharmacists were concerned about not having access to patients' medical charts, and 31% felt that pharmacies would be unable to provide the necessary privacy. Younger pharmacists ($p=0.02$) and those who have a Doctor of Pharmacy degree ($p=0.003$) were significantly more likely to agree that pharmacists are ready to provide direct pharmacy access to hormonal contraceptives (Hilverding et al. 2017).

Supporting Hilverding et al.'s (2017) findings that younger pharmacists are more willing to participate in direct pharmacy access, Rafie and El-Ibiary (2011) found that student pharmacists in California were very interested in prescribing hormonal contraceptives. Over 96% of students reported interest in providing direct pharmacy access, with slightly over half preferring to provide access to both adults and adolescents (Rafie et al. 2011). As seen in previous studies (Rafie et al. 2012; Landau et al. 2009; Hilverding et al. 2017), student pharmacists indicated that they felt patients would have better access to hormonal contraceptives if direct pharmacy access were implemented, and that it was appropriate to include contraceptive prescribing in pharmacists' scope of practice (Rafie et al. 2011). Time constraints, lack of reimbursement for services rendered, and lack of privacy were all potential barriers identified by student pharmacists (Rafie et al. 2011).

2.8 Direct Pharmacy Access in Action

Shotorbani, Miller, Blough, and Gardner (2006) studied the difference in prescribing outcomes of hormonal contraceptives between self-administered health questionnaires and traditional health care provider evaluations. The questionnaire was comprised of twenty items with dichotomous responses (yes/no) and was written in layman's terms to help ensure patient comprehension (Shotorbani et al. 2006). It was found that health care providers and women did not have significantly different answers (Shotorbani et al. 2006). This remained true when controlled for age, income level, educational attainment, and prior contraceptive use (Shotorbani et al. 2006).

A slight increase in agreement between patient and provider was found when the patient had been using contraceptives for at least one year prior to filling out the questionnaire, but this finding was not statistically significant (Shotorbani et al. 2006). The majority of women participating in this study (87.8%) chose a hormonal contraceptive as their preferred method (Shotorbani et al. 2006). When there was disagreement between the woman and the provider, it was found that the patient was more likely to determine that they were ineligible for hormonal contraceptive therapy (Shotorbani et al. 2006). The most common reason that women reported contraindications to using hormonal contraceptives was that they reported a possible pregnancy; however, providers answered this question after administering a pregnancy test and they were able to definitively rule out a pregnancy (Shotorbani et al. 2006). This suggests the importance of administering a

pregnancy test among women who are uncertain if they may be pregnant before initiating or excluding hormonal contraceptive therapy.

Gardner et al. (2008) went beyond measuring women's expectations and studied how direct pharmacy access to hormonal contraceptives was being implemented in community pharmacies in Seattle, Washington in 2003 to 2005. The Direct Access study looked at contraceptive initiation and continuation rates among women who used direct pharmacy access, acceptability of the program to both pharmacists and patients, and sustainability of the program as indicated by women's willingness to pay for direct pharmacy access services (Gardner et al. 2008). Similar to Landau et al.'s (2006) findings, Gardner et al. (2008) found that 60% of women using direct pharmacy access to hormonal contraceptives were doing so due to the increased convenience associated with direct pharmacy access.

The Direct Access study is unique in that it also analyzed the feasibility of direct pharmacy access and found that 80% of women paid out-of-pocket for the pharmacist consultation, and just under half of the women paid out-of-pocket for their prescribed hormonal contraceptives (Gardner et al. 2008). Pharmacist consultations cost an average of $25, and pharmacists spent an average of 23 minutes on each consultation (Gardner et al. 2008). Uninsured women reported that cost-savings associated with direct pharmacy access were beneficial, since the pharmacist consultation cost less than an appointment with a prescriber (Gardner et al. 2008). Pharmacists referred 38.9% of the study participants to other providers for care in place of or in addition to direct pharmacy access of hormonal contraceptives (Gardner et al. 2008). For continuation rates, it was found that 92.6% of participants had reported continuing their hormonal contraceptives at the 1-month follow-up, 80.3% at the 6-month follow-up, and 70.0% at the 12-month follow-up (Gardner et al. 2008). The most common reasons for discontinuation were side effects and change in sexual activity or desire to prevent pregnancy (Gardner et al. 2008).

Participant satisfaction was very high throughout the process, with over 95% of women reporting that they were satisfied with direct pharmacy access, felt the pharmacist was capable of answering their questions regarding hormonal contraceptive use, and would recommend direct pharmacy access to a friend (Gardner et al. 2008). At the 12-month follow-up, Gardner et al. (2008) found that 95% of participants were willing to receive other health services, such as pregnancy tests or sexually-transmitted disease screening, from a pharmacist, and 96.8% would feel comfortable continuing to use direct pharmacy access to receive their hormonal contraceptives.

All pharmacists reported confidence in counseling on and prescribing hormonal contraceptives, but many pharmacists reported feeling that the protocol should be expanded to include adults younger than 18 years of age, and for the protocol to use body mass index instead of weight in the determination of eligibility (Gardner et al. 2008). All pharmacists reported wanting to continue providing direct pharmacy access to hormonal contraceptives at the end of the study period (Gardner et al. 2008). A significant strength of Gardner et al.'s (2008) study is that high-volume pharmacies were selected, which demonstrates the feasibility of implementing direct pharmacy access in other community pharmacies. These findings help to support the continued expansion of direct pharmacy access in other states and the expansion of other pharmacist-provided services. Perhaps the most notable limitation of the Direct Access study was that Washington's Medicaid did not reimburse for pharmacist consultations, so lower-income women on Medicaid may have been unintentionally excluded from the study (Gardner et al. 2008).

In a more recent study, Rodriguez et al. (2018) explored the implementation of direct pharmacy access and pharmacists' motivating factors to participate in direct pharmacy access in Oregon. The percentage of counties in Oregon with a pharmacist trained to prescribe hormonal contraceptives rose from a baseline of 19.4% to 63% at six months (Rodriguez et al. 2018). Despite this dramatic increase, 76.1% of pharmacists reported writing less than ten prescriptions per month (Rodriguez et al., 2018). A little over 40% of the pharmacist consultations were reimbursed through a patient's insurance; however, the consultations cost an average of $39 when the patient either was uninsured or had insurance that did not reimburse for pharmacist-provided contraceptive services (Rodriguez et al. 2018).

Several states that have enacted laws permitting direct pharmacy access of hormonal contraceptives have also enacted accompanying laws which are intended to support access of contraceptives. These accompanying laws mainly focus on insurance coverage of pharmacist-prescribed contraceptives and minimum dispensing quantities of contraceptives.

Foster, Parvataneni, de Bocanegra, Lewis, Bradsberry, and Darney (2006) found that contraceptive continuation rates were significantly higher among women who received a 13-month supply at one time when compared to those receiving a 3-month supply. In response to concerns that providing women with larger supplies of contraceptives may disincentivize women to receive routine wellness checks, Foster et al. (2006) also found that women dispensed 13-month supplies of contraceptives were more likely be screened for chlamydia and receive a Pap smear. The results

of Foster et al.'s (2006) study also showed that costs to the low-income, government-funded health insurance plan spent less on women who received a 13-month supply of contraceptives.

In a randomized clinical trial, White and Westhoff (2011) explored the impact of contraceptive days supply on therapy continuation rates. Women received either a three-month or six-month supply of hormonal contraceptive pills, and continuation rates were assessed at the end of six months (White et al. 2011). It was found that 51% of the women who received the six-month supply were still taking their oral contraceptives at the six-month mark, while only 35% ($p<0.001$) of women who had received a three-month supply were continuing therapy (White et al. 2011). The difference between the two groups was even stronger when only women under the age of 18 were included in the analyses (White et al. 2011).

Potter, McKinnon, Hopkins, Amastae, Shedlin, Powers, and Grossman (2011) found similar results in Texas, when they compared women who accessed contraceptives through the traditional physician-prescribed model and those who traveled into Mexico to obtain hormonal contraceptives over-the-counter. Potter et al. (2011) found that continuation rates between the two groups was similar only once those in the traditional model group were given six-month or more supplies at one time. Likely based on the findings of Foster et al. (2006), Potter et al. (2011), and White et al. (2011), Oregon enacted a law in 2016 that required prescription insurance companies to cover a 3-month supply of hormonal contraceptives if it was the first time the patient had ever been prescribed contraceptives, or a 12-month supply if the patient had ever received a prescription contraceptive in the past (H.R. 2879 2015). California, Hawaii, Washington, New Hampshire, and Washington D.C. also currently require 12-month supplies of hormonal contraceptives to be covered by insurance (S.B. 999 2016; S.B. 513 2017; H.B. 2681 2015; H.B. 2583 2020; Code of the District of Columbia 2020).

Oregon also enacted House Bill 2527, which took effect January 1, 2018 (Oregon Board of Pharmacy 2018). This law requires prescription insurance companies to reimburse pharmacists for consultations associated with prescribing hormonal contraceptives (Oregon Board of Pharmacy 2018). Hawaii is the only other state that currently requires insurance companies to reimburse pharmacists for contraceptive services provided (S.B. 513 2017). This additional law may encourage more pharmacists to participate in direct pharmacy access of hormonal contraceptives, now that they have financial support for including additional services into their current workflow.

2.9 Conceptual Definitions of Access to Care

Access to care is a complex concept with many contributing factors. As this research project proposes to examine the impact of a direct pharmacy access policy on women's access to hormonal contraceptives, it is important to conceptually define "access". The definition and measurement of access to care has evolved over time since it first became commonplace in the 1960's, when research focused on utilization of care (Shengelia, Murray, and Adams 2003).

Conceptual definitions of access to care widely vary. Definitions have ranged from use of needed health care (Waters 2000) or a depiction of costs associated with health services (Culyer and Wagstaff 1993) to a complex model of supply and demand (Mooney 1983) or system-level and individual-level characteristics (Shengelia et al. 2003). Bashshur, Shannon, and Metzner (1971) defined access as the relationship between patients, facilities, and resources, which can be determined by barriers and facilitators. Dutton (1986) considered the characteristics of providers in addition to patient and system characteristics, while Salkever (1976), Margolis, Carey, Lannon, Earp, and Leininger (1995), and Peters, Garg, Bloom, Walker, Brieger, and Rahman (2008) considered patients' financial resources in their definitions of access. Margolis et al. (1995) also incorporated the time between first needing care and actually receiving care as a factor in their definition of access.

From these definitions, conceptual and theoretical frameworks were developed. One of the most widely known access to care frameworks was created by Andersen (1995). Andersen's (1995) Behavioral Model of Health Services consists of four major components: predisposing characteristics, enabling resources, need, and use of health services. Predisposing characteristics are factors which influence one's likelihood of using a health service such as demographics, social factors, and mental factors or health beliefs. Enabling resources are factors, such as financial or organizational factors, which impact an individual's ability to use a health service. Needs include the individual's perceived need to use a health service, and a healthcare provider's evaluation and determination of need to use a health service. Finally, these three components lead to the individual's use, or lack of use, of the health service. Over the decades, the model grew to include environmental characteristics and population characteristics (Andersen 1995).

In the most recent iteration of the Behavioral Model of Health Services Use, the framework still has four major components, but they now comprise of contextual characteristics, individual characteristics, health behaviors, and outcomes (Andersen, Davidson, and Baumeister 2013). To

measure access to care, Anderson suggests six different dimensions: potential access, realized access, equitable access, inequitable access, effective access, and efficient access (Andersen et al. 2013).

- Potential access refers to the availability of health services.
- Realized access refers to health services that are actually used by patients.
- Equitable access refers to access that is influenced by an individual's need for health care.
- Inequitable access refers to access that is influenced by factors such as race, education level, and insurance coverage status.
- Effective access deals with the health outcomes that individuals experience in response to the health services they receive.
- Efficient access, focuses on the costs associated with providing health services.

Shengalia et al. (2003) proposed that for a theoretical framework of access to care to be complete, it must include individual-level factors. The theoretical model includes gaps related to: resource availability, physical accessibility, affordability, cultural acceptability, provider-related quality, adherence, and strategic choice (Shengelia et al. 2003).

- The resource gap dimension looks at the availability of health resources, such as the number of health care clinics and providers (Shengelia et al. 2003).
- The physical accessibility dimension focuses on factors such distance between patients and health care facilities (Shengelia et al. 2003).
- Affordability refers to an individual's ability to pay for needed health services (Shengelia et al. 2003).
- Cultural acceptability looks at whether or not health services, and the manner in which they are provided, are considered appropriate under the patient's religious and cultural beliefs (Shengelia et al. 2003).
- The provider-related quality dimension includes factors such as a provider's ability to provide quality care in an effective manner (Shengelia et al. 2003).
- The adherence dimension looks at the impact of patient non-adherence to the prescribed therapy or lifestyle modifications (Shengelia et al. 2003).

- Finally, the last dimension, strategic choice, refers to the potential gap between optimal treatment regimens and the treatment regimen actually used (Shengelia et al. 2003).

Almeida et al. (2001) measured access by looking at whether the participant had a usual source of care, had their medical needs met, and their level of self-efficacy in obtaining care. More recently, Ross and Hardee (2013) argued that access is not simply a measure of usage of a given health service; rather, health care providers, past experiences, personal preferences, and alternative health service options all play a role in determining access. Looking specifically at contraceptive access, Upadhya, Burke, Marcell, Mistry, and Cheng (2015) used a modified version of Andersen's Behavioral Model which focused on enabling resources such as insurance coverage, usual source of care, and preventive care related to contraception or pregnancy. Cook, Farris, Chrischilles, and Aquilino (2012) assessed access of contraceptives by measuring product availability and accessibility, where availability referred to what products were offered by a pharmacy and accessibility referred to the location of the products and associated barriers to accessing them.

2.10 Theoretical Framework

The theoretical framework that will be used in this study is by Levesque, Harris, and Russell (2013). Levesque et al. (2013) reviewed the most frequently used existing frameworks and synthesized a new framework. Levesque et al.'s (2013) framework is the most extensive access to care framework published in the literature to date. This framework has been cited in public health and health service research articles (71.38%), followed by applied economics (6.90%) and policy and administration (4.14%) articles (Dimensions.ai 2018). Previous studies have used the model to inform the creation of interview guides (Priest, Englander, and McCarty 2020), map qualitative findings (Rice et al. 2019; Matthews et al. 2019), and inform framework development (Archambault, Cote, and Raynault 2019; Hoj, Jacka, Minoyan, Artenie, and Bruneau 2019).

The dimensions of approachability, acceptability, availability and accommodation, affordability, and appropriateness are factors affecting access from the supply-side (or health-system side), while ability to perceive, seek, reach, pay, and engage are factors affecting access from the demand-side (or patient-side) (Levesque et al. 2013). These dimensions are detailed in Figure 1. This study will focus on the supply side dimensions of access to care (indicated below),

since a policy change would likely impact the provision of healthcare but not the characteristics of individuals seeking care.

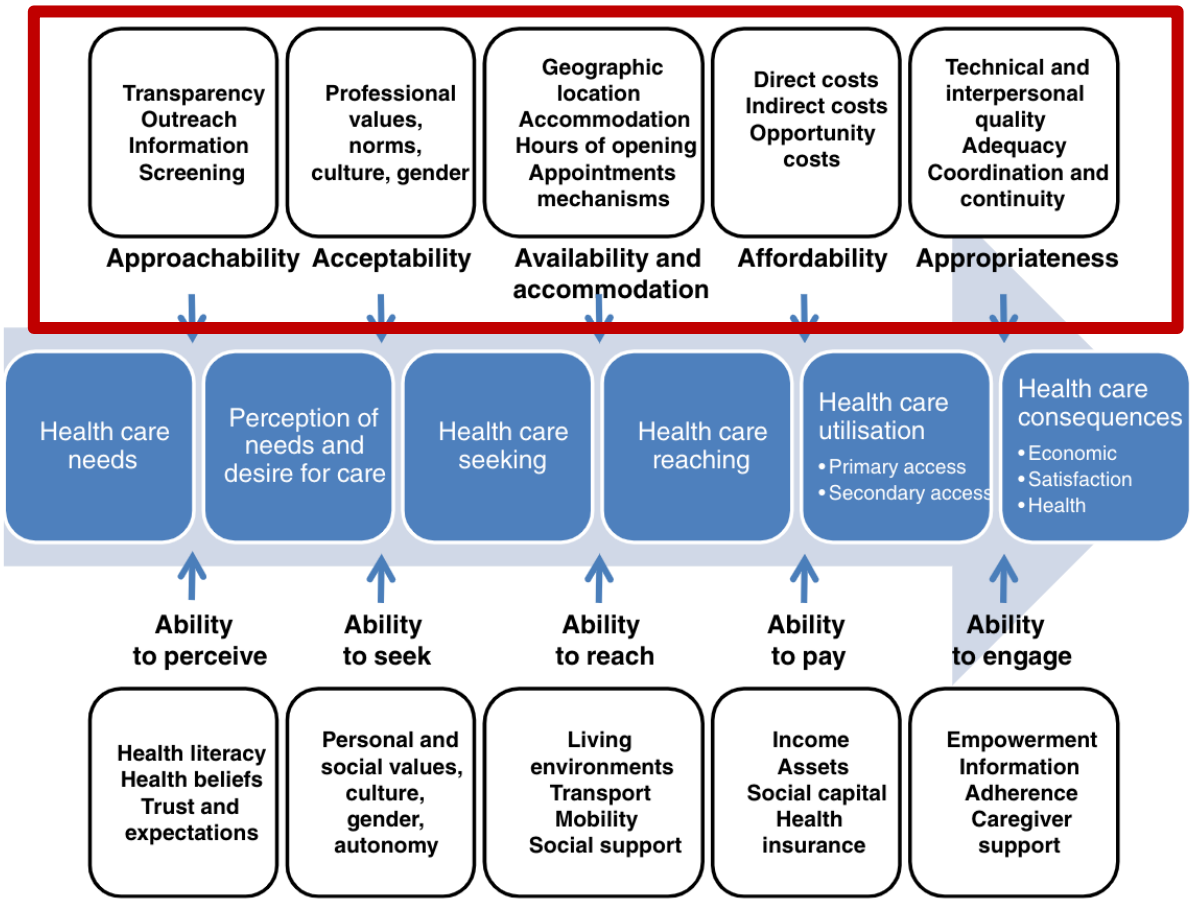

Figure 1. Theoretical Framework (Levesque et al. 2013)

CHAPTER 3. METHODS

3.1 Research Question, Objectives, and Hypotheses

The objective of this dissertation was to examine the potential impact of a policy permitting direct pharmacy access of hormonal contraceptives to women in Indiana. The purpose of this study was to answer RQ: What is the impact of a policy permitting direct pharmacy access to hormonal contraceptives on women's access to hormonal contraceptives?

For the hypotheses, "Group 1" was defined as women in Indiana who use traditional methods to obtain hormonal contraceptives, such as a medical doctor, nurse practitioner, or physician assistant. "Group 2" was defined as women in a state allowing direct pharmacy access who have only used traditional methods to obtain hormonal contraceptives, such as a medical doctor, nurse practitioner, or physician assistant. "Group 3" was defined as women in a state allowing direct pharmacy access who have used direct pharmacy access to obtain hormonal contraceptives. Although women in Group 3 may have also used traditional methods to obtain hormonal contraceptives, for the purposes of this research study, they were only asked about their experiences with direct pharmacy access.

Scores for each item were collected using a modified five-point Likert-type scale for each item (1=strongly disagree, 2=disagree, 3=neither agree nor disagree, 4=agree, 5=strongly agree, and 0=not applicable, unless reverse coded). Factor scores for each dimension were calculated using factor analysis of the final data to aide in differentiating the type of impact on access to hormonal contraceptives.

3.1.1 Objective 1.1

To examine the impact of direct pharmacy access policies on women's access to hormonal contraceptives by comparing women's perceptions in both a state that does not allow direct pharmacy access or hormonal contraceptives (Indiana) and states that do allow direct pharmacy access. All hypotheses for Objective 1.1 were tested using Kruskal-Wallis tests (a priori alpha = 0.05) and ad-hoc multiple comparisons. Bonferroni corrections were used in the multiple comparison tests to account for accumulation of Type I error. The adjusted alpha for the multiple comparisons was 0.0167. Details of all analyses are in Table 3.

1.1a H_o: The mean total access of Groups 1, 2, and 3 are all equal.

1.1a H_a: The mean total access of Groups 1, 2, and 3 are not all equal.

$1.1a_1$: Mean total access of Group 3 is greater than the mean total access of Group 2.

$1.1a_2$: Mean total access of Group 3 is greater than the mean total access of Group 1.

1.1b H_o: The mean approachability access of Groups 1, 2, and 3 are all equal.

1.1b H_a: The mean approachability access of Groups 1, 2, and 3 are not all equal.

$1.1b_1$: Mean approachability access of Group 3 is greater than the mean approachability access of Group 2.

$1.1b_2$: Mean approachability access of Group 3 is greater than the mean approachability access of Group 1.

1.1c H_o: The mean acceptability access of Groups 1, 2, and 3 are all equal.

1.1c H_a: The mean acceptability access of Groups 1, 2, and 3 are not all equal.

$1.1c_1$: Mean acceptability access of Group 3 is greater than the mean acceptability access of Group 2.

$1.1c_2$: Mean acceptability access of Group 3 is greater than the mean acceptability access of Group 1.

1.1d H_o: The mean availability and accommodation access of Groups 1, 2, and 3 are all equal.

1.1d H_a: The mean availability and accommodation access of Groups 1, 2, and 3 are not all equal.

$1.1d_1$: Mean availability and accommodation access of Group 3 is greater than the mean availability and accommodation access of Group 2.

$1.1d_2$: Mean availability and accommodation access of Group 3 is greater than the mean availability and accommodation access of Group 1.

1.1e H_o: The mean affordability access of Groups 1, 2, and 3 are all equal.

1.1e H_a: The mean affordability access of Groups 1, 2, and 3 are not all equal.

$1.1e_1$: Mean affordability access of Group 3 is greater than the mean affordability access of Group 2.

$1.1e_2$: Mean affordability access of Group 3 is greater than the mean affordability access of Group 1.

1.1f H_o: The mean appropriateness access of Groups 1, 2, and 3 are all equal.

1.1f H_a: The mean appropriateness access of Groups 1, 2, and 3 are not all equal.

1.1f$_1$: Mean appropriateness access of Group 3 is greater than the mean appropriateness access of Group 2.

1.1f$_2$: Mean appropriateness access of Group 3 is greater than the mean appropriateness access of Group 1.

1.1g H_o: The mean privacy access of Groups 1, 2, and 3 are all equal.

1.1g H_a: The mean privacy access of Groups 1, 2, and 3 are not all equal.

1.1g$_1$: Mean privacy access of Group 3 is greater than the mean appropriateness access of Group 2.

1.1g$_2$: Mean privacy access of Group 3 is greater than the mean appropriateness access of Group 1.

3.1.2 Objective 1.2

To examine the impact of direct pharmacy access policies on women's access to hormonal contraceptives by demographic characteristics. Multiple linear regression was used to test all hypotheses for Objective 1.2. For hypotheses 1.2a through 1.2j, the overall F test was used to determine whether a significant relationship existed. For hypotheses 1.2k through 1.2q, the ad hoc multiple comparisons tests were used. Bonferroni corrections were used to account for the accumulation of Type I error. The adjusted alpha used for multiple comparisons between groups was 0.0167, education level was 0.0125, income level was 0.01, and age was 0.01. Logistic regression was also used as a sensitivity analysis since a strong ceiling effect was present in the data. Details of analyses are included in Table 3.

1.2a H_o: There is not a relationship between total access, group, education level, income level, and age.

1.2a H_a: There is a significant relationship between total access, group, education level, income level, and/or age.

1.2b H_o: There is not a relationship between approachability access, group, education level, income level, and age.

1.2b H_a: There is a significant relationship between approachability access, group, education level, income level, and/or age.

1.2c H_o: There is not a relationship between acceptability access, group, education level, income level, and age.

1.2c H_a: There is a significant relationship between acceptability access, group, education level, income level, and/or age.

1.2d H_o: There is not a relationship between availability and accommodation access, group, education level, income level, and age.

1.2d H_a: There is a significant relationship between availability and accommodation access, group, education level, income level, and/or age.

1.2e H_o: There is not a relationship between affordability access, group, education level, income level, and age.

1.2e H_a: There is a significant relationship between affordability access, group, education level, income level, and/or age.

1.2f H_o: There is not a relationship between appropriateness access, group, education level, income level, and age.

1.2f H_a: There is a significant relationship between appropriateness access, group, education level, income level, and/or age.

1.2g H_o: There is not a relationship between privacy access, group, education level, income level, and age.

1.2g H_a: There is a significant relationship between privacy access, group, education level, income level, and/or age.

1.2h H_o: There is not a relationship between total access for Group 1, education level, income level, and age.

1.2h H_a: There is a significant relationship between total access for Group 1, education level, income level, and/or age.

1.2i H_o: There is not a relationship between total access for Group 2, education level, income level, and age.

1.2i H_a: There is a significant relationship between total access for Group 2, education level, income level, and/or age.

1.2j H_o: There is not a relationship between total access for Group 3, education level, income level, and age.

1.2j H_a: There is a significant relationship between total access for Group 3, education level, income level, and/or age.

1.2k H_o: There is not a relationship between total access and group, when controlling for education level, income level, and age.

1.2k H_a: There is a significant relationship between total access and group, when controlling for education level, income level, and/or age.

1.2l H_o: There is not a relationship between approachability access and group, when controlling for education level, income level, and age.

1.2l H_a: There is a significant relationship between approachability access and group, when controlling for education level, income level, and age.

1.2m H_o: There is not a relationship between acceptability access and group, when controlling for education level, income level, and age.

1.2m H_a: There is a significant relationship between acceptability access and group, when controlling for education level, income level, and age.

1.2n H_o: There is not a relationship between availability and accommodation access and group, when controlling for education level, income level, and age.

1.2n H_a: There is a significant relationship between availability and accommodation access and group, when controlling for education level, income level, and age.

1.2o H_o: There is not a relationship between affordability access and group, when controlling for education level, income level, and age.

1.2o H_a: There is a significant relationship between affordability access and group, when controlling for education level, income level, and age.

1.2p H_o: There is not a relationship between appropriateness access and group, when controlling for education level, age, and income level.

1.2p H_a: There is a significant relationship between appropriateness access and group, when controlling for education level, age, and income level.

1.2q H_o: There is not a relationship between privacy access and group, when controlling for education level, age, and income level.

1.2q H_a: There is a significant relationship between privacy access and group, when controlling for education level, age, and income level.

Table 3. Data analysis summary

Objective		Null Hypothesis	Alternative Hypothesis	Analysis	Dependent Variable	Independent Variables	Covariates
1.1	a	The mean total access of Groups 1, 2, and 3 are equal.	The mean total access of Groups 1, 2, and 3 are not equal.	Kruskal-Wallis	Total Access	Groups (1,2,3)	-
	1	Group 3 = Group 1	Group 3 > Group 1	Bonferroni	Total Access	Groups (1,3)	-
	2	Group 3 = Group 2	Group 3 > Group 2	Bonferroni	Total Access	Groups (2,3)	-
1.1	b	The mean approachability access of Groups 1, 2, and 3 are equal.	The mean approachability access of Groups 1, 2, and 3 are not equal.	Kruskal-Wallis	Approachability	Groups (1,2,3)	-
	1	Group 3 = Group 1	Group 3 > Group 1	Bonferroni	Approachability	Groups (1,3)	-
	2	Group 3 = Group 2	Group 3 > Group 2	Bonferroni	Approachability	Groups (2,3)	-
1.1	c	The mean acceptability access of Groups 1, 2, and 3 are equal.	The mean acceptability access of Groups 1, 2, and 3 are not equal.	Kruskal-Wallis	Acceptability	Groups (1,2,3)	-
	1	Group 3 = Group 1	Group 3 > Group 1	Bonferroni	Acceptability	Groups (1,3)	-
	2	Group 3 = Group 2	Group 3 > Group 2	Bonferroni	Acceptability	Groups (2,3)	-
1.1	d	The mean availability and accommodation access of Groups 1, 2, and 3 are equal.	The mean availability and accommodation access of Groups 1, 2, and 3 are not equal.	Kruskal-Wallis	Availability and Accommodation	Groups (1,2,3)	-
	1	Group 3 = Group 1	Group 3 > Group 1	Bonferroni	Availability and Accommodation	Groups (1,3)	-
	2	Group 3 = Group 2	Group 3 > Group 2	Bonferroni	Availability and Accommodation	Groups (2,3)	-
1.1	e	The mean affordability access of Groups 1, 2, and 3 are equal.	The mean affordability access of Groups 1, 2, and 3 are not equal.	Kruskal-Wallis	Affordability	Groups (1,2,3)	-
	1	Group 3 = Group 1	Group 3 > Group 1	Bonferroni	Affordability	Groups (1,3)	-
	2	Group 3 = Group 2	Group 3 > Group 2	Bonferroni	Affordability	Groups (2,3)	-

Table 3 continued

Objective			Null Hypothesis	Alternative Hypothesis	Analysis	Dependent Variable	Independent Variables	Covariates
1.1	f		The mean appropriateness access of Groups 1, 2, and 3 are equal.	The mean appropriateness access of Groups 1, 2, and 3 are not equal.	Kruskal-Wallis	Appropriateness	Groups (1,2,3)	-
		1	Group 3 = Group 1	Group 3 > Group 1	Bonferroni	Appropriateness	Groups (1,3)	-
		2	Group 3 = Group 2	Group 3 > Group 2	Bonferroni	Appropriateness	Groups (2,3)	-
1.1	g		The mean privacy access of Groups 1, 2, and 3 are equal.	The mean privacy access of Groups 1, 2, and 3 are not equal.	Kruskal-Wallis	Privacy	Groups (1,2,3)	-
		1	Group 3 = Group 1	Group 3 > Group 1	Bonferroni	Privacy	Groups (1,3)	-
		2	Group 3 = Group 2	Group 3 > Group 2	Bonferroni	Privacy	Groups (2,3)	-
1.2	a	1	No relationship exists between total access, group, education level, income level, and age.	A significant relationship exists between total access, group, education level, income level, and/or age.	Multiple regression	Total Access	Groups (1,2,3) Education[1] Income level[2] Age[3]	-
		2			Binary Logistic Regression	Total Access (Upper third, Lower two-thirds)	Groups (1,2,3) Education[1] Income level[2] Age[3]	
1.2	b	1	No relationship exists between approachability access, group, education level, income level, and age.	A significant relationship exists between approachability access, group, education level, income level, and/or age.	Multiple regression	Approachability	Groups (1,2,3) Education[1] Income level[2] Age[3]	-
		2			Binary Logistic Regression	Approachability	Groups (1,2,3) Education[1] Income level[2] Age[3]	

Table 3 continued

Objective			Null Hypothesis	Alternative Hypothesis	Analysis	Dependent Variable	Independent Variables	Covariates
1.2	c	1	No relationship exists between acceptability access, group, education level, income level, and age.	A significant relationship exists between acceptability access, group, education level, income level, and/or age.	Multiple regression	Acceptability	Groups (1,2,3) Education[1] Income level[2] Age[3]	-
		2			Binary Logistic Regression	Acceptability	Groups (1,2,3) Education[1] Income level[2] Age[3]	
1.2	d	1	No relationship exists between availability and accommodation access, group, education level, income level, and age.	A significant relationship exists between availability and accommodation access, group, education level, income level, and/or age.	Multiple regression	Availability and Accommodation	Groups (1,2,3) Education[1] Income level[2] Age[3]	-
		2			Binary Logistic Regression	Availability and Accommodation	Groups (1,2,3) Education[1] Income level[2] Age[3]	
1.2	e	1	No relationship exists between affordability access, group, education level, income level, and age.	A significant relationship exists between affordability access, group, education level, income level, and/or age.	Multiple regression	Affordability	Groups (1,2,3) Education[1] Income level[2] Age[3]	-
		2			Binary Logistic Regression	Affordability	Groups (1,2,3) Education[1] Income level[2] Age[3]	

Table 3 continued

Objective			Null Hypothesis	Alternative Hypothesis	Analysis	Dependent Variable	Independent Variables	Covariates
1.2	f	1	No relationship exists between appropriateness access, group, education level, income level, and age.	A significant relationship exists between appropriateness access, group, education level, income level, and/or age.	Multiple regression	Appropriateness	Groups (1,2,3) Education[1] Income level[2] Age[3]	-
		2			Binary Logistic Regression	Appropriateness	Groups (1,2,3) Education[1] Income level[2] Age[3]	
1.2	g	1	No relationship exists between privacy access, group, education level, income level, and age.	A significant relationship exists between privacy access, group, education level, income level, and/or age.	Multiple regression	Privacy	Groups (1,2,3) Education[1] Income level[2] Age[3]	-
		2			Binary Logistic Regression	Privacy	Groups (1,2,3) Education[1] Income level[2] Age[3]	
1.2	h	1	No relationship exists between total access for Group 1, education level, income level, and age.	A significant relationship exists between total access for Group 1, education level, income level, and/or age.	Multiple regression	Total Access for Group 1	Education[1] Income level[2] Age[3]	-
		2			Binary Logistic Regression	Total Access for Group 1	Education[1] Income level[2] Age[3]	
1.2	i	1	No relationship exists between total access for Group 2, education level, income level, and age.	A significant relationship exists between total access for Group 2, education level, income level, and/or age.	Multiple regression	Total Access for Group 2	Education[1] Income level[2] Age[3]	-
		2			Binary Logistic Regression	Total Access for Group 2	Education[1] Income level[2] Age[3]	

Table 3 continued

Objective			Null Hypothesis	Alternative Hypothesis	Analysis	Dependent Variable	Independent Variables	Covariates
1.2	j	1	No relationship exists between total access for Group 3, education level, income level, and age.	A significant relationship exists between total access for Group 3, education level, income level, and/or age.	Multiple regression	Total Access for Group 3	Education[1] Income level[2] Age[3]	-
		2			Binary Logistic Regression	Total Access for Group 3	Education[1] Income level[2] Age[3]	
1.2	k	1	No relationship exists between total access and group when controlling for education, income level, and age.	A significant relationship exists between total access and group, when controlling for education level, income level, and age.	Multiple regression with covariates	Total Access	Groups (1,2,3)	Education[1] Income level[2] Age[3]
		2			Binary Logistic Regression	Total Access	Groups (1,2,3)	Education[1] Income level[2] Age[3]
1.2	l	1	No relationship exists between approachability access and group when controlling for education, income level, and age.	A significant relationship exists between approachability access and group, when controlling for education level, income level, and age.	Multiple regression with covariates	Approachability	Groups (1,2,3)	Education[1] Income level[2] Age3
		2			Binary Logistic Regression	Approachability	Groups (1,2,3)	Education[1] Income level[2] Age[3]
1.2	m	1	No relationship exists between acceptability access and group when controlling for education, income level, and age.	A significant relationship exists between acceptability access and group, when controlling for education level, income level, and age.	Multiple regression with covariates	Acceptability	Groups (1,2,3)	Education[1] Income level[2] Age[3]
		2			Binary Logistic Regression	Acceptability	Groups (1,2,3)	Education[1] Income level[2] Age[3]

Table 3 continued

Objective			Null Hypothesis	Alternative Hypothesis	Analysis	Dependent Variable	Independent Variables	Covariates
1.2	n	1	No relationship exists between availability and accommodation access and group when controlling for education, income level, and age.	A significant relationship exists between availability and accommodation access and group, when controlling for education level, income level, and age.	Multiple regression with covariates	Availability and Accommodation	Groups (1,2,3)	Education[1] Income level[2] Age[3]
		2			Binary Logistic Regression	Availability and Accommodation	Groups (1,2,3)	Education[1] Income level[2] Age[3]
1.2	o	1	No relationship exists between affordability access and group when controlling for education, income level, and age.	A significant relationship exists between affordability access and group, when controlling for education level, income level, and age.	Multiple regression with covariates	Affordability	Groups (1,2,3)	Education[1] Income level[2] Age[3]
		2			Binary Logistic Regression	Affordability	Groups (1,2,3)	Education[1] Income level[2] Age[3]
1.2	p	1	No relationship exists between appropriateness access and group when controlling for education, income level, and age.	A significant relationship exists between appropriateness access and group, when controlling for education level, income level, and age.	Multiple regression with covariates	Appropriateness	Groups (1,2,3)	Education[1] Income level[2] Age[3]
		2			Binary Logistic Regression	Appropriateness	Groups (1,2,3)	Education[1] Income level[2] Age[3]

Table 3 continued

Objective	Null Hypothesis	Alternative Hypothesis	Analysis	Dependent Variable	Independent Variables	Covariates
1.2 q 1	No relationship exists between privacy access and group when controlling for education, income level, and age.	A significant relationship exists between privacy access and group, when controlling for education level, income level, and age.	Multiple regression with covariates	Privacy	Groups (1,2,3)	Education[1] Income level[2] Age[3]
2			Binary Logistic Regression	Privacy	Groups (1,2,3)	Education[1] Income level[2] Age[3]

1. Education: a) did not finish high school, b) high school, c) some college, d) associate's degree, e) bachelor's degree, f) advanced degree. 2. Income level: a) <$25k, b) $25k-<50k, c) $50k-<75k, d) $75k-<100k, e) $100k+. 3. Age: a)18-24 years of age, b) 25-29, c) 30-34, d) 35-39, e) 40-44

3.2 Research Design

This study used a cross-sectional survey to quantitatively assess the impact of a direct pharmacy access policy allowing pharmacists to prescribe hormonal contraceptives on women's access to hormonal contraceptives in Indiana and states allowing direct pharmacy access.

3.3 Data Sources and Data Collection

All data collected for this dissertation were primary data and collected in a single time point. Recruitment for the online survey took place through Amazon's MechanicalTurk (MTurk). MTurk is an online hub that uses crowdsourcing to match "Workers" to tasks created by "Developers", which can be completed by Workers for credit to be used on Amazon's website (Amazon Mechanical Turk 2020). Tasks, called Human Intelligence Tasks (HITs), are often short-term work, such as audio transcription and survey completion (Amazon Mechanical Turk 2020). Although participant demographics in studies conducted through Amazon MechanicalTurk may differ somewhat from nationally representative samples (Walters, Christakis, and Wright 2018), a review of the literature by Mortensen and Hughes (2018) suggests that MechanicalTurk provides reliable results for health research.

Data for both the pilot and the final survey were collected online via Qualtrics surveys distributed through Amazon's MechanicalTurk. Each participant was compensated for their time with $0.50 for each participant completing the pilot and $1.00 for completing the final survey.

3.4 Ethical Considerations

This study was approved through Purdue University's Institutional Review Board (IRB) prior to study participant recruitment or data collection. The University of Mississippi's Institutional Review Board accepted Purdue's IRB approval.

3.5 Sampling and Recruitment

The target population included all women in Indiana or states with a policy permitting direct pharmacy access, who either currently use hormonal contraceptives or would like to use hormonal contraceptives. All states with direct pharmacy access policies were chosen to ensure an adequate sample size could be achieved for all three groups. "Group 1" was defined as women in Indiana

who use traditional methods to obtain hormonal contraceptives, such as a medical doctor, nurse practitioner, or physician assistant. “Group 2” was defined as women in states with a direct pharmacy access policy who use traditional methods to obtain hormonal contraceptives, such as a medical doctor, nurse practitioner, or physician assistant. “Group 3” was defined as women in states with a direct pharmacy access policy who use direct pharmacy access to obtain hormonal contraceptives.

3.6 Inclusion and Exclusion Criteria

To be eligible for inclusion in this study, participants had to be women who had lived in Indiana or a state with a direct pharmacy access policy for at least three of the past 12 months, as well as of childbearing age, able to speak and understand English, and interested in accessing hormonal contraceptives at the time of completing the survey, or had been interested in the preceding twelve months. A minimum of three months of living in Indiana or a state permitting direct pharmacy access was chosen because the day supply for most chronic prescriptions are between 30- and 90-day supplies. Therefore, the participant would likely have attempted to access hormonal contraceptives at least once in the three-month period.

For the purposes of this study, a modified version of the Centers for Disease Control and Prevention’s (CDC) (2006) definition of childbearing age was used: 18 to 44 years of age rather than 15 to 44 years of age. The reason for this modification was that some state laws restrict direct pharmacy access of hormonal contraceptives to those 18 years of age and older (H.R. 2879 2015). Implementation, pharmacist participation, and patient utilization of direct pharmacy access has been low (Batra et al. 2018; Rodriguez 2018); however, assessing access over the past year improved the chances of achieving an adequate sample size of women who have used direct pharmacy access. For the purposes of this study, participants were considered eligible to participate in the study if they had been interested in accessing hormonal contraceptives within the past 12 months.

3.7 Study Instrument

The survey included a scale designed to assess women’s access to hormonal contraceptives based on Levesque’s (2013) theoretical framework. During scale item development, items were

generated using both deductive and inductive methods (Boateng, Neilands, Frongillo, Melgar-Quinonez, and Young 2018). For deductive item generation, questions were borrowed from previous literature, including the Agency for Healthcare Research and Quality's (AHRQ) access to care measures (AHRQ 2002), items from the General Practice Assessment Survey (GPAS) (Ramsay, Campbell, Schroter, Green, and Roland 2000), and items from Grogan, Conner, Willits, and Norman's (1995) patient satisfaction survey. New items generated using an inductive method used agreement response choices to measure the magnitude of particular barriers or facilitators to accessing contraceptives that participants experience. Item generation resulted in 148 items total. A five-point Likert response format (1= strongly disagree, 2=disagree, 3=neither agree nor disagree, 4=agree, 5=strongly agree) was used. The direction (positive or negative wording) of the items were varied to decrease risk of acquiescence response bias (Spector 1992). Attention checks were used to screen out respondents who did not read the questions to improve validity of responses collected and included in analysis (Sheehan 2017).

Content validity was conducted using expert and layperson evaluation. Eight content experts were invited to review the scale items. Five content experts reviewed the items and provide suggestions for items to be included, excluded, and revised based on the item's perceived usefulness in measuring the intended dimension of access. Expert suggestions regarding revision were also collected. Five experts were determined to be sufficient to reduce chance agreement based on the literature (Zamanzadeh, Ghahramanian, Rassouli, Abbaszadeh, Alavi-Majd, Nikanfar 2015). To assess expert agreement, percent agreement was used. Previous studies have used cutoffs of greater than 50% up to 90% agreement (Augustine et al. 2012; Pedreira, Rocha, Alves dos Santos, Vascaoncelos, and Reis 2016; Nieveen, Zimmerman, Barnason, and Yates 2008). For this study, items had to have a percent agreement of 75% or greater to be included in the instrument. Items that failed to achieve 75% or greater agreement to be included or revised were removed. Open-ended responses were used to revise items and to help choose between items intended to measure the same dimension. After removing and revising items based on expert evaluation, 73 items remained.

After modifying and deleting items based on the expert evaluations, the survey was informally pre-tested for face validity with a sample that was representative of the study sample. The purpose of pre-test cognitive interviews was to identify any confusing wording within the survey or other areas of potential misinterpretation by the study participants (Blair, Czaja, and Blair 2014). An

outline of pre-test cognitive interview questions may be found in Appendix A. Cognitive interviews were conducted by telephone. The verbal probing method with open-ended questions was used (Peterson, Peterson, and Powell 2017) as well as an adaptive approach, meaning that interview questions were changed, added, or removed as the interviews progressed in response to interview findings. Since an adaptive approach was used, several distinct rounds of interviews were not conducted. The number of cognitive interviews (n=10) conducted was determined when saturation from participant feedback was reached.

3.8 Pilot Study

Once any issues identified through pre-testing were resolved, the survey was piloted among those representative of the study population. Item reduction analysis was conducted. Item discrimination was assessed using item-total correlations, or point-biserial correlations, to ensure that items were able to differentiate between participants with high and low levels of access, with 0.40 used as a minimum value for inclusion (Stevens 1992). If removal of an item improved the Cronbach's alpha for that dimension or the total scale, then the item was removed. Data collection for the pilot study took place over approximately two weeks in January and February 2020.

3.8.1 Exploratory Factor Analysis

Exploratory factor analysis was conducted on the pilot data to assess if the scale items measured five distinct sub-dimensions as intended: approachability, acceptability, appropriateness, availability and accommodation, and affordability.

3.9 Final Study

The final survey, with the 31-item final access scale, was distributed via Amazon's MechanicalTurk in March 2020. The survey was open for approximately three days.

3.9.1 Confirmatory Factor Analysis

Confirmatory factor analysis with the maximum likelihood estimation method with the Satorra-Bentler adjustment was used on the data from the final scale. The Satorra-Bentler adjustment was utilized due to the ceiling effect present in the data. Factor scores were calculated

using regression. Regression scores rather than simple summed scores were used to account for correlation between observed variables and correlated factors (DiStefano, Zhu, and Mindrila 2009). Since the factors were oblique, regression scores were used rather than the Anderson-Rubin method (DiStefano, Zhu, and Mindrila 2009). Regression also was utilized rather than the Bartlett method to improve validity of the estimates (DiStefano, Zhu, and Mindrila 2009). All reverse coded items were re-coded so that all factor loadings would reflect positive values.

3.9.2 Data Integrity

To address data quality issues and concerns related to using MTurk to collect data, multiple measures were used to filter out any knowingly poor quality data. Steps were taken through four distinct mechanisms: 1) Qualtrics, 2) MTurk, 3) CloudResearch, and 4) manual checking.

The final data were collected via an online survey built in Qualtrics. Using the survey settings, "ballot box stuffing" was prevented. This makes it more difficult for one individual to complete the survey multiple times, regardless of whether they have multiple WorkerIDs or not. A second measure was to prevent the use of virtual private networks (VPN) or virtual private servers (VPS). Other researchers who have used MTurk to collect data have found that some Workers use VPNs to mask their true location (Dennis, Goodson, and Pearson 2019). This means that Workers may use the VPN to appear to be located in the United States in order to qualify for HITs intended only for Workers living in the United States. To avoid this, the landing page for the Qualtrics surveys included a warning message asking Workers to turn off VPN, otherwise their work may not be approved. Even simply including this message has shown to be effective in greatly reducing the number of individuals with IP addresses outside of the United States from even attempting to complete the HIT (Burleigh, Kennedy, and Clifford 2018).

Skip logic was used extensively within the survey to screen out participants who did not meet eligibility criteria based upon their responses to the screening questions and participants who did not pass all validation checks accurately. Three validation checks were automated within the survey using skip logic. One validation item checked participants' understanding of the directions. After being told which type of provider they should answer the following questions about, participants were asked to select that same type of provider (pharmacist, medical doctor, nurse practitioner, or physician assistant) to ensure consistency. Any participant who answered incorrectly was skipped to the end of the survey. Two additional attention checks were

incorporated into the survey, and any participant who did not answer or incorrectly answered the attention checks were skipped to the end of the survey (Sheehan 2018). These attention checks asked the participant to select a specific answer in order to continue the survey.

To ease data sorting, embedded data was added to the survey to tag each participant based upon where and how they exited the survey. Participants who were screened out due to ineligibility were tagged as "Not Eligible". Participants who were screened out due to failure to pass validation checks were tagged as "Bad Validation". All remaining participants were not tagged. Finally, a custom completion code was provided to participants who were eligible and successfully passed all automated validation checks. This custom completion code was then entered into MTurk by the participant for their work to be approved and receive payment.

Within MTurk, several steps were taken to improve data quality. First, the HIT was only made visible to Workers who report being in the United States and being women. To aid in screening out Internet robots, or bots, only Workers who have completed at least 50 HITs with a HIT approval rating of 75% or greater were permitted to access the HIT. Some sources suggest limiting the approval rating to 99% or greater (Matherly 2018); however, to achieve an adequate sample size of a small, specialized population, it was decided to choose a lower approval rating to avoid unnecessarily restricting the number of participants able to accept the HIT. A minimum of 50 completed HITs was chosen, because all MTurk Workers start with a 100% approval rating (Amazon 2020).

Several functions offered by CloudResearch (2020), formerly TurkPrime, were utilized to ensure data quality. The option to block duplicate IP addresses and responses from suspicious geocode locations were used. Blocking duplicate IP addresses helps to prevent a single individual with multiple MTurk WorkerIDs from completing the same HIT several times. Suspicious geocode locations refer to locations throughout the United States that have been identified as locations where multiple VPNs IP addresses are provided via VPN. These "server farms" have been linked to poor data quality (CloudResearch 2020).

As an extra measure to ensure that participants completing the survey live in the United States, CloudResearch offers an option to screen participants' IP addresses to ensure they match with a location within the United States. This option was used to maintain data quality. Researchers using CloudResearch can opt to allow CloudResearch to verify demographic characteristics of the participants. Data from any participants whose reported gender did not match between the survey

and the verification were not included in the analyses. Finally, any Workers who had completed the pilot survey through a server farm or attempted to complete the HIT for the pilot multiple times were blocked from accessing the final survey.

The fourth and final mechanism used to maintain data integrity included manual checking of the data exported from Qualtrics. Since the survey was estimated to take approximately eight minutes to complete, data from participants who spent less than 100 seconds, or two minutes and 40 seconds, in the survey were removed. Before approving a participant's work, the provided WorkerID was searched for in the data output to make sure the same participant did not manage to bypass the Qualtrics setting to prevent ballot box stuffing and make multiple attempts. Data from Workers who attempted the survey more than once were removed. Finally, education level for any participants who reported their occupation as pharmacist, medical doctor, nurse practitioner, or physician assistant was assessed. If the education level and occupation did not match, then the data were removed. For participants who reported being pharmacists, they were removed if they also reported having less than a Bachelor's degree. For those who reported being a medical doctor, nurse practitioner, or physician assistant, they were removed if they also reported having less than an advanced degree.

3.10 Data Analysis of Final Study Data

SPSS Version 26 was used to conduct descriptive analysis, exploratory factor analysis, Kruskal-Wallis, and linear and logistic regression procedures. Stata 16.1 was used to conduct structural equation modelling and calculate factor scores. Any respondents who did not answer all items on the perceived access scale were excluded from analysis. Descriptive statistics were used to summarize the demographic data collected. Participant data were not removed for not answering all demographic questions (n=2). Kruskal-Wallis, ad hoc multiple comparisons with Bonferroni corrections, and multiple regression were utilized to identify significant relationships. Logistic regression was conducted as a sensitivity analysis due to the presence of a ceiling effect (>15% of participants achieved the uppermost score) in the data (Terwee, Bot, De Boer, van der Windt, Knol, Dekker, Bouter and de Vet 2007). Details of all analyses to address objectives 1.1 and 1.2 are included in Table 3.

CHAPTER 4. RESULTS

4.1 Pilot Study

Responses were collected from 400 individuals who met the eligibility criteria and passed all validation checks. Demographics can be found in Table 4. The flow diagram of participant eligibility and data integrity for the pilot study may be found in Figure 2.

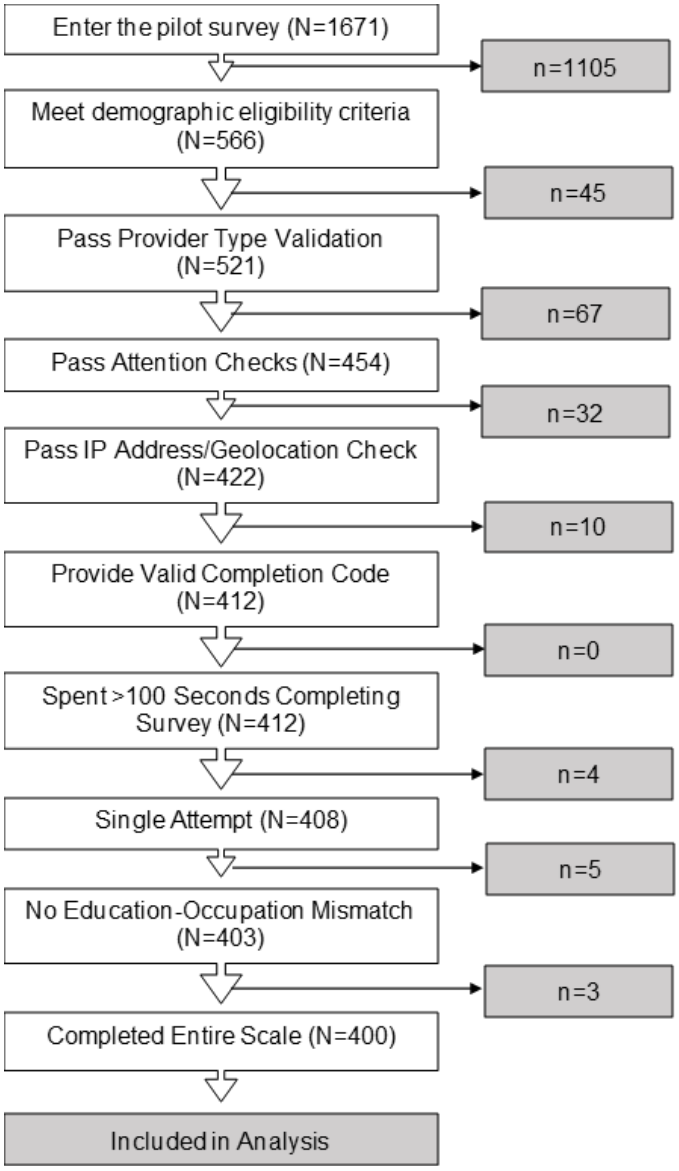

Figure 2. Eligibility and Data Integrity Flow Diagram for the Pilot Survey

Table 4. Demographics of pilot study participants

	n	%[a]
Age	Avg=31.9, Range=20-44	
18-24	52	13.0
25-29	98	24.5
30-34	109	27.3
35-39	90	22.5
40-44	51	12.8
Residence, by Region		
Northeast	75	18.8
Midwest	80	20.0
South	181	45.3
West	64	16.0
Direct Pharmacy Access		
Yes	16	4.0
No	384	96.0
Education		
Less than high school	1	0.3
Completed high school	26	6.5
Some college	89	22.3
Associate degree	61	15.3
Bachelor's degree	161	40.3
Advanced degree	59	14.8
Income		
<$25,000	65	16.3
$25,000-$49,999	113	28.2
$50,000-$74,999	112	28.0
$75,000-$99,999	60	15.0
>$100,00	47	11.8
Prescription Insurance		
No insurance	57	14.2
Private/commercial	257	64.3
Medicaid	82	20.5
Religion		
Christian (Evangelical)	54	13.5
Christian (Mainline)	61	15.3
Catholic	63	15.8
Jewish	9	2.3
Latter Day Saints (Mormon)	4	1.0
Buddhist	4	1.0
Hindu	2	0.5
Agnostic	85	21.3
Atheist	61	15.3
Other	53	13.3

Table 4 continued

Political Affiliation		
Republican	93	23.3
Democrat	205	51.2
Libertarian	24	6.0
Green Party	3	0.8
Other	71	17.8

[a]*Calculated with a denominator of 400 to reflect all survey participants*

4.1.1 Exploratory Factor Analysis

Exploratory factor analysis was conducted on the pilot data. Using the five factors that impact access from Levesque et al.'s (2013) model, the scale items were separated into five categories and each category was initially analyzed individually. This was done due to the large number of items present in the pilot scale. Principal factor analysis was used to estimate the common factor model, since the data were not normally distributed, which ruled out maximum likelihood (Brown 2015). Since it is expected that the factors were correlated, promax rotation was used. This decision was confirmed by assessing the factor correlation matrix. Since the majority (80%) of the factor correlations were greater than 0.32, the use of oblique rotation was affirmed (Tabachnick and Fidell 2007). Once all five factors were analyzed separately, factor analysis was conducted on all remaining items from the initial exploratory factor analyses. Finally, items in each factor were assessed to ensure all major aspects of each factor were included in the scale. Through exploratory factor analysis, six factors emerged. Five of the factors mapped back to Levesque et al.'s model of access to care and the sixth factor assessed privacy. After refining and reducing the number of items in the scale based on the pilot scale, 31 items remained. The number of items in each factor are as follows: approachability (5 items), acceptability (4 items), availability and accommodation (5 items), affordability (4 items), appropriateness (10 items), and privacy (3 items).

4.1.2 Approachability

Four factors were identified through factor analysis of the 13 items intended to represent the approachability dimension of access to care (Table 5). Items with a communality below 0.50 were

removed. A second round of analysis extracted one factor, but two items had communalities below 0.400. After removing these two items, five items remained, all with loading factors above 0.650.

Table 5. Exploratory factor analysis of Approachability items

Items	Factor Loadings						
	Within Approachability						
	1st Iteration				2nd Iteration	3rd Iteration	**Total Scale**[a]
	Factor 1	Factor 2	Factor 3	Factor 4	Factor 1	Factor 1	
I know of more than one place where I can get birth control from a provider.	0.526	0.018	-0.109	0.096	0.530	-	-
I know what steps I must go through to get birth control from a provider.	0.804	0.042	0.018	-0.121	0.760	0.771	**0.800**
I know how to get a prescription for birth control from a provider.	0.890	0.020	-0.080	-0.056	0.827	0.848	**0.917**
Getting a prescription for birth control from a provider is overwhelming.	-0.012	0.856	0.008	0.017	-	-	-

Table 5 continued

Getting a prescription for birth control from a provider is complicated.	0.035	0.869	0.008	-0.003	-	-	-
I know what types of birth control (pills, patch, vaginal ring, injection, etc.) I can get from a provider.	0.701	-0.020	0.079	-0.024	0.718	0.695	**0.589**
I am confident in my ability to get a prescription for birth control from a provider.	0.763	0.064	-0.023	-0.014	0.773	0.785	**0.725**
Getting birth control is important.	0.070	-0.027	-0.046	0.611	-	-	-
Birth control works well.	-0.026	0.043	-0.001	0.815	-	-	-
I know the potential side effects of birth control.	0.504	-0.113	0.141	0.122	0.593	-	-
I know how to properly use birth control.	0.636	-0.029	0.064	0.210	0.764	0.740	**0.684**

Table 5 continued

I know how much it costs to see a provider to have birth control prescribed for me.	0.092	-0.039	0.719	-0.091	-	-	-
I know how much birth control costs.	-0.082	0.055	0.922	0.045	-	-	-

[a]*Scale with all retained items from all dimensions after initial, dimension-specific EFA.*

4.1.3 Acceptability

Analysis of all items in the acceptability dimension revealed three initial factors (Table 6). Items with a communality below 0.400 were removed. Of the remaining items, four were selected that loaded onto one factor based upon the pattern matrix. After a second round of analysis, these items all had loading factors of 0.50 or higher.

4.1.4 Availability and Accommodation

Three factors were identified through initial factor analysis of the 12 items in the availability and accommodation dimension (Table 7). Four items that loaded onto one factor based upon the pattern matrix underwent factor analysis. All four items had loading factors greater than 0.55. Based upon content of the items, one item was added back in to ensure all major aspects of the factor were assessed. The item that was added back was selected based upon which item kept all of the loading factors above 0.55.

4.1.5 Affordability

After running factor analysis on all seven items in the affordability dimension, items with a communality less than 0.450 were removed (Table 8). This left four items. A second round of analysis extracted one factor with communalities above 0.450 for all items. All loading factors were above 0.60.

4.1.6 Appropriateness

Initial factor analysis of the appropriateness dimension revealed five factors (Table 9). Analysis was run on the eight items from the largest factor identified in the pattern matrix, and all communalities were above 0.500. After examining the remaining items, two additional items were included to ensure all major aspects of the appropriateness dimension were included in the study. The items added back into the factor were chosen based on the highest loading factors, above 0.60.

Table 6. Exploratory factor analysis of Acceptability items

Items	Factor Loadings				
	Within Acceptability				**Total Scale**[a]
	1st Iteration			2nd Iteration	
	Factor 1	Factor 2	Factor 3	Factor 1	
My family supports my decision to get a prescription for birth control from a provider.	-0.021	0.989	-0.066	0.726*	-
My friends support my decision to get a prescription for birth control from a provider.	0.568	0.160	0.052	0.723	**0.686**
My family supports my decision to use birth control.	0.002	0.938	-0.027	0.739*	-
My friends support my decision to use birth control.	0.590	0.136	0.123	0.751	**0.716**
My partner(s) supports my decision to get a prescription for birth control from a provider.	1.001	-0.093	-0.111	0.794	**0.906**
My partner(s) supports my decision to use birth control.	0.967	-0.078	-0.100	0.785	**0.896**
My provider supports my decision to use birth control.	0.401	0.070	0.252	-	-
It is ok to get a prescription for birth control from a provider.	0.218	0.097	0.559	-	-
My provider's cultural background makes me uncomfortable to discuss birth control with them.	-0.120	-0.082	0.743	-	-

Table 6 continued

I am comfortable getting a prescription for birth control from a provider.	0.043	0.202	0.255	-	-
The transportation I use to see a provider to get birth control is safe.	0.118	0.026	0.421	-	-
My provider's gender makes me uncomfortable to discuss birth control with them.	-0.081	-0.078	0.770	-	-

**Items had lower factor loadings and/or cross-loaded on more than one dimension in factor analysis of all retained items. [a]Scale with all retained items from all dimensions after initial, dimension-specific EFA.*

Table 7. Exploratory factor analysis of Availability and Accommodation items

	Factor Loadings								
	Within Availability and Accommodation								
	1st iteration			2nd iteration			3rd iteration*	4th iteration	**Total Scale**
	Factor 1	Factor 2	Factor 3	Factor 1	Factor 2	Factor 3	Factor 1	Factor 1	
It is easy to find a provider to discuss birth control.	0.028	0.637	0.154	0.686	-0.007	0.106	0.743	-	-
I can see a provider in a location that is convenient for me to get a prescription for birth control.	0.053	0.677	0.085	0.729	0.002	0.045	0.764	-	-
It is difficult to find transportation to get birth control.	0.482	-0.208	0.585	-	-	-	-	-	-
I have transportation to see a provider to get a birth control prescription.	-0.139	0.101	0.930	0.013	-0.030	0.934	-	-	-
The transportation I take to see a provider to get a birth control prescription is convenient.	-0.102	0.139	0.825	0.055	0.011	0.803	-	-	-
I have to travel a long distance to get birth control.	0.521	0.072	0.206	-	-	-	-	-	**0.575

Table 7 continued

I am able to see my provider to get a prescription for birth control when it is convenient with my schedule.	0.076	0.763	-0.091	0.779	0.040	-0.100	0.737	-	-
I am unable to get birth control because the provider's office or clinic is not open when I need it to be.	0.708	-0.148	0.224	-0.151	0.669	0.260	-	0.679	**0.739**
I can see my provider to get a prescription for birth control when I need to.	0.043	0.727	0.102	0.759	0.020	0.064	0.805	-	-
The time between deciding I need birth control and getting birth control is too long.	0.650	0.134	-0.065	0.109	0.617	-0.005	-	0.685	**0.617**
I don't have time to see the provider to get birth control.	0.716	0.152	-0.133	0.107	0.699	-0.059	-	0.744	**0.750**
The time spent with the provider to get birth control is too long.	0.785	0.084	-0.192	-0.001	0.829	-0.110	-	0.763	**0.661**

Table 8. Exploratory factor analysis of Affordability items

Items	Factor Loadings			
	Within Affordability			
	1st Iteration	2nd Iteration	3rd Iteration	**Total Scale**[a]
	Factor 1	Factor 1	Factor 1	
I am able to afford my birth control.	0.770	0.746	0.698	**0.754**
Getting birth control from a provider costs too much.	0.784	0.802	0.796	**0.732**
I am unable to afford to see a provider to get a birth control prescription.	0.706	0.692	0.713	**0.619**
I am unable to get my preferred type of birth control because of cost.	0.785	0.785	0.824	**0.715**
My provider prescribes a birth control that is affordable.	0.624	0.618	-	-
I have to take time off of work to see my provider.	0.283	-	-	-
I am unable to get birth control because I cannot afford transportation.	0.491	-	-	-

[a]*Scale with all retained items from all dimensions after initial, dimension-specific EFA*

Table 9. Exploratory factor analysis of Appropriateness items

Items	Factor Loadings							
	Within Appropriateness							**Total Scale**[a]
	1st Iteration					2nd Iteration	3rd Iteration**	
	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 1	Factor 1	
My provider is kind.	0.023	0.764	0.010	0.116	0.017	-	-	-
My provider cares about me.	0.026	0.881	-0.043	-0.063	-0.003	-	-	-
My provider has my best interest in mind.	0.108	0.726	-0.078	0.179	-0.010	-	-	**0.730***
My provider is willing to prescribe birth control for me.	-0.154	0.156	0.061	0.647	0.123	-	-	-
My provider makes me feel comfortable.	0.084	0.637	0.125	0.036	0.032	-	-	**0.615***
My provider speaks a language that I am comfortable communicating in when I get birth control.	0.004	0.114	-0.067	0.714	-0.033	-	-	-

Table 9 continued

My provider explains prescription birth control options to me in terms that I can understand.	0.737	0.010	0.003	0.030	0.002	0.774	-	**0.675**
My provider explains the side effects of birth control to me in terms I can understand.	0.971	-0.053	-0.078	-0.079	-0.041	0.801	-	**0.822**
My provider explains how birth control works to me in terms I can understand.	0.809	0.026	-0.110	0.142	-0.096	0.799	-	**0.75**
My provider is knowledgeable regarding birth control.	0.673	-0.046	-0.096	0.289	-0.067	0.758	-	**0.649**
My provider helps me choose which type of birth control is best for me.	0.811	0.115	-0.010	-0.055	-0.022	0.832	-	**0.828**
My provider chooses the birth control that is safe for me to use.	0.746	0.101	0.138	-0.090	-0.144	0.747	-	**0.710**

Table 9 continued

My provider chooses the birth control that works the best for me.	0.705	0.146	0.043	-0.117	-0.050	0.741	-	**0.713**
The provider adequately assesses me before prescribing birth control.	0.603	0.212	0.013	0.032	0.012	0.785	-	**0.829**
My provider prescribes a large enough quantity/day supply of birth control at one time.	0.347	-0.041	0.076	0.211	0.113	-	-	-
I have adequate privacy while getting a prescription for birth control from a provider.	0.392	-0.125	0.069	0.479	-0.074	-	-	-
I am able to get a prescription for birth control from a provider without my family finding out.	-0.065	0.080	0.881	-0.031	-0.014	-	0.840**	**0.843****

Table 9 continued

I am able to get a prescription for birth control from a provider without my friends finding out.	-0.115	-0.035	0.629	0.315	-0.008	-	0.756**	**0.685****
I am able to get a prescription for birth control from a provider without my partner(s) finding out.	0.136	-0.067	0.774	-0.120	-0.035	-	0.723**	**0.668****
I am comfortable going into my provider's office or clinic to get a prescription for birth control.	0.466	-0.041	0.133	0.279	0.014	-	-	-
Obtaining birth control from a provider is convenient.	0.587	0.033	-0.039	-0.186	0.372	-	-	-
There are too many steps to getting birth control from my provider.	-0.016	-0.042	-0.052	0.070	0.836	-	-	-
I have to return to see my provider to get more birth control too frequently.	-0.103	0.062	-0.004	0.030	0.760	-	-	-

Table 9 continued

I am able to get my birth control on time.	0.485	-0.145	0.073	0.201	0.211	-	-	-
My provider prescribes the type of birth control that I want.	0.456	-0.018	0.006	0.371	0.032	-	-	-

**Item added back into scale in order to cover all aspects of the dimension. **Items loaded onto a separate, sixth dimension (privacy).*
[a]Scale with all retained items from all dimensions after initial, dimension-specific EFA.

4.1.7 Privacy

Three items initially included in the appropriateness dimension were found to represent a separate factor. All three items had loading factors above 0.70. Based on the content of these items, this factor appears to represent privacy, and all three items were included in the final version of the scale.

4.2 Final Study

The flow diagram of participant eligibility and data integrity for the final study may be found in Figure 3.

4.2.1 Demographics

Survey responses were collected from a total of 320 participants (Table 10). Responses were collected from those living in Indiana using a traditional method to obtain hormonal contraceptives, those living in a state with a direct pharmacy access policy using a traditional method, and those living in a state with a direct pharmacy access policy using direct pharmacy access (n=66, n=182, n=72, respectively). Participants from the Indiana group were younger (average age = 29.6 vs 31.9 and 30.3 years of age), less educated (48.5% vs 35.0% and 29.2% have an associate's or lower), had lower levels of income (72.8% vs 58.2% and 62.4% earning $75,000 per year or less), had higher levels of Medicaid insurance coverage (19.7% vs 16.5% and 16.7%), and higher proportions of Evangelical Christianity (16.7% vs 9.9% and 13.9%) and Catholicism (21.2% vs 17.0% and 18.1%). However, no statistically significant associations were found between group and age ($\chi^2(8) = 13.258$, p=0.103), education (χ^2 (6) = 7.150, p=0.307), income (χ^2 (8) = 7.757, p=0.458), prescription insurance status (χ^2 (4) = 5.697, p=0.223), religion (χ^2 (10) = 5.182, p=0.879), or political affiliation (χ^2 (8) = 6.381 p=0.605). Due to the low number of respondents in some religious groups, the groups compared in the Chi-square test were 1) Christian (evangelical), 2) Christian (mainline), 3) Catholic, 4) Agnostic, 5) Atheist, and 6) other. Also, no statistically significant associations were identified between direct pharmacy access use and age, education, income, prescription insurance status, religion, or political affiliation.

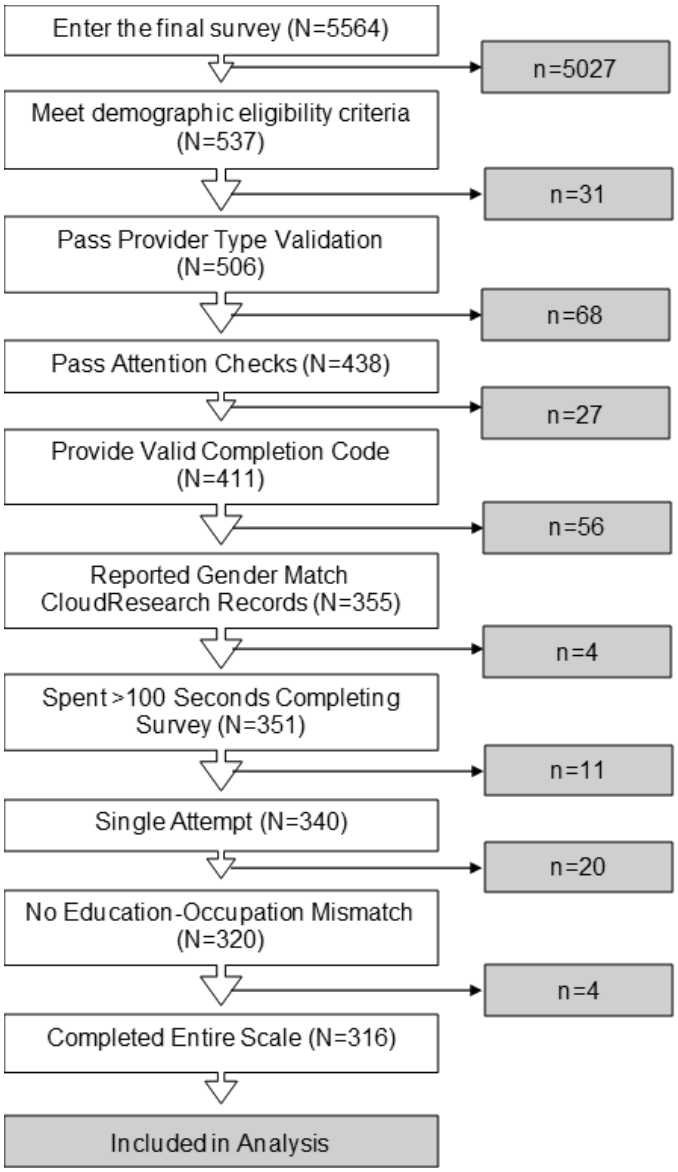

Figure 3. Eligibility and Data Integrity Flow Diagram for the Final Survey

Table 10. Demographics of final study participants

	All Participants[a]		Indiana, traditional[b]		DPA state, traditional[c]		DPA state, DPA[d]	
	n=316	%	n=65	%	n=180	%	n=71	%
Age	Avg=31.1 Range=18-44		Avg=29.6 Range=18-43		Avg=31.9 Range=18-44		Avg=30.3 Range=20-42	
Region								
Northeast	11	3.5	2[e]	3.1	6	3.3	3	4.2
Midwest	59	18.7	52	80.0	6	3.3	1	1.4
South	78	24.7	9[e]	13.8	57	31.7	12	16.9
West	168	53.2	2[e]	3.1	111	61.7	55	77.5
Education								
Less than high school	2	0.6	1	1.5	1	0.6	0	0
Completed high school	13	4.1	6	9.2	5	2.8	2	2.8
Some college	63	19.9	15	23.1	37	20.6	11	15.5
Associate's degree	39	12.3	10	15.4	21	11.7	8	11.3
Bachelor's degree	143	45.3	22	33.8	86	47.8	35	49.3
Advanced degree	55	17.4	11	16.9	29	16.1	15	21.1
Income								
<$25,000	36	11.4	10	15.4	18	10	8	11.3
$25,000-$49,999	91	28.8	19	29.2	50	27.8	22	31
$50,000-$74,999	69	21.8	18	27.7	37	20.6	14	19.7
$75,000-$99,999	59	18.7	7	10.8	35	19.4	17	23.9
>$100,000	58	18.4	10	15.4	38	21.1	10	14.1
Prescription								
No insurance	28	8.9	5	7.7	12	6.7	11	15.5
Private/commercial	234	74.1	47	72.3	139	77.2	48	67.6
Medicaid	54	17.1	13	20	29	16.1	12	16.9
Religion								
Christian (Evangelical)	39	12.3	11	16.9	18	10	10	14.1
Christian (Mainline)	46	14.6	7	10.8	27	15	12	16.9
Catholic	56	17.7	14	21.5	30	16.7	12	16.9
Jewish	5	1.6	0	0	4	2.2	1	1.4
Latter Day Saints	3	0.9	0	0	2	1.1	1	1.4
Muslim	3	0.9	0	0	2	1.1	1	1.4
Buddhist	4	1.3	0	0	3	1.7	1	1.4
Hindu	2	0.6	0	0	2	1.1	0	0
Agnostic	60	19	12	18.5	34	18.9	14	19.7
Atheist	54	17.1	9	13.8	35	19.4	10	14.1
Other	44	13.9	12	18.5	23	12.8	9	12.7
Political Affiliation								
Republican	71	22.5	15	23.1	34	18.9	22	31

Table 10 continued

Democrat	180	57	34	52.3	110	61.1	36	50.7
Libertarian	20	6.3	5	7.7	12	6.7	3	4.2
Green Party	3	0.9	1	1.5	1	0.6	1	1.4
Other	41	13	10	15.4	22	12.2	9	12.7

[a]Calculated with a denominator of 320 to reflect all survey participants [b]Calculated with a denominator of 66 to reflect all survey participants [c]Calculated with a denominator of 182 to reflect all survey participants [d]Calculated with a denominator of 72 to reflect all survey participants [e]Some participants moved out of Indiana in the past year and lived in another state at the time of participating in the study [f]No statistically significant differences were found between any groups

Oral contraceptive pills were the most commonly used type of hormonal contraceptive (76.9%) among all study participants in the year prior to completing the survey. IUDs (19.6%), injections (11.7%), vaginal rings (10.1%), implants (9.2%), and transdermal patches (8.9%) were used by participants in the past year. No statistically significant associations were found between participant group and form of hormonal contraceptive. Hormonal contraceptive use by group may be found in Table 11.

Table 11. Forms of hormonal contraceptives used, by group

Group		Form of Hormonal Contraceptive					
		Oral Pill	Patch	Vaginal Ring	Injection	Implant	IUD
Total	**n (% of Total)[a]**	**243 (76.9)**	**28 (8.9)**	**32 (10.1)**	**37 (11.7)**	**29 (9.2)**	**62 (19.6)**
Indiana	n (% of Group)[a]	49 (75.4)	4 (6.2)	3 (4.6)	7 (10.8)	5 (7.7)	15 (23.1)
DPA Nonuser	n (% of Group)[a]	134 (74.4)	13 (7.2)	18 (10.0)	17 (9.4)	18 (10.0)	37 (20.6)
DPA User	n (% of Group)[a]	60 (84.5)	11 (15.5)	11 (15.5)	13 (18.3)	6 (8.5)	10 (14.1)

[a]Percents do not sum to 100% because some participants have used more than one form of hormonal contraceptives in the past year

4.2.2 Confirmatory Factor Analysis

Confirmatory factor analysis, using maximum likelihood estimation, was conducted on the final scale data. All reverse coded items were re-coded so that all factor loadings were positive values.

4.2.2.1 Model Specification

The model specification for the measurement model was guided by Levesque et al.'s (2013) conceptual framework of access to care from the supply side, as discussed previously and was informed based on the results of the exploratory factor analysis. The first observed variable in each factor was selected as the marker, or reference indicator, for the corresponding latent factor. The model, complete with observed variables (or scale items) for each factor and constraints, may be found in Figure 4 and Table 12, respectively. This model was overidentified (df = 412) with 84 freely estimated parameters (31 factor loadings, 31 error variances, seven error covariances, and 15 factor covariances) and 496 known inputs.

Table 12. Parameter specification for confirmatory factor analysis

Factor	Constraint	Indicators (Items)
Approachability (AH)	1	I know what steps I must go through to get birth control from a provider.
	-	I know how to get a prescription for birth control from a provider.
	-	I know what types of birth control (pills, patch, vaginal ring, injection, etc.) I can get from a provider.
	-	I am confident in my ability to get a prescription for birth control from a provider.
	-	I know how to properly use birth control.
Acceptability (AC)	1	My friends support my decision to get a prescription for birth control from a provider.
	-	My friends support my decision to use birth control.
	-	My partner(s) supports my decision to get a prescription for birth control from a provider.
	-	My partner(s) supports my decision to use birth control.
Availability and Accommodation (AA)	1	I have to travel a long distance to get birth control.
	-	I am unable to get birth control because the provider's pharmacy or clinic is not open when I need it to be.
	-	The time between deciding I need birth control and getting birth control is too long.
	-	I don't have time to see the provider to get birth control.
	-	The time spent with the provider to get birth control is too long.
Affordability (AF)	1	I am able to afford my birth control.
	-	Getting birth control from a provider costs too much.
	-	I am unable to afford to see a provider to get a birth control prescription.
	-	I am unable to get my preferred type of birth control because of cost.
Appropriateness (AP)	1	My provider has my best interest in mind.
	-	My provider makes me feel comfortable.
	-	My provider explains prescription birth control options to me in terms that I can understand.
	-	My provider explains the side effects of birth control to me in terms I can understand.

Table 12 continued

	-	My provider explains how birth control works to me in terms I can understand.
	-	My provider is knowledgeable regarding birth control.
	-	My provider helps me choose which type of birth control is best for me.
	-	My provider chooses the birth control that is safe for me to use.
	-	My provider chooses the birth control that works the best for me.
	-	The provider adequately assesses me before prescribing birth control.
Privacy (PR)	1	I am able to get a prescription for birth control from a provider without my family finding out.
	-	I am able to get a prescription for birth control from a provider without my friends finding out.
	-	I am able to get a prescription for birth control from a provider without my partner(s) finding out.

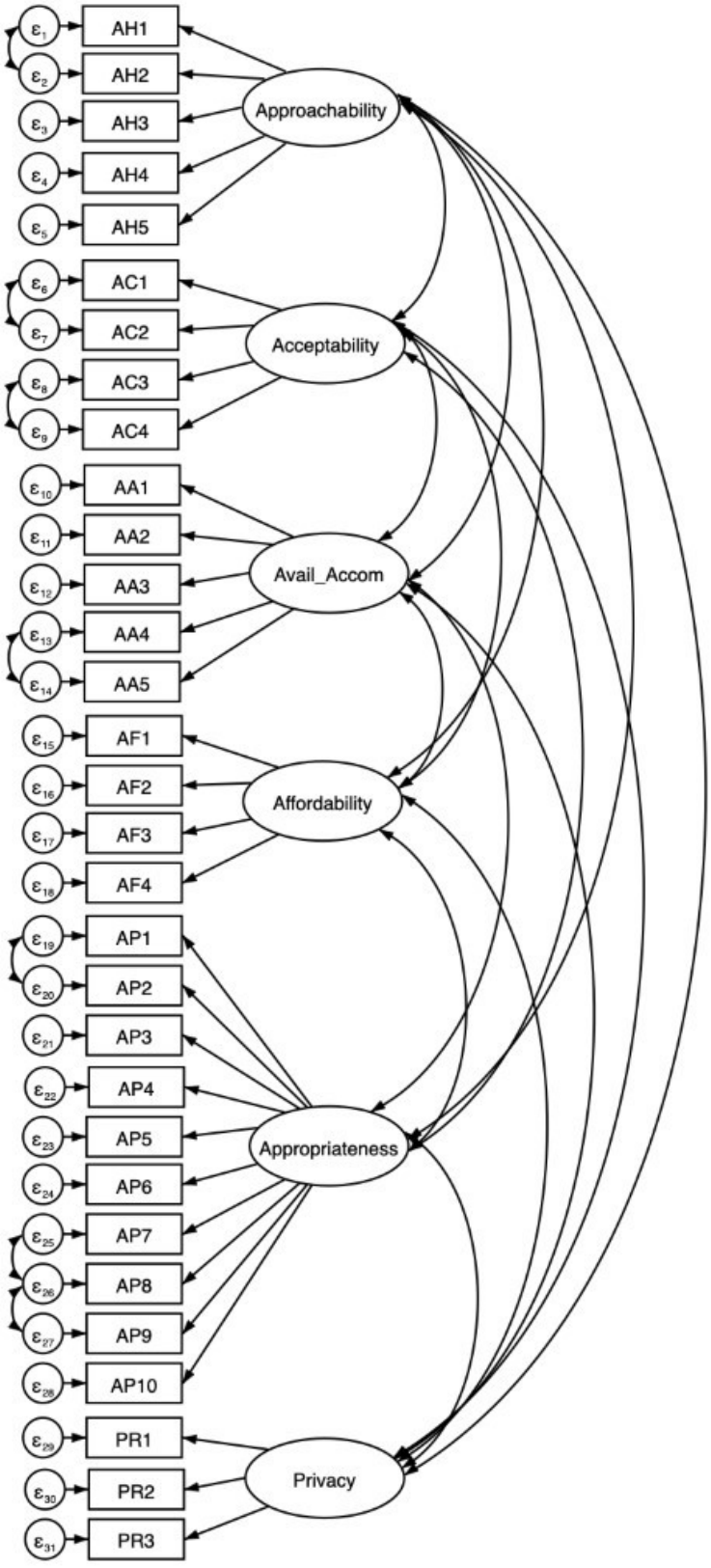

Figure 4. Measurement Model for Confirmatory Factor Analysis, with Error Covariances

4.2.2.2 Input Data

All data used in the factor analysis were ordered categorical, or ordinal, data. The assumption of multivariate normality was found to be violated, by using a Doornik-Hansen test ($p<0.05$). The majority of the indicators had strong ceiling effects which skewed the data. Out of 320 respondents, only four observations had missing data from non-demographic items. Participants who did not complete all items in the scale were excluded, and analysis was performed on the remaining observations (N=316) to assist with factor analysis computation of the standardized root mean square residual (SRMR). The sample correlation matrix is in Table 13.

4.2.2.3 Model Estimation

Model estimation was conducted in Stata/SE 16.1 (StataCorp 2019). Since maximum likelihood estimation produces incorrect parameter estimates for non-normally distributed data (Brown 2015), robust standard errors were used. Satorra-Bentler results were used to determine the model's overall goodness of fit (Satorra and Bentler 1994). Means and standard deviations for all items can be found in Table 14.

4.2.2.4 Model Evaluation

To determine the appropriate measurement model, the model was evaluated for specific areas of poor fit using modification indices in conjunction with standardized covariance residuals. Indicator pairs with high modification indices and high (or missing) standardized covariance residuals were assessed for potential method effects. If the indicator pairs had substantive support to suggest a method effect, the errors were correlated. This led to the errors being correlated for seven indicator pairs. These pairs may be found in Table 15.

The overall goodness of fit, as indicated by the Satorra-Bentler adjusted chi-square, was statistically significant ($\chi 2$ (412)=591.332, $p<0.001$). The RMSEA, once adjusted for Satorra-Bentler, indicated a good fit ($0.037<0.06$) as well as the SRMR ($0.058<0.090$). The comparative fit index (CFI) also indicated a good fit after adjustment ($CFI=0.952>0.95$). Using a combination of RMSEA and SRMR and the cutoff values were chosen based on the findings of Hu and Bentler (2009) to reduce Type I and Type II error for model specification. The model demonstrated good

Table 13. Sample correlation matrix

Items	AH1	AH2	AH3	AH4	AH5	AC1	AC2	AC3	AC4	AA1	AA2	AA3	AA4	AA5	AF1	AF2	AF3	AF4
AH1	1.000																	
AH2	**0.779**	1.000																
AH3	**0.558**	**0.567**	1.000															
AH4	**0.648**	**0.679**	**0.561**	1.000														
AH5	**0.475**	**0.517**	**0.411**	**0.508**	1.000													
AC1	**0.293**	**0.298**	0.203	**0.350**	**0.361**	1.000												
AC2	**0.275**	**0.257**	0.188	**0.310**	**0.332**	**0.683**	1.000											
AC3	**0.417**	**0.350**	**0.352**	**0.398**	**0.502**	**0.349**	**0.418**	1.000										
AC4	**0.373**	**0.284**	**0.279**	**0.308**	**0.395**	**0.268**	**0.336**	**0.792**	1.000									
AA1	**0.253**	**0.269**	0.181	**0.358**	**0.321**	**0.254**	0.212	**0.219**	**0.228**	1.000								
AA2	**0.260**	**0.335**	0.185	**0.374**	**0.265**	0.214	0.179	0.188	0.203	**0.567**	1.000							
AA3	**0.309**	**0.293**	**0.262**	**0.311**	**0.259**	0.128	0.095	0.180	0.145	**0.490**	**0.538**	1.000						
AA4	0.156	0.134	0.188	**0.240**	0.163	0.128	0.079	0.128	0.087	**0.329**	**0.483**	**0.507**	1.000					
AA5	0.183	0.189	0.197	**0.224**	0.080	0.066	0.029	0.034	0.062	**0.406**	**0.420**	**0.495**	**0.613**	1.000				
AF1	**0.277**	**0.299**	**0.270**	**0.405**	**0.370**	0.180	0.189	**0.327**	**0.280**	**0.299**	0.210	**0.272**	0.201	**0.268**	1.000			
AF2	**0.231**	**0.229**	0.187	**0.270**	0.183	0.132	0.058	0.103	0.124	**0.365**	**0.291**	**0.413**	**0.291**	**0.430**	**0.461**	1.000		
AF3	**0.218**	**0.296**	0.212	**0.359**	**0.247**	0.145	0.140	0.155	0.148	**0.375**	**0.388**	**0.405**	**0.315**	**0.446**	**0.472**	**0.540**	1.000	
AF4	**0.313**	**0.307**	**0.285**	**0.388**	**0.309**	0.185	0.182	**0.222**	**0.271**	**0.396**	**0.430**	**0.392**	**0.356**	**0.466**	**0.487**	**0.597**	**0.692**	1.000
AP1	**0.305**	**0.278**	**0.237**	**0.332**	**0.309**	0.204	**0.246**	**0.391**	**0.307**	0.142	0.164	0.190	0.139	0.169	**0.409**	0.202	**0.256**	**0.260**
AP2	**0.361**	**0.338**	0.173	**0.376**	**0.239**	0.186	0.207	**0.250**	**0.249**	0.123	**0.246**	**0.248**	0.189	**0.240**	**0.376**	0.183	**0.267**	**0.254**
AP3	**0.453**	**0.446**	**0.383**	**0.532**	**0.442**	**0.291**	**0.347**	**0.442**	**0.406**	**0.316**	**0.305**	**0.303**	0.173	0.188	**0.404**	0.192	**0.263**	**0.341**
AP4	**0.307**	**0.288**	**0.270**	**0.312**	**0.233**	0.107	0.198	**0.304**	**0.319**	0.198	0.175	**0.305**	0.163	**0.222**	**0.333**	0.203	**0.253**	**0.289**
AP5	**0.401**	**0.374**	**0.279**	**0.428**	**0.429**	**0.259**	**0.344**	**0.433**	**0.369**	**0.283**	**0.235**	**0.343**	0.199	**0.224**	**0.388**	0.184	**0.223**	**0.297**

Table 13 continued

AP6	**0.398**	**0.407**	**0.237**	**0.446**	**0.357**	**0.268**	**0.301**	**0.478**	**0.433**	**0.285**	**0.334**	**0.273**	0.128	0.165	**0.404**	0.138	**0.224**	**0.305**
AP7	**0.376**	**0.329**	**0.348**	**0.376**	**0.300**	0.195	**0.264**	**0.335**	**0.267**	0.090	0.141	0.209	0.137	0.145	**0.299**	0.176	0.167	**0.264**
AP8	**0.295**	0.213	0.203	**0.356**	0.206	0.148	**0.257**	**0.300**	**0.262**	0.076	0.139	0.184	0.126	0.151	**0.305**	0.137	0.177	**0.254**
AP9	0.202	0.179	0.177	**0.284**	0.157	0.031	0.111	**0.229**	0.195	0.104	0.146	0.209	0.209	0.198	**0.290**	0.128	0.160	0.140
AP10	**0.305**	**0.290**	0.209	**0.401**	**0.311**	0.175	0.202	**0.364**	**0.332**	0.204	**0.227**	0.199	**0.229**	0.211	**0.302**	0.114	0.216	**0.238**
PR1	**0.248**	**0.239**	0.143	**0.247**	**0.325**	**0.249**	**0.287**	**0.241**	**0.227**	0.184	**0.237**	0.141	0.147	0.129	**0.289**	0.079	0.165	0.210
PR2	**0.315**	**0.228**	0.148	**0.283**	**0.320**	**0.272**	**0.325**	**0.447**	**0.418**	**0.232**	**0.310**	0.138	0.150	0.118	**0.318**	0.045	0.120	0.178
PR3	**0.130**	0.139	0.063	0.192	**0.298**	0.216	**0.249**	**0.289**	**0.229**	0.095	0.155	0.059	0.041	0.083	0.185	0.011	0.099	0.093

	AP1	AP2	AP3	AP4	AP5	AP6	AP7	AP8	AP9	AP10	PR1	PR2	PR3
AP1	1.000												
AP2	**0.617**	1.000											
AP3	**0.493**	**0.565**	1.000										
AP4	**0.394**	**0.392**	**0.641**	1.000									
AP5	**0.475**	**0.518**	**0.720**	**0.622**	1.000								
AP6	**0.523**	**0.533**	**0.731**	**0.613**	**0.674**	1.000							
AP7	**0.506**	**0.520**	**0.577**	**0.571**	**0.565**	**0.563**	1.000						
AP8	**0.455**	**0.386**	**0.476**	**0.503**	**0.491**	**0.516**	**0.588**	1.000					
AP9	**0.411**	**0.404**	**0.404**	**0.368**	**0.400**	**0.448**	**0.450**	**0.569**	1.000				
AP10	**0.491**	**0.492**	**0.582**	**0.424**	**0.550**	**0.570**	**0.459**	**0.487**	**0.453**	1.000			
PR1	0.209	**0.300**	**0.377**	0.184	**0.315**	**0.325**	0.176	**0.271**	0.119	**0.310**	1.000		
PR2	**0.283**	**0.297**	**0.438**	**0.243**	**0.434**	**0.459**	**0.255**	**0.277**	**0.225**	**0.383**	**0.625**	1.000	
PR3	0.186	**0.226**	**0.278**	0.144	**0.277**	**0.318**	0.180	0.166	0.091	0.207	**0.508**	**0.494**	1.000

AH = Approachability, AC = Acceptability, AA = Availability and Accommodation, AF = Affordability, AP = Appropriateness, PR = Privacy. Bolded items signify a significant correlation ($p<0.05$ after Bonferroni corrections). Items may be found in Table X.

Table 14. Sample means

	Items	Mean	Std Dev
AH1	I know what steps I must go through to get birth control from a provider.	4.402	0.943
AH2	I know how to get a prescription for birth control from a provider.	4.484	0.871
AH3	I know what types of birth control (pills, patch, vaginal ring, injection, etc.) I can get from a provider.	4.259	0.961
AH4	I am confident in my ability to get a prescription for birth control from a provider.	4.443	0.876
AH5	I know how to properly use birth control.	4.598	0.772
AC1	My friends support my decision to get a prescription for birth control from a provider.	4.443	0.858
AC2	My friends support my decision to use birth control.	4.430	0.838
AC3	My partner(s) supports my decision to get a prescription for birth control from a provider.	4.589	0.833
AC4	My partner(s) supports my decision to use birth control.	4.560	0.865
AA1	I have to travel a long distance to get birth control.	4.250	1.123
AA2	I am unable to get birth control because the provider's office or clinic is not open when I need it to be.	4.294	1.121
AA3	The time between deciding I need birth control and getting birth control is too long.	3.908	1.293
AA4	I don't have time to see the provider to get birth control.	3.642	1.327
AA5	The time spent with the provider to get birth control is too long.	3.706	1.311
AF1	I am able to afford my birth control.	4.051	1.126
AF2	Getting birth control from a provider costs too much.	3.557	1.317
AF3	I am unable to afford to see a provider to get a birth control prescription.	4.073	1.170
AF4	I am unable to get my preferred type of birth control because of cost.	3.949	1.244
AP1	My provider has my best interest in mind.	4.225	0.900
AP2	My provider makes me feel comfortable.	4.256	0.936
AP3	My provider explains prescription birth control options to me in terms that I can understand.	4.335	0.954
AP4	My provider explains the side effects of birth control to me in terms I can understand.	4.193	1.068

Table 14 continued

AP5	My provider explains how birth control works to me in terms I can understand.	4.373	0.894
AP6	My provider is knowledgeable regarding birth control.	4.525	0.849
AP7	My provider helps me choose which type of birth control is best for me.	4.165	1.041
AP8	My provider chooses the birth control that is safe for me to use.	4.155	1.032
AP9	My provider chooses the birth control that works the best for me.	3.813	1.110
AP10	The provider adequately assesses me before prescribing birth control.	4.222	0.993
PR1	I am able to get a prescription for birth control from a provider without my family finding out.	4.291	1.089
PR2	I am able to get a prescription for birth control from a provider without my friends finding out.	4.535	0.899
PR3	I am able to get a prescription for birth control from a provider without my partner(s) finding out.	4.256	1.099

AH = Approachability, AC = Acceptability, AA = Availability and Accommodation, AF = Affordability, AP = Appropriateness, PR = Privacy

Table 15. Method effects (standard error covariance)

Pairs	Error Covariance	Items
AH1 - AH2	0.4246	I know what steps I must go through to get birth control from a provider.
		I know how to get a prescription for birth control from a provider.
AC1 - AC2	0.5681	My friends support my decision to get a prescription for birth control from a provider.
		My friends support my decision to use birth control.
AC3 - AC4	0.6268	My partner(s) support my decision to get a prescription for birth control from a provider.
		My partner(s) support my decision to use birth control.
AA4 - AA5	0.3743	I don't have time to see the provider to get birth control.
		The time spent with the provider to get birth control is too long.
AP1 - AP2	0.3602	My provider has my best interest in mind.
		My provider makes me feel comfortable.
AP7 - AP8	0.2365	My provider helps me choose which type of birth control is best for me.
		My provider chooses the birth control that is safe for me to use.
AP8 - AP9	0.3370	My provider chooses the birth control that is safe for me to use.
		My provider chooses the birth control that works best for me.

discriminant validity with none of the factor correlations greater than or equal to 0.85 (Brown 2015).

Wald tests were run for each freely estimated parameter to determine if any parameters should be fixed to zero (Brown 2015). All results were significant ($p<0.0001$), which means removal of any of the freely estimated parameters would not significantly improve the model fit. Standardized parameter estimates of the model, including factor loadings and error variances can be found in Table 16.

Table 16. Standardized parameter estimates for measurement model

Items	Factor Loadings						Error Variances
	AH	AC	AA	AF	AP	PR	
AH1	0.7744	-	-	-	-	-	0.4003
AH2	0.7963	-	-	-	-	-	0.3659
AH3	0.6712	-	-	-	-	-	0.5495
AH4	0.8381	-	-	-	-	-	0.2976
AH5	0.6454	-	-	-	-	-	0.5834
AC1	-	0.4876	-	-	-	-	0.7623
AC2	-	0.5519	-	-	-	-	0.6954
AC3	-	0.7383	-	-	-	-	0.4549
AC4	-	0.6265	-	-	-	-	0.6075
AA1	-	-	0.6861	-	-	-	0.5293
AA2	-	-	0.7500	-	-	-	0.4376
AA3	-	-	0.7386	-	-	-	0.4545
AA4	-	-	0.6040	-	-	-	0.6352
AA5	-	-	0.6312	-	-	-	0.6016
AF1	-	-	-	0.6013	-	-	0.6385
AF2	-	-	-	0.6982	-	-	0.5125
AF3	-	-	-	0.7954	-	-	0.3674
AF4	-	-	-	0.8547	-	-	0.2696
AP1	-	-	-	-	0.6193	-	0.6164
AP2	-	-	-	-	0.6490	-	0.5788
AP3	-	-	-	-	0.8654	-	0.2510
AP4	-	-	-	-	0.7167	-	0.4863
AP5	-	-	-	-	0.8185	-	0.3301
AP6	-	-	-	-	0.8373	-	0.2989
AP7	-	-	-	-	0.6998	-	0.5103
AP8	-	-	-	-	0.6200	-	0.6155
AP9	-	-	-	-	0.5267	-	0.7226
AP10	-	-	-	-	0.6837	-	0.5325
PR1	-	-	-	-	-	0.7315	0.4649
PR2	-	-	-	-	-	0.8585	0.2629
PR3	-	-	-	-	-	0.6065	0.6321

AH = Approachability, AC = Acceptability, AA = Availability and Accommodation, AF = Affordability, AP = Appropriateness, PR = Privacy

4.2.2.5 Consideration of a Higher Order Model

A higher order structural equation model was considered in order to evaluate the impact of global access. However, the second order factor analysis model would not converge. Both lower order confirmatory factor analyses using scale scores and factor scores separately demonstrated very poor fit (CFI<0.90, RMSEA>0.1). Upon further investigation, exploratory factor analysis of the scale scores revealed two separate higher order dimensions rather than one global higher order dimension as substantiated by Levesque et al. (2013). Based upon these findings, it was determined that a single-factor second-order model should not be used.

4.2.3 Instrument Validation

The criterion and construct validity of the scale were assessed. For criterion validity, predictive validity was calculated (alpha=0.05) using the correlations between scale scores (summed and factor) and participants' reported access to hormonal contraceptives (obtained hormonal contraceptives at least once in the past year vs. unable to obtain any hormonal contraceptives in the past year). Both parametric and nonparametric correlation tests were used for predictive validity since several of the six dimensions of access were normally distributed (approachability and availability and accommodation) while four were not normally distributed (acceptability, affordability, appropriateness, and privacy). Correlation coefficients calculated for summed dimensional scores and factor dimensional scores may be found in Table 17.

Parametric tests provided similar results to nonparametric tests for all normally distributed dimensions; however, different results were found between parametric and nonparametric tests for appropriateness factor scores, which was not normally distributed. Because of this discrepancy, the results for nonparametric tests were deemed most appropriate for interpretation. Factor scores were considered to provide the most appropriate results because factor scores account for error variance and shared variance between items and the dimension, while summed scores give equal weight to each item within the dimension. All dimensions of access except for privacy were found to have a significant correlation between the scale measurement of access and reported access of hormonal contraceptives. This suggests the dimensions of approachability, acceptability, availability and accommodation, affordability, and appropriateness demonstrated strong predictive validity.

Table 17. Predictive validity of hormonal contraceptive access

	Parametric[1]		Non-parametric[2]	
Dimension	Summed Score	Factor Score	Summed Score	Factor Score
Approachability	*0.237	*0.228	*0.182	*0.172
Acceptability	0.082	*0.141	0.072	*0.123
Availability & Accommodation	*0.156	*0.175	*0.148	*0.155
Affordability	*0.238	*0.224	*0.183	*0.172
Appropriateness	0.062	0.071	0.073	*0.096
Privacy	0.019	0.008	0.012	0.070

*[1]Calculated using Pearson point biserial correlations, [2]Calculated using Kendall's tau correlations, *Significant correlation ($p<0.05$)*

For construct validity, differentiation between groups was used. Scale scores were compared between the highest and lowest categories of education (Table 18) and income (Table 19). Education and income were chosen as variables to test construct validity, since both have previously been correlated with access to care (Zajacova and Lawrence 2018). It was found that the scale demonstrated poor construct validity with respect to education, because those with the highest level of education, an advanced degree, did not have significantly different scores than those with the lowest level of education (no college degree) for any of the six dimensions of access.

For income level, affordability access was the only dimension that significantly differentiated between those with the lowest levels (less than $25,000 per year) and the highest levels of income (greater than $100,000 per year). Those with the higher level of income had significantly higher affordability access scores than those with lower income levels (mean score=4.15, 3.49 respectively). All other dimensions demonstrated poor construct validity with respect to income level.

Table 18. Construct validity – Education (p-values)

	Mean Difference[1]		Parametric[2]		Non-parametric[3]	
Dimension	Summed Score	Factor Score	Summed Score	Factor Score	Summed Score	Factor Score
Approachability	0.027	0.056	0.831	0.683	0.500	0.587
Acceptability	0.084	0.056	0.490	0.399	0.418	0.499
Availability & Accommodation	-0.069	-0.031	0.674	0.795	0.606	0.671
Affordability	-0.024	-0.005	0.893	0.967	0.716	0.798
Appropriateness	0.101	0.070	0.484	0.527	0.889	0.989
Privacy	0.159	0.173	0.368	0.260	0.990	0.927

[1]Group with higher level of education subtracted from group with lower level of education (low-high), [2]Calculated using independent t-tests, [3]Calculated using Mann-Whitney U tests

Table 19. Construct validity – Income (p-values)

	Mean Difference[1]		Parametric[2]		Non-parametric[3]	
Dimension	Summed Score	Factor Score	Summed Score	Factor Score	Summed Score	Factor Score
Approachability	-0.158	-0.135	0.253	0.337	0.170	0.150
Acceptability	-0.164	-0.134	0.197	0.062	0.160	0.061
Availability & Accommodation	-0.204	-0.211	0.276	0.111	0.406	0.205
Affordability	-0.816	-0.458	*<0.001	*0.001	*<0.001	*0.003
Appropriateness	-0.186	-0.148	0.238	0.255	0.571	0.410
Privacy	-0.153	-0.100	0.349	0.399	0.321	0.276

*[1]Group with higher level of income subtracted from group with lower level of income (low-high), [2]Calculated using independent t-tests, [3]Calculated using Mann-Whitney U tests, *Denotes significant p-value (p<0.05)*

4.2.4 Summary Statistics

The means and standard deviations for all scale items across all three groups may be found in Table 20. Frequencies for each scale item for the Indiana, DPA Nonuser, and DPA User groups may be found in Tables 21-23.

4.3 Objective 1.1 Results

To examine the impact of direct pharmacy access policies on women's access to hormonal contraceptives by comparing women's perceptions in both a state that does not allow direct pharmacy access or hormonal contraceptives (Indiana) and states that do allow direct pharmacy access (California, Colorado, Oregon, Hawaii, Maryland, New Hampshire, New Mexico, Tennessee, Utah, Washington, West Virginia, and Washington DC). For the hypotheses, "Group 1" was defined as women in Indiana who use traditional methods to obtain hormonal contraceptives, such as a medical doctor, nurse practitioner, or physician assistant. "Group 2" was defined as women in states with a direct pharmacy access policy who use traditional methods to obtain hormonal contraceptives, such as a medical doctor, nurse practitioner, or physician assistant. "Group 3" was defined as women in states with a direct pharmacy access policy who use direct pharmacy access to obtain hormonal contraceptives.

4.3.1 Objective 1.1a: The mean total access of Groups 1, 2, and 3 are all equal.

Total access was unable to be calculated because a single-factor higher order factor analysis model would not converge. A higher order structural equation model was considered in order to evaluate the impact of global access. However, the second order factor analysis model would not converge. Both lower order confirmatory factor analyses using scale scores and factor scores separately demonstrated very poor fit ($CFI<0.90$, $RMSEA>0.1$). Upon further investigation, exploratory factor analysis of the scale scores revealed two separate higher order dimensions rather than one global higher order dimension. Based upon these findings, it was determined that a single-factor second-order model should not be used.

Table 20. Summary statistics for scale items

Dimension	Items	Group							
		All N=316		Indiana N=65		DPA Non-users N=180		DPA Users N=71	
		M	SD	M	SD	M	SD	M	SD
Approachability	I know what steps I must go through to get birth control from a provider.	4.40	0.94	4.63	0.65	4.58	0.75	3.73	1.25
	I know how to get a prescription for birth control from a provider.	4.48	0.87	4.66	0.67	4.68	0.61	3.82	1.21
	I know what types of birth control (pills, patch, vaginal ring, injection, etc.) I can get from a provider.	4.26	0.96	4.35	0.86	4.37	0.84	3.89	1.23
	I am confident in my ability to get a prescription for birth control from a provider.	4.44	0.88	4.68	0.71	4.59	0.72	3.85	1.09
	I know how to properly use birth control.	4.60	0.77	4.66	0.69	4.68	0.72	4.34	0.91
	AVERAGE APPROACHABILITY ACCESS	**4.44**	**0.72**	**4.60**	**0.56**	**4.58**	**0.56**	**3.92**	**0.93**
Acceptability	My friends support my decision to get a prescription for birth control from a provider.	4.44	0.86	4.55	0.79	4.49	0.84	4.21	0.94
	My friends support my decision to use birth control.	4.43	0.84	4.51	0.79	4.51	0.76	4.15	1.01
	My partner(s) supports my decision to get a prescription for birth control from a provider.	4.59	0.83	4.71	0.68	4.69	0.70	4.23	1.14
	My partner(s) supports my decision to use birth control.	4.56	0.87	4.66	0.78	4.62	0.83	4.31	0.99
	AVERAGE ACCEPTABILITY ACCESS	**4.51**	**0.66**	**4.61**	**0.60**	**4.58**	**0.57**	**4.23**	**0.84**
Availability and	I have to travel a long distance to get birth control.	4.25	1.12	4.34	1.07	4.38	0.99	3.83	1.37
	I am unable to get birth control because the provider's office or clinic is not open when I need it to be.	4.29	1.12	4.31	1.22	4.50	0.92	3.76	1.31

Table 20 continued

	The time between deciding I need birth control and getting birth control is too long.	3.91	1.29	3.92	1.44	4.07	1.13	3.49	1.45
	I don't have time to see the provider to get birth control.	3.64	1.33	3.46	1.46	3.81	1.21	3.38	1.43
	The time spent with the provider to get birth control is too long.	3.71	1.31	3.65	1.41	3.80	1.26	3.52	1.35
	AVER. AVAILABILITY ACCOMMODATION ACCESS	**3.96**	**0.95**	**3.94**	**1.04**	**4.11**	**0.79**	**3.60**	**1.13**
Affordability	I am able to afford my birth control.	4.05	1.13	4.31	0.95	4.11	1.09	3.68	1.27
	Getting birth control from a provider costs too much.	3.56	1.32	3.65	1.37	3.65	1.25	3.24	1.40
	I am unable to afford to see a provider to get a birth control prescription.	4.07	1.17	4.28	1.14	4.14	1.09	3.70	1.32
	I am unable to get my preferred type of birth control because of cost.	3.95	1.24	4.14	1.16	4.09	1.14	3.42	1.44
	AVERAGE AFFORDABILITY ACCESS	**3.91**	**0.98**	**4.09**	**1.02**	**4.00**	**0.91**	**3.51**	**1.04**
Appropriateness	My provider has my best interest in mind.	4.22	0.90	4.42	0.81	4.31	0.79	3.85	1.12
	My provider makes me feel comfortable.	4.26	0.94	4.51	0.69	4.31	0.85	3.89	1.21
	My provider explains prescription birth control options to me in terms that I can understand.	4.34	0.95	4.60	0.66	4.42	0.84	3.87	1.26
	My provider explains the side effects of birth control to me in terms I can understand.	4.19	1.07	4.29	1.04	4.27	0.98	3.92	1.25
	My provider explains how birth control works to me in terms I can understand.	4.37	0.89	4.57	0.64	4.46	0.78	3.97	1.21
	My provider is knowledgeable regarding birth control.	4.53	0.85	4.74	0.67	4.64	0.61	4.03	1.24
	My provider helps me choose which type of birth control is best for me.	4.16	1.04	4.46	0.81	4.28	0.87	3.59	1.37

Table 20 continued

	My provider chooses the birth control that is safe for me to use.	4.16	1.03	4.35	0.96	4.27	0.90	3.68	1.25
	My provider chooses the birth control that works the best for me.	3.81	1.11	3.78	1.17	3.92	1.05	3.56	1.18
	The provider adequately assesses me before prescribing birth control.	4.22	0.99	4.49	0.79	4.32	0.88	3.72	1.23
	AVERAGE APPROPRIATENESS ACCESS	**4.23**	**0.73**	**4.42**	**0.59**	**4.32**	**0.59**	**3.81**	**0.98**
Privacy	I am able to get a prescription for birth control from a provider without my family finding out.	4.29	1.09	4.42	1.06	4.33	1.02	4.08	1.25
	I am able to get a prescription for birth control from a provider without my friends finding out.	4.53	0.90	4.66	0.71	4.62	0.85	4.20	1.08
	I am able to get a prescription for birth control from a provider without my partner(s) finding out.	4.26	1.10	4.28	1.07	4.32	1.08	4.07	1.18
	AVERAGE PRIVACY ACCESS	**4.36**	**0.86**	**4.45**	**0.73**	**4.42**	**0.82**	**4.12**	**1.01**
	AVERAGE TOTAL ACCESS	***4.23***	***0.57***	***4.35***	***0.46***	***4.34***	***0.47***	***3.86***	***0.71***

M = Mean, SD = Standard Deviation, 1=Strongly Disagree, 2=Disagree, 3=Neither Agree nor Disagree, 4=Agree, 5=Strongly Agree

Table 21. Frequency of response to scale items – Indiana group (n=65)

Item	Strongly Agree		Agree		Neither Agree nor Disagree		Disagree		Strongly Disagree	
Approachability	n	%	n	%	n	%	n	%	n	%
I know what steps I must go through to get birth control from a provider.	45	69.2	18	27.7	0	0.0	2	3.1	0	0.0
I know how to get a prescription for birth control from a provider.	48	73.8	14	21.5	1	1.5	2	3.1	0	0.0
I know what types of birth control (pills, patch, vaginal ring, injection, etc.) I can get from a provider.	35	53.8	22	33.8	4	6.2	4	6.2	0	0.0
I am confident in my ability to get a prescription for birth control from a provider.	49	75.4	14	21.5	0	0.0	1	1.5	1	1.5
I know how to properly use birth control.	49	75.4	12	18.5	2	3.1	2	3.1	0	0.0
Acceptability										
My friends support my decision to get a prescription for birth control from a provider.	48	73.8	5	7.7	12	18.5	0	0.0	0	0.0
My friends support my decision to use birth control.	44	67.7	11	16.9	9	13.8	1	1.5	0	0.0
My partner(s) supports my decision to get a prescription for birth control from a provider.	52	80.0	9	13.8	2	3.1	2	3.1	0	0.0
My partner(s) supports my decision to use birth control.	51	78.5	9	13.8	3	4.6	1	1.5	1	1.5
Availability and Accommodation										
I have to travel a long distance to get birth control.	41	63.1	14	21.5	2	3.1	7	10.8	1	1.5

Table 21 continued

I am unable to get birth control because the provider's office or clinic is not open when I need it to be.	44	67.7	10	15.4	2	3.1	5	7.7	4	6.2
The time between deciding I need birth control and getting birth control is too long.	36	55.4	9	13.8	6	9.2	7	10.8	7	10.8
I don't have time to see the provider to get birth control.	24	36.9	12	18.5	5	7.7	18	27.7	3	4.6
The time spent with the provider to get birth control is too long.	26	40.0	13	20.0	10	15.4	9	13.8	7	10.8
Affordability										
I am able to afford my birth control.	35	53.8	21	32.3	4	6.2	4	6.2	1	1.5
Getting birth control from a provider costs too much.	28	43.1	7	10.8	13	20.0	13	20.0	4	6.2
I am unable to afford to see a provider to get a birth control prescription.	41	63.1	11	16.9	5	7.7	6	9.2	2	3.1
I am unable to get my preferred type of birth control because of cost.	35	53.8	15	23.1	6	9.2	7	10.8	2	3.1
Appropriateness										
My provider has my best interest in mind.	37	56.9	21	32.3	4	6.2	3	4.6	0	0.0
My provider makes me feel comfortable.	39	60.0	21	32.3	4	6.2	1	1.5	0	0.0
My provider explains prescription birth control options to me in terms that I can understand.	44	67.7	17	26.2	3	4.6	1	1.5	0	0.0
My provider explains the side effects of birth control to me in terms I can understand.	38	58.5	16	24.6	4	6.2	6	9.2	1	1.5
My provider explains how birth control works to me in terms I can understand.	41	63.1	21	32.3	2	3.1	1	1.5	0	0.0
My provider is knowledgeable regarding birth control.	54	83.1	7	10.8	2	3.1	2	3.1	0	0.0
My provider helps me choose which type of birth control is best for me.	40	61.5	18	27.7	4	6.2	3	4.6	0	0.0

Table 21 continued

My provider chooses the birth control that is safe for me to use.	40	61.5	12	18.5	10	15.4	2	3.1	1	1.5
My provider chooses the birth control that works the best for me.	21	32.3	24	36.9	7	10.8	11	16.9	2	3.1
The provider adequately assesses me before prescribing birth control.	42	64.6	15	23.1	6	9.2	2	3.1	0	0.0
Privacy										
I am able to get a prescription for birth control from a provider without my family finding out.	45	69.2	10	15.4	4	6.2	4	6.2	2	3.1
I am able to get a prescription for birth control from a provider without my friends finding out.	51	78.5	7	10.8	6	9.2	1	1.5	0	0.0
I am able to get a prescription for birth control from a provider without my partner(s) finding out.	40	61.5	9	13.8	12	18.5	2	3.1	2	3.1

Table 22. Frequency of response to scale items – DPA user group (n=71)

Item	Strongly Agree		Agree		Neither Agree nor Disagree		Disagree		Strongly Disagree	
Approachability	n	%	n	%	n	%	n	%	n	%
I know what steps I must go through to get birth control from a provider.	22	31.0	29	40.8	4	5.6	11	15.5	5	7.0
I know how to get a prescription for birth control from a provider.	23	32.4	30	42.3	5	7.0	8	11.3	5	7.0
I know what types of birth control (pills, patch, vaginal ring, injection, etc.) I can get from a provider.	26	36.6	28	39.4	6	8.5	5	7.0	6	8.5
I am confident in my ability to get a prescription for birth control from a provider.	23	32.4	26	36.6	12	16.9	8	11.3	2	2.8
I know how to properly use birth control.	39	54.9	22	31.0	6	8.5	3	4.2	1	1.4
Acceptability										
My friends support my decision to get a prescription for birth control from a provider.	35	49.3	20	28.2	13	18.3	2	2.8	1	1.4
My friends support my decision to use birth control.	35	49.3	19	26.8	10	14.1	7	9.9	0	0.0
My partner(s) supports my decision to get a prescription for birth control from a provider.	40	56.3	18	25.4	6	8.5	3	4.2	4	5.6
My partner(s) supports my decision to use birth control.	41	57.7	17	23.9	9	12.7	2	2.8	2	2.8
Availability and Accommodation										
I have to travel a long distance to get birth control.	33	46.5	16	22.5	4	5.6	13	18.3	5	7.0
I am unable to get birth control because the provider's office or clinic is not open when I need it to be.	30	42.3	14	19.7	11	15.5	12	16.9	4	5.6
The time between deciding I need birth control and getting birth control is too long.	25	35.2	17	23.9	5	7.0	16	22.5	8	11.3

Table 22 continued

I don't have time to see the provider to get birth control.	21	29.6	19	26.8	5	7.0	18	25.4	8	11.3
The time spent with the provider to get birth control is too long.	24	33.8	15	21.1	11	15.5	16	22.5	5	7.0
Affordability										
I am able to afford my birth control.	21	29.6	28	39.4	6	8.5	10	14.1	6	8.5
Getting birth control from a provider costs too much.	17	23.9	18	25.4	11	15.5	15	21.1	10	14.1
I am unable to afford to see a provider to get a birth control prescription.	28	39.4	16	22.5	9	12.7	14	19.7	4	5.6
I am unable to get my preferred type of birth control because of cost.	24	33.8	14	19.7	9	12.7	16	22.5	8	11.3
Appropriateness										
My provider has my best interest in mind.	24	33.8	23	32.4	17	23.9	3	4.2	4	5.6
My provider makes me feel comfortable.	29	40.8	20	28.2	11	15.5	7	9.9	4	5.6
My provider explains prescription birth control options to me in terms that I can understand.	29	40.8	22	31.0	7	9.9	8	11.3	5	7.0
My provider explains the side effects of birth control to me in terms I can understand.	31	43.7	20	28.2	7	9.9	9	12.7	4	5.6
My provider explains how birth control works to me in terms I can understand.	30	42.3	24	33.8	7	9.9	5	7.0	5	7.0
My provider is knowledgeable regarding birth control.	35	49.3	18	25.4	8	11.3	5	7.0	5	7.0
My provider helps me choose which type of birth control is best for me.	23	32.4	22	31.0	8	11.3	10	14.1	8	11.3

Table 22 continued

My provider chooses the birth control that is safe for me to use.	22	31.0	22	31.0	16	22.5	4	5.6	7	9.9
My provider chooses the birth control that works the best for me.	16	22.5	27	38.0	14	19.7	9	12.7	5	7.0
The provider adequately assesses me before prescribing birth control.	23	32.4	24	33.8	9	12.7	11	15.5	4	5.6
Privacy										
I am able to get a prescription for birth control from a provider without my family finding out.	38	53.5	16	22.5	7	9.9	5	7.0	5	7.0
I am able to get a prescription for birth control from a provider without my friends finding out.	37	52.1	20	28.2	8	11.3	3	4.2	3	4.2
I am able to get a prescription for birth control from a provider without my partner(s) finding out.	36	50.7	16	22.5	10	14.1	6	8.5	3	4.2

Table 23. Frequency of response to scale items – DPA nonuser group (n=180)

Item	Strongly Agree		Agree		Neither Agree nor Disagree		Disagree		Strongly Disagree	
Approachability	n	%	n	%	n	%	n	%	n	%
I know what steps I must go through to get birth control from a provider.	124	68.9	45	25.0	5	2.8	4	2.2	2	1.1
I know how to get a prescription for birth control from a provider.	134	74.4	38	21.1	5	2.8	3	1.7	0	0.0
I know what types of birth control (pills, patch, vaginal ring, injection, etc.) I can get from a provider.	94	52.2	71	39.4	6	3.3	6	3.3	3	1.7
I am confident in my ability to get a prescription for birth control from a provider.	125	69.4	43	23.9	7	3.9	4	2.2	1	0.6
I know how to properly use birth control.	141	78.3	27	15.0	6	3.3	5	2.8	1	0.6
Acceptability										
My friends support my decision to get a prescription for birth control from a provider.	124	68.9	25	13.9	28	15.6	2	1.1	1	0.6
My friends support my decision to use birth control.	120	66.7	33	18.3	26	14.4	1	0.6	0	0.0
My partner(s) supports my decision to get a prescription for birth control from a provider.	144	80.0	20	11.1	12	6.7	4	2.2	0	0.0
My partner(s) supports my decision to use birth control.	142	78.9	17	9.4	13	7.2	7	3.9	1	0.6
Availability and Accommodation										
I have to travel a long distance to get birth control.	113	62.8	42	23.3	10	5.6	11	6.1	4	2.2
I am unable to get birth control because the provider's office or clinic is not open when I need it to be.	124	68.9	37	20.6	8	4.4	7	3.9	4	2.2
The time between deciding I need birth control and getting birth control is too long.	85	47.2	53	29.4	16	8.9	21	11.7	5	2.8

Table 23 continued

I don't have time to see the provider to get birth control.	68	37.8	55	30.6	17	9.4	35	19.4	5	2.8
The time spent with the provider to get birth control is too long.	69	38.3	56	31.1	13	7.2	34	18.9	8	4.4
Affordability										
I am able to afford my birth control.	83	46.1	60	33.3	17	9.4	13	7.2	7	3.9
Getting birth control from a provider costs too much.	60	33.3	48	26.7	29	16.1	35	19.4	8	4.4
I am unable to afford to see a provider to get a birth control prescription.	90	50.0	50	27.8	23	12.8	10	5.6	7	3.9
I am unable to get my preferred type of birth control because of cost.	91	50.6	41	22.8	27	15.0	15	8.3	6	3.3
Appropriateness										
My provider has my best interest in mind.	88	48.9	63	35.0	25	13.9	4	2.2	0	0.0
My provider makes me feel comfortable.	90	50.0	66	36.7	15	8.3	8	4.4	1	0.6
My provider explains prescription birth control options to me in terms that I can understand.	104	57.8	60	33.3	5	2.8	10	5.6	1	0.6
My provider explains the side effects of birth control to me in terms I can understand.	92	51.1	64	35.6	9	5.0	10	5.6	5	2.8
My provider explains how birth control works to me in terms I can understand.	107	59.4	56	31.1	11	6.1	5	2.8	1	0.6
My provider is knowledgeable regarding birth control.	127	70.6	44	24.4	7	3.9	2	1.1	0	0.0
My provider helps me choose which type of birth control is best for me.	90	50.0	61	33.9	20	11.1	8	4.4	1	0.6

Table 23 continued

My provider chooses the birth control that is safe for me to use.	92	51.1	56	31.1	22	12.2	9	5.0	1	0.6
My provider chooses the birth control that works the best for me.	58	32.2	76	42.2	28	15.6	10	5.6	8	4.4
The provider adequately assesses me before prescribing birth control.	96	53.3	57	31.7	17	9.4	9	5.0	1	0.6
Privacy										
I am able to get a prescription for birth control from a provider without my family finding out.	111	61.7	33	18.3	26	14.4	4	2.2	6	3.3
I am able to get a prescription for birth control from a provider without my friends finding out.	142	78.9	18	10.0	14	7.8	2	1.1	4	2.2
I am able to get a prescription for birth control from a provider without my partner(s) finding out.	115	63.9	28	15.6	24	13.3	6	3.3	7	3.9

4.3.2 Objective 1.1b: The mean approachability access of Groups 1, 2, and 3 are all equal.

Approachability access, which includes patients' awareness of and ability to reach a service, was measured by calculating a factor score. The data violated the assumption of normality, so a non-parametric test, the Kruskal-Wallis test, was used instead. The results of the Kruskal-Wallis and multiple comparisons with Bonferroni correction comparing factor scores of approachability access between the three groups of women can be found in Table 24. Mean approachability access of Groups 1, 2, and 3 are not all equal (χ^2=36.232, p<0.001). Women using direct pharmacy access had statistically significantly lower approachability access than women using a traditional method to obtain birth control in Indiana or in a state allowing direct pharmacy access (p<0.001 and p<0.001 respectively). Women using a traditional method in Indiana and in states allowing DPA did not have statistically significantly different approachability access scores (p=0.750).

Table 24. Comparison of Approachability access across groups

Kruskal-Wallis			Multiple Comparisons*				Factor Scores	
df	χ^2	p-value	Group (A)	Group (B)	Std. Test Statistic	p-value	Group	Median (Std Dev)
2	36.232	***<0.001***	DPA User	DPA Nonuser	-5.69	***<0.001***	DPA User	-0.47 (1.00)
				Indiana	-4.92	***<0.001***	DPA Nonuser	0.44 (0.58)
			DPA Nonuser	Indiana	-0.32	0.750	Indiana	0.39 (0.55)

**Bonferroni corrections were used. P-value<0.0167 was considered significant*

4.3.3 Objective 1.1c: The mean acceptability access of Groups 1, 2, and 3 are all equal.

Acceptability access, which includes patient values and social norms, was measured by calculating a factor score. The results of the Kruskal-Wallis test and multiple comparisons with Bonferroni correction comparing mean acceptability access between the three groups of women can be found in Table 25. Mean acceptability access of Groups 1, 2, and 3 are not all equal (χ^2=17.337, p<0.001). Women using direct pharmacy access had statistically significantly lower

acceptability access than women using a traditional method to obtain birth control in Indiana or in a state allowing direct pharmacy access (p=<0.001 and p<0.001, respectively). Women using a traditional method in Indiana and in states allowing DPA did not have statistically significantly different acceptability access scores (p=0.519).

Table 25. Comparison of Acceptability access across groups

Kruskal-Wallis			Multiple Comparisons*				Factor Scores	
df	χ^2	p-value	Group (A)	Group (B)	Std. Test Statistic	p-value	Group	Median (Std Dev)
2	17.337	***<0.001***	DPA User	DPA Nonuser	-3.78	***<0.001***	DPA User	0.10 (0.45)
				Indiana	-3.63	***<0.001***	DPA Nonuser	0.17 (0.28)
			DPA Nonuser	Indiana	-0.64	0.519	Indiana	0.18 (0.28)

**Bonferroni corrections were used. P-value <0.0167 was considered significant*

4.3.4 Objective 1.1d: The mean availability and accommodation access of Groups 1, 2, and 3 are all equal.

Availability and accommodation access, which includes location and patients' ability to receive care in a timely manner, was measured by calculating a factor score. The results of the Kruskal-Wallis test and multiple comparisons with Bonferroni correction comparing mean availability and accommodation access between the three groups of women can be found in Table 26. Mean availability and accommodation access of Groups 1, 2, and 3 are not all equal (χ^2=12.937, p=0.002<0.05). Women using direct pharmacy access had statistically significantly lower availability and accommodation access than women using a traditional method to obtain birth control in Indiana or a state allowing direct pharmacy access (p<0.009 and p<0.001 respectively). Women using a traditional method in Indiana and in states allowing DPA did not have statistically significantly different availability and accommodation access scores (p=0.749).

Table 26. Comparison of Availability and Accommodation across groups

Kruskal-Wallis			Multiple Comparisons*				Factor Scores	
df	χ^2	p-value	Group (A)	Group (B)	Std. Test Statistic	p-value	Group	Median (Std Dev)
2	12.937	***0.002***	DPA User	DPA Nonuser	-3.53	***<0.001***	DPA User	-0.23 (0.81)
				Indiana	-2.62	***0.009***	DPA Nonuser	0.21 (0.56)
			DPA Nonuser	Indiana	-0.32	0.749	Indiana	0.22 (0.72)

*Bonferroni corrections were used. P-value <0.0167 was considered significant

4.3.5 Objective 1.1e: The mean affordability access of Groups 1, 2, and 3 are all equal.

Affordability access, which focuses on the direct and indirect costs of receiving care, was measured using a factor score. The results of the Kruskal-Wallis test and multiple comparisons with Bonferroni correction comparing mean affordability access between the three groups of women can be found in Table 27. Mean affordability access of Groups 1, 2, and 3 are not all equal (χ^2=16.783, p<0.001). Women using direct pharmacy access had statistically significantly lower affordability access than women using a traditional method to obtain birth control in Indiana or in a state allowing direct pharmacy access (p<0.001 and p<0.001, respectively). Women using a traditional method in Indiana and in states allowing DPA did not have statistically significantly different affordability access scores (p=0.366).

Table 27. Comparison of Affordability access across groups

Kruskal-Wallis			Multiple Comparisons*				Factor Scores	
df	χ^2	p-value	Group (A)	Group (B)	Std. Test Statistic	p-value	Group	Median (Std Dev)
2	16.783	***<0.001***	DPA User	DPA Nonuser	-3.60	***<0.001***	DPA User	-0.25 (0.71)
				Indiana	-3.70	***<0.001***	DPA Nonuser	0.17 (0.56)
			DPA Nonuser	Indiana	-0.90	0.366	Indiana	0.34 (0.63)

**Bonferroni corrections were used. P-value <0.0167 was considered significant*

4.3.6 Objective 1.1f: The mean appropriateness access of Groups 1, 2, and 3 are all equal.

Appropriateness access, which includes adequacy and timeliness of the service provided, was measured using a factor score. The results of the Kruskal-Wallis test and multiple comparisons with Bonferroni correction comparing mean appropriateness access between the three groups of women can be found in Table 28. Mean appropriateness access of Groups 1, 2, and 3 are not all equal (χ^2=22.960, p<0.001). Women using direct pharmacy access had significantly lower appropriateness access than women using a traditional method to obtain birth control in Indiana or in a state allowing direct pharmacy access (p<0.001 and p<0.001 respectively). Women using a traditional method in Indiana and in states allowing DPA did not have a statistically significant difference in appropriateness access scores (p=0.131).

Table 28. Comparison of Appropriateness access across groups

Kruskal-Wallis			Multiple Comparisons*				Factor Scores	
df	χ^2	p-value	Group (A)	Group (B)	Std. Test Statistic	p-value	Group	Median (Std Dev)
2	22.96	***<0.001***	DPA User	DPA Nonuser	-3.96	***<0.001***	DPA User	-0.19 (0.78)
				Indiana	-4.51	***<0.001***	DPA Nonuser	0.22 (0.44)
			DPA Nonuser	Indiana	-1.51	0.131	Indiana	0.31 (0.42)

**Bonferroni corrections were used. P-value <0.0167 was considered significant*

4.3.7 Objective 1.1g: The Mean privacy access of Groups 1, 2, and 3 are all equal.

Privacy access, which includes patients' ability to receive care without other people being aware, was assessed by using a factor score. The results of the Kruskal-Wallis test and multiple comparisons with Bonferroni correction comparing mean privacy access between the three groups of women can be found in Table 29. Mean privacy access of Groups 1, 2, and 3 are not all equal (χ^2=9.001, p=0.011). Women using direct pharmacy access had significantly lower privacy access than women using a traditional method to obtain birth control in a state allowing direct pharmacy access (p<0.004). Women using a traditional method in Indiana and in states allowing DPA did not have a statistically significant difference in privacy access scores (p=0.971). Women in Indiana and women using DPA did not have a statistically significant difference in privacy access scores (p=0.017).

Table 29. Comparison of Privacy access across groups

Kruskal-Wallis			Multiple Comparisons*				Factor Scores	
df	χ^2	p-value	Group (A)	Group (B)	Std. Test Statistic	p-value	Group	Median (Std Dev)
2	9.001	***0.011***	DPA User	DPA Nonuser	-2.88	***0.004***	DPA User	-0.07 (0.92)
				Indiana	-2.38	0.017	DPA Nonuser	0.37 (0.67)
			DPA Nonuser	Indiana	-0.04	0.971	Indiana	0.35 (0.55)

**Bonferroni corrections were used. P-value <0.0167 was considered significant*

4.4 Objective 1.2 Results

The purpose of objective 1.2 was to examine the impact of direct pharmacy access policies on women's access to hormonal contraceptives by demographic characteristics. Linear regression was used to assess relationships between factor scores of the access dimensions (dependent variable) and education, income, age, and group (independent variables). Since a ceiling effect was present, binary logistic regression was also used to determine the robustness of the results of the linear regression. For the logistic regression calculations, the dependent variables were dichotomized into two categories: the upper tertile of factor scores (or the highest levels of access) and the combined lower two tertiles of factor scores. For the independent variable, education, respondents who indicated that their highest level of education was "some college", "high school", or "less than high school" were grouped together for both linear and logistic regression, to ensure at least 15 respondents were present in each category of all independent variables (Laerd Statistics 2017).

4.4.1 Objective 1.2a: There is not a relationship between total access, group, education level, income level, and age.

This hypothesis was unable to be tested, since total access was not able to be calculated. A higher order structural equation model was considered in order to evaluate the impact of global access. However, the second order factor analysis model would not converge. Both lower order confirmatory factor analyses using scale scores and factor scores separately demonstrated very poor fit (CFI<0.90, RMSEA>0.1). Upon further investigation, exploratory factor analysis of the

scale scores revealed two separate higher order dimensions rather than one global higher order dimension as substantiated by Levesque et al. (2013). Based upon these findings, it was determined that a single-factor second-order model should not be used.

4.4.2 Objective 1.2b: There is not a relationship between approachability access, group education level, income level, and age.

The results from the linear regression reveal that there is statistically significant evidence of a relationship between approachability access, group, education level, income level, and age ($F=7.55$, $p<0.001$, $r^2=0.200$) (Table 30). Binary logistic regression did not find a statistically significant relationship between approachability access, group, education level, income level, and age ($\chi^2(10) =17.624$, $p=0.062$) (Table 31).

4.4.3 Objective 1.2c: There is not a relationship between acceptability access, group, education level, income level, and age.

There is statistically significant evidence that a relationship exists between acceptability access, group, education level, income level, and age ($F=2.91$, $p<0.002$, $r^2=0.088$) (Table 32). Binary logistic regression also revealed a statistically significant relationship between acceptability access, group, education level, income level, and age ($\chi^2(10) =21.248$, $p=0.019$) (Table 33).

4.4.4 Objective 1.2d: There is not a relationship between availability and accommodation access, group, education level, income level, and age.

There is a statistically significant relationship between availability and accommodation access, group, education level, income level, and age ($F=5.85$, $p<0.001$, $r^2=0.091$) (Table 34). Binary logistic regression did not reveal a statistically significant relationship between availability and accommodation access, group, education level, income level, and age ($\chi^2(10) =9.838$, $p=0.455$) (Table 35).

4.4.5 Objective 1.2e: There is not a relationship between affordability access, group, education level, income level, and age.

There is a statistically significant relationship between affordability access, group, education level, income level, and age ($F=4.54$, $p<0.001$, $r^2=0.131$) (Table 36). Binary logistic regression also revealed a statistically significant relationship between affordability access, group, education level, income level, and age ($\chi^2(10) =22.494$, $p=0.013$) (Table 37).

4.4.6 Objective 1.2f: There is not a relationship between appropriateness access, group, education level, income level, and age.

There is a statistically significant relationship between appropriateness access, group, education level, income level, and age ($F=4.79$, $p<0.001$, $r^2=0.137$) (Table 38). Binary logistic regression also revealed a statistically significant relationship between appropriateness access, group, education level, income level, and age ($\chi^2(10) =18.903$, $p=0.042$) (Table 39).

4.4.7 Objective 1.2g: There is not a relationship between privacy access, group, education level, income level, and age.

There is a statistically significant relationship between privacy access, group, education level, income level, and age ($F=2.70$, $p=0.004$, $r^2=0.082$) (Table 40). Binary logistic regression did not reveal a statistically significant relationship between privacy access, group, education level, income level, and age ($\chi^2(10) =6.856$, $p=0.739$) (Table 41).

4.4.8 Objective 1.2h: There is not a relationship between total access for Group 1, education level, income level, and age.

This hypothesis was unable to be tested, since total access was not able to be calculated. A higher order structural equation model was considered in order to evaluate the impact of global access. However, the second order factor analysis model would not converge. Both lower order confirmatory factor analyses using scale scores and factor scores separately demonstrated very poor fit (CFI<0.90, RMSEA>0.1). Upon further investigation, exploratory factor analysis of the scale scores revealed two separate higher order dimensions rather than one global higher order dimension as substantiated by Levesque et al. (2013). Based upon these findings, it was determined that a single-factor second-order model should not be used.

4.4.9 Objective 1.2i: There is not a relationship between total access for Group 2, education level, income level, and age.

This hypothesis was unable to be tested, since total access was not able to be calculated. A higher order structural equation model was considered in order to evaluate the impact of global access. However, the second order factor analysis model would not converge. Both lower order confirmatory factor analyses using scale scores and factor scores separately demonstrated very poor fit (CFI<0.90, RMSEA>0.1). Upon further investigation, exploratory factor analysis of the scale scores revealed two separate higher order dimensions rather than one global higher order dimension as substantiated by Levesque et al. (2013). Based upon these findings, it was determined that a single-factor second-order model should not be used.

4.4.10 Objective 1.2j: There is not a relationship between total access for Group 3, education level, income level, and age.

This hypothesis was unable to be tested, since total access was not able to be calculated. A higher order structural equation model was considered in order to evaluate the impact of global access. However, the second order factor analysis model would not converge. Both lower order confirmatory factor analyses using scale scores and factor scores separately demonstrated very poor fit (CFI<0.90, RMSEA>0.1). Upon further investigation, exploratory factor analysis of the scale scores revealed two separate higher order dimensions rather than one global higher order dimension as substantiated by Levesque et al. (2013). Based upon these findings, it was determined that a single-factor second-order model should not be used.

4.4.11 Objective 1.2k: There is not a relationship between total access and group, when controlling for education level, income level, and age.

This hypothesis was unable to be tested, since total access was not able to be calculated. A higher order structural equation model was considered in order to evaluate the impact of global access. However, the second order factor analysis model would not converge. Both lower order confirmatory factor analyses using scale scores and factor scores separately demonstrated very poor fit (CFI<0.90, RMSEA>0.1). Upon further investigation, exploratory factor analysis of the scale scores revealed two separate higher order dimensions rather than one global higher order

dimension as substantiated by Levesque et al. (2013). Based upon these findings, it was determined that a single-factor second-order model should not be used.

4.4.12 Objective 1.2l: There is not a relationship between approachability access and group, when controlling for education level, income level, and age.

Women using direct pharmacy access had a statistically significantly lower approachability access than women using a traditional method to obtain contraceptives in Indiana and states allowing direct pharmacy access ($p<0.001$, $p<0.001$ respectively). Women using a traditional method in Indiana and states allowing direct pharmacy access did not have a statistically significant difference in approachability access ($p=0.630$). Women in states allowing direct pharmacy access who used a traditional method were 2.55 (95% confidence interval = 1.31 to 4.98) times more likely than women using direct pharmacy access to have an approachability access score in the top tertile. Results from the linear regression can be found in Table 30, and results from the binary logistic regression can be found in Table 31.

Table 30. Approachability access linear regression

Source	Type III Sum of Squares	Degrees of Freedom	Mean Square	F	Sig.
Corrected Model	36.37	10	3.64	7.55	***<0.001***
Intercept	1.28	1	1.28	2.65	0.105
Education[1]	0.58	3	0.19	0.40	0.751
Income[2]	2.07	4	0.52	1.07	0.370
Age[3]	0.88	1	0.88	1.82	0.178
Group[4]	30.70	2	15.35	31.86	***<0.001***
Error	145.06	301	0.48		
Total	181.43	312			
Corrected Total	181.43	311			

			Pairwise Comparisons		
			Mean Difference	**Std. Error**	**Sig.**
	DPA Users	*DPA Non-users*	-0.74	0.10	***<0.001***
		Indiana	-0.79	0.12	***<0.001***
	DPA Non-users	*Indiana*	-0.05	0.10	0.630

[1]Categorical: 1) No college degree, 2) Associate's, 3) Bachelor's, or 4) Advanced degree, [2]Categorical: 1) <$25k, 2) $25-50k, 3) $50-75k, 4) $75-100k, 5) >$100k, [3]Continuous, [4]Categorical: 1) DPA User, 2) DPA Non-user, 3) Indiana

Table 31. Logistic regression of Approachability access

	B	SE	Wald	df	p	Odds Ratio	95% CI for OR	
Education			2.78	3	0.426			
No college degree						**Ref**		
Associate's	0.57	0.42	1.81	1	0.179	1.77	0.77	4.05
Bachelor's	0.14	0.32	0.19	1	0.666	1.15	0.61	2.17
Advanced	-0.14	0.41	0.12	1	0.728	0.87	0.39	1.95
Income			4.14	4	0.388			
<$25,000						**Ref**		
$25-49,999	0.07	0.45	0.02	1	0.881	1.07	0.45	2.57
$50-74,999	0.26	0.47	0.31	1	0.578	1.30	0.52	3.24
$75-99,999	0.21	0.49	0.19	1	0.665	1.23	0.48	3.20
>$100,000	0.75	0.48	2.45	1	0.118	2.12	0.83	5.44
Age	0.02	0.02	0.89	1	0.346	1.02	0.98	1.06
Group			7.55	2	***0.023***			
DPA User						**Ref**		
DPA Non-user	0.94	0.34	7.54	1	***0.006***	2.55	1.31	4.98
Indiana	0.70	0.41	2.90	1	0.089	2.01	0.90	4.48
Constant	-2.37	0.81	8.51	1	***0.004***	0.09		

4.4.13 Objective 1.2m: There is not a relationship between acceptability access and group, when controlling for education level, income level, and age.

Women using direct pharmacy access had statistically significantly lower approachability access than women using a traditional method to obtain contraceptives in Indiana and states allowing direct pharmacy access (p=0.001 and p<0.001 respectively). Women using a traditional method in Indiana and states allowing direct pharmacy access did not have a statistically significant difference in approachability access (p=0.569). Women using a traditional method to obtain hormonal contraceptives in Indiana (OR=3.87, 95% CI=1.74 to 8.60) and in states allowing direct pharmacy access (OR=3.01, 95% CI=1.52 to 5.96) were approximately three times as likely to have an acceptability access score in the top tertile as women using direct pharmacy access. Results from the linear regression can be found in Table 32, and results from the binary logistic regression can be found in Table 33.

Table 32. Acceptability access linear regression

Source	Type III Sum of Squares	Degrees of Freedom	Mean Square	F	Sig.
Corrected Model	3.13	10	0.31	2.91	***0.002***
Intercept	0.09	1	0.09	0.82	0.366
Education[1]	0.32	3	0.11	0.99	0.397
Income[2]	0.51	4	0.13	1.18	0.322
Age[3]	0.05	1	0.05	0.48	0.489
Group[4]	2.15	2	1.07	10.01	***<0.001***
Error	32.32	301	0.11		
Total	35.45	312			
Corrected Total	35.45	311			

			Pairwise Comparisons		
			Mean Difference	**Std. Error**	**Sig.**
	DPA Users	*DPA Nonusers*	-0.19	0.05	***<0.001***
		Indiana	-0.22	0.06	***<0.001***
	DPA Nonusers	*Indiana*	-0.03	0.05	0.569

[1]Categorical: 1) No college degree, 2) Associate's, 3) Bachelor's, or 4) Advanced degree, [2]Categorical: 1) <$25k, 2) $25-50k, 3) $50-75k, 4) $75-100k, 5) >$100k, [3]Continuous, [4]Categorical: 1) DPA User, 2) DPA Nonuser, 3) Indiana

Table 33. Logistic regression of Acceptability access

	B	SE	Wald	df	p	Odds Ratio	95% CI for OR	
Education			2.16	3	0.541			
No college degree						**Ref**		
Associate's	-0.28	0.44	0.40	1	0.529	0.76	0.32	1.79
Bachelor's	0.13	0.31	0.17	1	0.677	1.14	0.62	2.10
Advanced	-0.32	0.41	0.62	1	0.430	0.73	0.33	1.61
Income			3.38	4	0.496			
<$25,000						**Ref**		
$25-49,999	0.29	0.43	0.45	1	0.504	1.33	0.58	3.08
$50-74,999	-0.19	0.46	0.16	1	0.687	0.83	0.34	2.06
$75-99,999	0.27	0.47	0.32	1	0.574	1.30	0.52	3.29
>$100,000	0.47	0.47	0.99	1	0.320	1.60	0.63	4.02
Age	0.02	0.02	1.25	1	0.264	1.02	0.98	1.07
Group			12.55	2	***0.002***			
DPA User						**Ref**		
DPA Non-User	1.10	0.35	10.04	1	***0.002***	3.01	1.52	5.96
Indiana	1.35	0.41	11.01	1	***0.001***	3.87	1.74	8.60
Constant	-2.39	0.81	8.77	1	***0.003***	0.09		

4.4.14 Objective 1.2n: There is not a relationship between availability and accommodation access and group, when controlling for education level, income level, and age.

Women using direct pharmacy access had significantly lower availability and accommodation access than women using a traditional method to obtain contraceptives in Indiana and states allowing direct pharmacy access ($p<0.003$ and $p<0.001$, respectively). Women using a traditional method in Indiana and states allowing direct pharmacy access did not have a statistically significant difference in availability and accommodation access ($p=0.307$). Results from the linear regression can be found in Table 34, and results from the binary logistic regression can be found in Table 35.

Table 34. Availability and Accommodation access linear regression

Source	Type III Sum of Squares	Degrees of Freedom	Mean Square	F	Sig.
Corrected Model	12.95	10	1.30	3.03	***0.001***
Intercept	0.63	1	0.63	1.48	0.225
Education[1]	0.15	3	0.05	0.12	0.949
Income[2]	2.28	4	0.57	1.33	0.258
Age[3]	0.99	1	0.99	2.32	0.129
Group[4]	9.58	2	4.79	11.19	***<0.001***
Error	128.88	301	0.43		
Total	141.84	312			
Corrected Total	141.84	311			

			Pairwise Comparisons		
			Mean Difference	**Std. Error**	**Sig.**
	DPA Users	*DPA Nonusers*	-0.44	0.09	***<0.001***
		Indiana	-0.34	0.12	***0.003***
	DPA Nonusers	*Indiana*	0.10	0.10	0.307

[1]Categorical: 1) No college degree, 2) Associate's, 3) Bachelor's, or 4) Advanced degree, [2]Categorical: 1) <$25k, 2) $25-50k, 3) $50-75k, 4) $75-100k, 5) >$100k, [3]Continuous, [4]Categorical: 1) DPA User, 2) DPA Nonuser, 3) Indiana

Table 35. Logistic regression of Availability and Accommodation access

	B	SE	Wald	df	p	Odds Ratio	95% CI for OR	
Education			0.61	3	0.895			
No college degree						**Ref**		
Associate's	0.23	0.42	0.29	1	0.590	1.26	0.55	2.88
Bachelor's	-0.07	0.32	0.05	1	0.829	0.93	0.50	1.74
Advanced	0.04	0.40	0.01	1	0.918	1.04	0.48	2.28
Income			5.19	4	0.268			
<$25,000						**Ref**		
$25-49,999	-0.39	0.43	0.81	1	0.367	0.68	0.29	1.58
$50-74,999	0.24	0.44	0.29	1	0.594	1.27	0.53	3.03
$75-99,999	0.10	0.47	0.05	1	0.829	1.11	0.44	2.76
>$100,000	0.39	0.46	0.72	1	0.396	1.48	0.60	3.68
Age	-0.02	0.02	0.80	1	0.370	0.98	0.94	1.02
Group			2.80	2	0.247			
DPA User						**Ref**		
DPA Non-User	0.52	0.32	2.57	1	0.109	1.67	0.89	3.14
Indiana	0.53	0.39	1.87	1	0.172	1.69	0.80	3.60
Constant	-0.53	0.78	0.47	1	0.494	0.59		

4.4.15 Objective 1.2o: There is not a relationship between affordability access and group, when controlling for education level, income level, and age.

Women using direct pharmacy access had statistically significantly lower affordability access than women using a traditional method to obtain contraceptives in Indiana and states allowing direct pharmacy access ($p<0.001$ and $p<0.001$, respectively). Women using a traditional method in Indiana and states allowing direct pharmacy access did not have a statistically significant difference in affordability access ($p=0.644$). Women using a traditional method to obtain hormonal contraceptives in Indiana (OR=2.80, 95% CI=1.26 to 6.22) and states allowing direct pharmacy access (OR=2.36, 95% CI=1.19 to 4.65) were two to three times as likely to have affordability access scores in the top tertile. Results from the linear regression can be found in Table 36, and results from the binary logistic regression can be found in Table 37.

Table 36. Affordability access linear regression

Source	Type III Sum of Squares	Degrees of Freedom	Mean Square	F	Sig.
Corrected Model	16.32	10	1.63	4.54	***<0.001***
Intercept	0.61	1	0.61	1.69	0.194
Education[1]	0.16	3	0.05	0.15	0.932
Income[2]	7.47	4	1.87	5.19	***<0.001***
Age[3]	0.85	1	0.85	2.36	0.125
Group[4]	7.87	2	3.93	10.94	***<0.001***
Error	108.25	301	0.36		
Total	124.57	312			
Corrected Total	124.57	311			

			Pairwise Comparisons		
			Mean Difference	**Std. Error**	**Sig.**
	DPA Users	*DPA Nonusers*	-0.37	0.09	***<0.001***
		Indiana	-0.41	0.11	***<0.001***
	DPA Nonusers	*Indiana*	-0.04	0.09	0.644

[1]Categorical: 1) No college degree, 2) Associate's, 3) Bachelor's, or 4) Advanced degree, [2]Categorical: 1) <$25k, 2) $25-50k, 3) $50-75k, 4) $75-100k, 5) >$100k, [3]Continuous, [4]Categorical: 1) DPA User, 2) DPA Nonuser, 3) Indiana

Table 37. Logistic regression of Affordability access

	B	SE	Wald	df	p	Odds Ratio	95% CI for OR	
Education			0.55	3	0.907			
No college degree						**Ref**		
Associate's	0.08	0.44	0.04	1	0.851	1.09	0.46	2.55
Bachelor's	-0.18	0.33	0.29	1	0.591	0.84	0.44	1.59
Advanced	-0.07	0.41	0.03	1	0.858	0.93	0.42	2.07
Income			11.26	4	***0.024***			
<$25,000						**Ref**		
$25-49,999	0.15	0.48	0.10	1	0.751	1.16	0.46	2.98
$50-74,999	0.80	0.49	2.68	1	0.102	2.23	0.85	5.81
$75-99,999	0.86	0.51	2.86	1	0.091	2.36	0.87	6.40
>$100,000	1.26	0.51	6.22	1	***0.013***	3.53	1.31	9.52
Age	-0.03	0.02	2.19	1	0.139	0.97	0.93	1.01
Group			7.56	2	***0.023***			
DPA User						**Ref**		
DPA Non-User	0.86	0.35	6.11	1	***0.013***	2.36	1.19	4.65
Indiana	1.03	0.41	6.42	1	***0.011***	2.80	1.26	6.22
Constant	-0.98	0.82	1.44	1	0.229	0.38		

4.4.16 Objective 1.2p: There is not a relationship between appropriateness access and group, when controlling for education level, age, and income level.

Women using direct pharmacy access had statistically significantly lower appropriateness access than women using a traditional method to obtain contraceptives in Indiana and states allowing direct pharmacy access ($p<0.001$ and $p<0.001$, respectively). Women using a traditional method in Indiana and states allowing direct pharmacy access did not have a statistically significant difference in appropriateness access ($p=0.297$). Women using a traditional method to obtain hormonal contraceptives in Indiana (OR=2.41, 95% CI=1.10 to 5.28) and states allowing direct pharmacy access (OR=2.33, 95% CI=1.20 to 4.53) were two to three times as likely as women using direct pharmacy access to have an appropriateness access score in the top tertile.

Results from the linear regression can be found in Table 38, and results from the binary logistic regression can be found in Table 39.

Table 38. Appropriateness access linear regression

Source	Type III Sum of Squares	Degrees of Freedom	Mean Square	F	Sig.
Corrected Model	13.34	10	1.33	4.79	***<0.001***
Intercept	0.03	1	0.03	0.12	0.727
Education[1]	0.72	3	0.24	0.86	0.461
Income[2]	1.22	4	0.30	1.09	0.360
Age[3]	0.01	1	0.01	0.02	0.898
Group[4]	10.82	2	5.41	19.42	***<0.001***
Error	83.90	301	0.28		
Total	97.24	312			
Corrected Total	97.24	311			

Pairwise Comparisons

		Mean Difference	Std. Error	Sig.
DPA Users	*DPA Nonusers*	-0.42	0.08	***<0.001***
	Indiana	-0.50	0.09	***<0.001***
DPA Nonusers	*Indiana*	-0.08	0.08	0.297

[1]Categorical: 1) No college degree, 2) Associate's, 3) Bachelor's, or 4) Advanced degree, [2]Categorical: 1) <$25k, 2) $25-50k, 3) $50-75k, 4) $75-100k, 5) >$100k, [3]Continuous, [4]Categorical: 1) DPA User, 2) DPA Nonuser, 3) Indiana

Table 39. Logistic regression of Appropriateness access

	B	SE	Wald	df	p	Odds Ratio	95% CI for OR	
Education			3.43	3	0.330			
No college degree						**Ref**		
Associate's	0.77	0.43	3.15	1	0.076	2.15	0.92	5.00
Bachelor's	0.45	0.33	1.87	1	0.172	1.57	0.82	2.99
Advanced	0.41	0.42	0.94	1	0.332	1.50	0.66	3.41
Income			6.56	4	0.161			
<$25,000						**Ref**		
$25-49,999	-0.45	0.42	1.17	1	0.279	0.64	0.28	1.45
$50-74,999	-0.72	0.45	2.58	1	0.109	0.49	0.20	1.17
$75-99,999	-0.80	0.48	2.82	1	0.093	0.45	0.18	1.14
>$100,000	0.00	0.46	0.00	1	0.996	1.00	0.41	2.47
Age	-0.04	0.02	3.26	1	0.071	0.96	0.92	1.00
Group			6.79	2	***0.034***			
DPA User						**Ref**		
DPA Non-User	0.85	0.34	6.20	1	***0.013***	2.33	1.20	4.53
Indiana	0.88	0.40	4.85	1	***0.028***	2.41	1.10	5.28
Constant	-0.10	0.79	0.02	1	0.904	0.91		

4.4.17 Objective 1.2q: There is not a relationship between privacy access and group, when controlling for education level, age, and income level.

Women using direct pharmacy access had statistically significantly lower privacy access than women using a traditional method to obtain contraceptives in Indiana and states allowing direct pharmacy access ($p<0.001$ and $p<0.001$, respectively). Women using a traditional method in Indiana and states allowing direct pharmacy access did not have a statistically significant difference in privacy access ($p=0.529$). Results from the linear regression can be found in Table 40, and results from the binary logistic regression can be found in Table 41.

Table 40. Privacy access linear regression

Source	Type III Sum of Squares	Degrees of Freedom	Mean Square	F	Sig.
Corrected Model	13.38	10	1.34	2.70	***0.004***
Intercept	1.71	1	1.71	3.44	0.065
Education[1]	2.70	3	0.90	1.81	0.145
Income[2]	1.70	4	0.43	0.86	0.490
Age[3]	1.51	1	1.51	3.05	0.082
Group[4]	7.00	2	3.50	7.05	***0.001***
Error	149.44	301	0.50		
Total	162.83	312			
Corrected Total	162.83	311			

Pairwise Comparisons

		Mean Difference	Std. Error	Sig.
DPA Users	*DPA Non-users*	-0.34	0.10	***0.001***
	Indiana	-0.41	0.12	***0.001***
DPA Non-users	*Indiana*	-0.07	0.11	0.529

[1]Categorical: 1) No college degree, 2) Associate's, 3) Bachelor's, or 4) Advanced degree, [2]Categorical: 1) <$25k, 2) $25-50k, 3) $50-75k, 4) $75-100k, 5) >$100k, [3]Continuous, [4]Categorical: 1) DPA User, 2) DPA Non-user, 3) Indiana

Table 41. Logistic regression of Privacy access

	B	SE	Wald	df	p	Odds Ratio	95% CI for OR	
Education			1.93	3	0.586			
No college degree						**Ref**		
Associate's	0.40	0.43	0.85	1	0.358	1.49	0.64	3.46
Bachelor's	0.39	0.32	1.43	1	0.232	1.47	0.78	2.78
Advanced	0.50	0.40	1.53	1	0.216	1.65	0.75	3.63
Income			1.45	4	0.835			
<$25,000						**Ref**		
$25-49,999	0.03	0.43	0.01	1	0.942	1.03	0.44	2.41
$50-74,999	0.13	0.45	0.08	1	0.776	1.14	0.47	2.77
$75-99,999	-0.15	0.48	0.10	1	0.749	0.86	0.34	2.20
>$100,000	0.31	0.47	0.43	1	0.512	1.36	0.54	3.43
Age	0.00	0.02	0.02	1	0.897	1.00	0.96	1.04
Group			3.02	2	0.221			
DPA User						**Ref**		
DPA Non-User	0.34	0.32	1.17	1	0.279	1.41	0.76	2.62
Indiana	0.66	0.38	3.02	1	0.082	1.93	0.92	4.04
Constant	-1.32	0.79	2.79	1	0.095	0.27		

4.5 Sensitivity Analysis

Due to the strong ceiling effect present in the data for all six dimensions of access, additional tests were run to assess the robustness of the results from the linear regression. One of the assumptions of linear regression is that a linear relationship is present between the dependent variable and each of the independent variables (Laerd Statistics 2017). A ceiling effect violates this assumption. Binary logistic regression, however, does not assume that a linear relationship exists between dependent and independent variables, and can be used to account for ceiling and floor effects (Rindskopf and Shrout 2019). The results of the logistic regression analyses were similar to the results from the linear regression analyses, which suggests that the ceiling effect present in the data does not significantly impact the results.

4.6 Access Perceptions

Participants who have used direct pharmacy access to obtain hormonal contraceptives were also asked if using DPA made it easier to access contraceptives. The majority (78.9%, n=56) agreed or strongly agreed that DPA made it easier to obtain hormonal contraceptives (Figure 5).

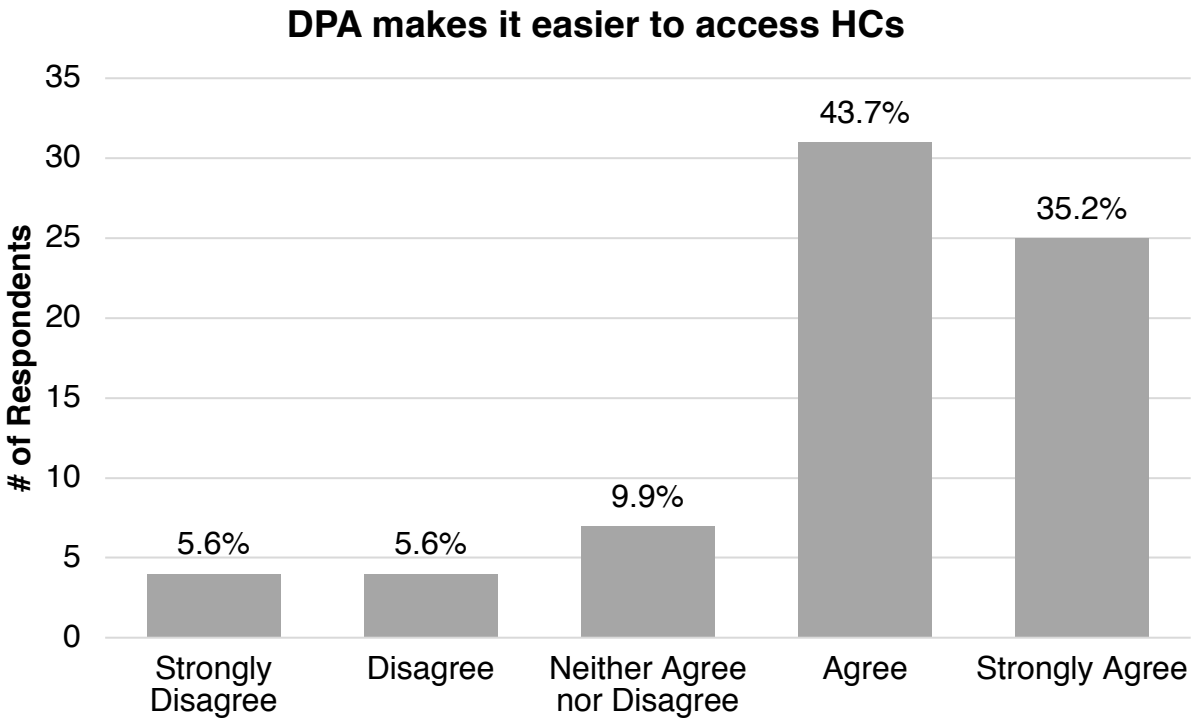

Figure 5. Perceptions of Direct Pharmacy Access (DPA) impact on hormonal contraceptive (HC) access (N=316)

Participants who had only ever used a traditional method to obtain hormonal contraceptives were asked if they were aware that some states allow direct pharmacy access. The majority of respondents in states allowing direct pharmacy access (81%, n=146) and Indiana (86.2%, n=56) were not aware that pharmacists may prescribe hormonal contraceptives in some states (Figure 6). There was not a statistically significant difference in awareness of direct pharmacy access between women in Indiana and those in a state with a DPA policy ($\chi^2(1) = 0.839$, p=0.360).

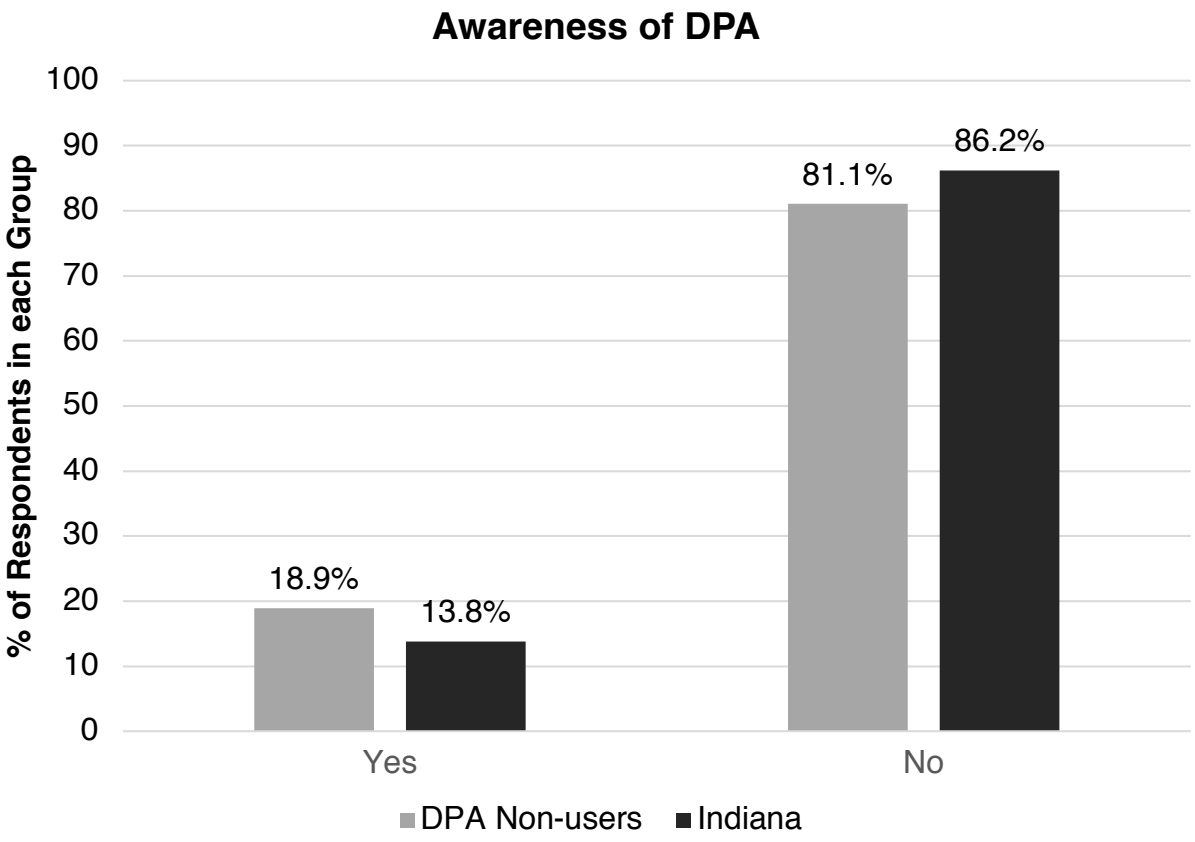

Figure 6. Awareness of Direct Pharmacy Access (DPA) (N=316)

Participants who had never used direct pharmacy access before were asked if they would be interested in using direct pharmacy access in the future. The majority of respondents from DPA-allowing states and Indiana were somewhat (55.6%, n=100, 49.2%, n=32, respectively) or extremely interested (27.2%, n=49, 30.8%, n=20, respectively) (Figure 7). There was not a statistically significant difference in interest in using direct pharmacy access between women in Indiana and those in a state with a DPA policy ($\chi^2(2) = 0.773$, p=0.679).

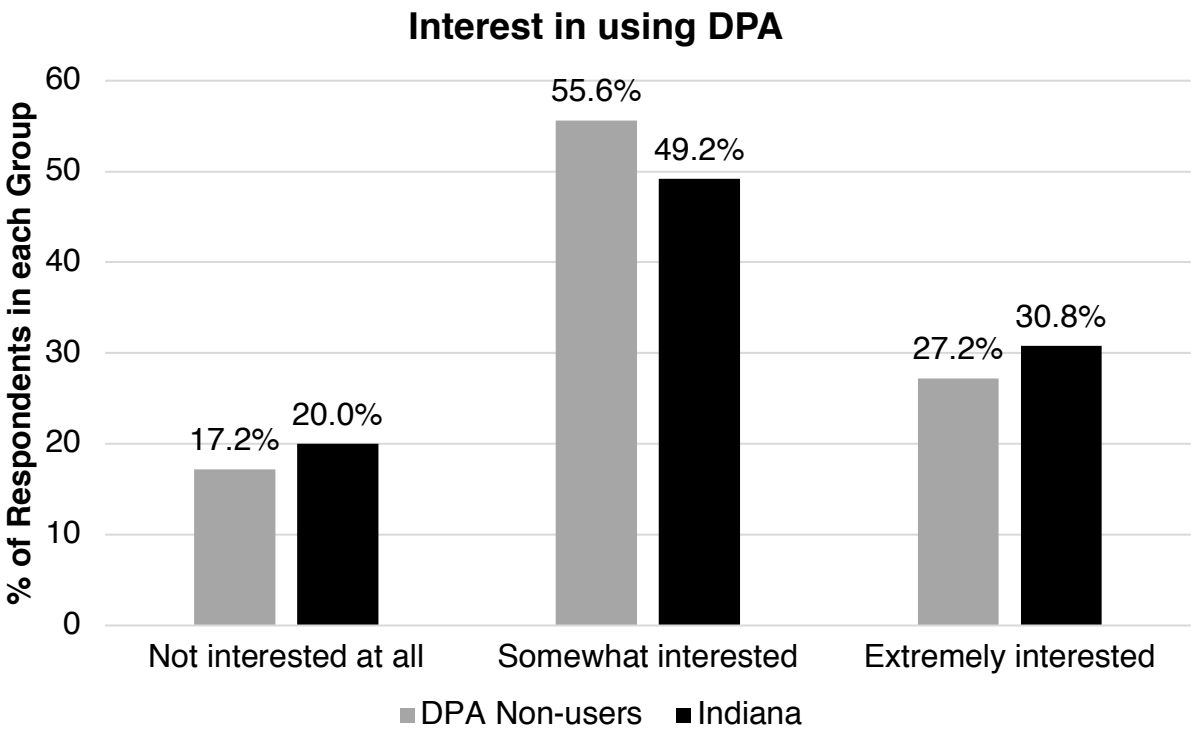

Figure 7. Interest in using Direct Pharmacy Access (DPA) in the future (N=316)

Finally, participants who had never used direct pharmacy access before were asked if they thought that using direct pharmacy access would make obtaining hormonal contraceptives easier. The majority of respondents in states allowing direct pharmacy access and Indiana agreed (36.1%, n=65, 41.5%, n=27, respectively) or strongly agreed (45.6%, n=82, 46.2%, n=30, respectively) that using direct pharmacy access would make it easier to access hormonal contraceptives (Figure 8). There was no evidence for a statistically significant difference in agreement between women in Indiana and women in a state with a DPA policy who have never used DPA (U = 5631.50, p=0.628).

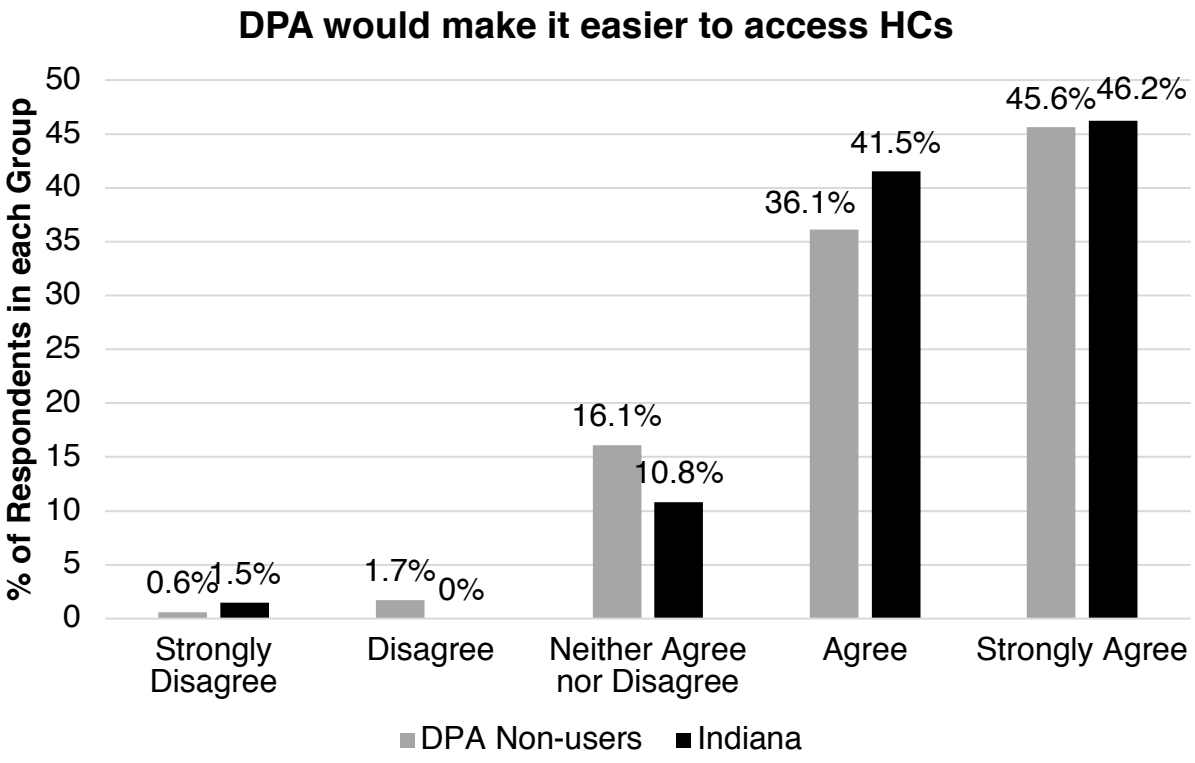

Figure 8. Perceptions of Direct Pharmacy Access (DPA) impact on hormonal contraceptive (HC) access (N=316)

CHAPTER 5. DISCUSSION

Women who used DPA to obtain hormonal contraceptives reported lower levels of access than women who sought hormonal contraceptives from a traditional prescriber. When controlling for participants' age, education, and income level, this finding was consistent across all six dimensions of access: approachability, acceptability, availability and accommodation, affordability, appropriateness, and privacy. Women using DPA reported lower levels of access than women using a traditional method to obtain hormonal contraceptives, regardless of whether the women lived in a state that did not allow DPA, such as Indiana, or a state that did allow DPA. However, the majority women who used DPA reported that DPA made accessing hormonal contraceptives easier. Additionally, the majority of women who did not use DPA reported that they had been unaware of DPA prior to participating in this study but felt DPA would improve access and were interested in using DPA to obtain hormonal contraceptives in the future.

Women in this study who did not use DPA, whether in Indiana or a state that currently allows DPA, consistently reported significantly higher levels of access. Two possible explanations for this phenomenon exist: either DPA worsens access or individuals with lower baseline access are more likely to use DPA. In this discussion, both possibilities will be explored in more depth.

Not all DPA policies are created equal. States place varying restrictions on direct pharmacy access, including the ages served and hormonal contraceptive products offered. In terms of dosage forms that may be prescribed by pharmacists, Oregon is the most restrictive state, allowing only oral contraceptives and transdermal patches to be prescribed (H.R. 2879 2015). Washington and Hawaii are the least restrictive states, with Washington leaving it open to any contraceptive included in collaborative practice agreements (H.B. 2681 2015) and Hawaii including any FDA-approved medication or device (S.B. 513 2017). These limitations may decrease accessibility, particularly for women who prefer a form of hormonal contraceptive that a pharmacist is not legally able to prescribe. Some states have amended their direct pharmacy access policies to include additional forms of hormonal contraceptives that pharmacists may prescribe, so the impact of the policy may also change over time.

In addition, the handling of insurance reimbursement for patient assessment and product dispensation varies between states. Medicaid in Oregon reimburses pharmacists for both product dispensation and assessment of the patient (Anderson 2019); however, other states only require

insurance reimbursement for product dispensation or require no reimbursement at all. In New Mexico and Oregon, it was found that approximately half of all hormonal contraceptives prescribed by pharmacists were for patients without prescription insurance coverage (Rodriguez, Garg, Williams, Souphanavong, Schrote, and Darney 2020). If insurance companies do not cover this service, then patients must shoulder the cost. Since inability to afford contraceptives can pose a significant barrier to access (Landau 2006), the lack of pharmacist reimbursement may attenuate the impact of DPA on access. If DPA worsens access, it is likely a reflection of poor implementation and failure to legislatively enable the sustainability of this service rather than pharmacists' ability to improve women's access to hormonal contraceptives.

The majority of women in this study who have used DPA before reported that DPA made it easier to access contraceptives; this finding casts doubt on the hypothesis that DPA worsens access. In addition, pharmacists in California and Oregon most frequently prescribe and dispense year-long prescriptions for hormonal contraceptives (Lu, Rafie, Hamper, Strauss, and Kroon 2019), which has been shown to improve therapy continuation and therefore access (White and Westhoff 2011). In Oregon, direct pharmacy access of hormonal contraceptives has also been shown to prevent 51 unintended pregnancies and $1.6 million in Medicaid expenditures over a two-year period from 2016 and 2017 (Rodriguez, Hersh, Anderson, Hartung, and Edelman 2019).

An alternative explanation for lower access reported among women using DPA is that women who use DPA may have lower access levels at baseline than women who do not use DPA. Although there were no statistically significant differences in demographics between the three groups, the relatively small sample sizes may have prevented any true differences from being detected. For example, insurance coverage has been shown to be correlated with improved access to health care (Herman, Rissi, and Walsh 2011; Wen, Druss, and Cummings 2015; Cole, Trivedi, Wright, and Carey 2018). Women in this study who had used direct pharmacy access also had the highest proportion with no insurance coverage (15.3% versus 7.6% in the Indiana group and 6.6% in the DPA Nonuser group), which may partially explain their lower levels of reported access.

In addition, women who face the most barriers to accessing contraceptives through traditional methods may be those most likely to seek alternatives, such as DPA. For example, this study found the majority of women in a state allowing DPA who use a traditional method to access contraceptives were unaware of pharmacists' ability to prescribe contraceptives in their state. It follows that women who use DPA and report lower levels of access overall also have a greater

awareness of DPA. In addition, the primary rationale for allowing pharmacists to prescribe hormonal contraceptives was to improve women's access. In other words, the intended target of this policy were women with the lowest levels of access to contraceptives. If women who use DPA have lower levels of access, then it might suggest that the policy is working as intended.

Finally, although women who have used DPA to obtain hormonal contraceptives reported lower levels of access than women using a traditional method, it is possible that women using a traditional method would have experienced even higher levels of access if they had used visited a pharmacist rather than a traditional prescriber. Only 3.5% (n=11) or participants reported the highest level of access for every single item across all six dimensions in the scale; therefore, the other 96.5% of respondents could have experienced better access in some way. To better determine whether women who had never used DPA might experience better access to hormonal contraceptives by utilizing DPA, it would be necessary to measure women's access before using DPA and after using DPA.

The nature of most community pharmacies may include characteristics that are conducive to lowering barriers to access of hormonal contraceptives that may exist when seeking contraceptives from a traditional prescriber. For example, community pharmacies often are open for extended hours, such as evenings, nights, and weekends (Goad, Taitel, Fensterheim, and Cannon 2013), and do not require a patient to schedule an appointment to speak with the pharmacist (CVS pharmacy 2020).

Allowing pharmacists to prescribe hormonal contraceptives may also help to address racial disparities present in the incidence of unintended pregnancies. Gilliam and Hernandez (2007) found that African American teenagers from low-income areas experienced better contraceptive access when providers spent slightly more time with the patients and when providers broached the topic of contraception when patients were being seen for an unrelated visit. Pharmacists in Oregon spend more time discussing contraceptive options with patients than traditional prescribers, with pharmacist-patient interactions taking 26 minutes on average and 89% of physicians in the United States spending less than 25 minutes with patients (Rodriguez, Biel, Swartz, Anderson, and Edelman 2018; Elflein 2019). This may improve contraceptive uptake and adherence (Gilliam and Hernandez 2007).

Additionally, Medicare patients visit their community pharmacy 13 times per year on average as compared to 7 visits per year to their primary care physician (Berenbrok, Gabriel, Coley, and

Hernandez 2020). Although most women seeking hormonal contraceptives are not likely to be Medicare beneficiaries, it is likely that younger women also visit their community pharmacy more frequently than a physician, since 89% of Americans live within five miles of a community pharmacy (National Association of Chain Drug Stores 2015). Therefore, pharmacists may have more opportunities to initiate a discussion about hormonal contraceptive usage. These considerations are important as states such as Oregon expand DPA policies to include young women under 18 years of age.

A sixth factor affecting access to hormonal contraceptives was identified: privacy. The scale items forming the privacy dimension of access were intended to assess appropriateness, but factor analysis revealed the items were better suited to measuring a separate dimension. Previous research has shown that some pharmacists are concerned that community pharmacies may not provide sufficient privacy for prescribing hormonal contraceptives (Beal, Ades, Vernon, Wilkinson, Meredith Forthcoming). Adding private areas to assess patients discuss contraceptive options, such as patient counseling rooms, may help to address any privacy concerns.

When new legislation is considered, the potential impact, both positive and negative, must be weighed. Some legislators are hesitant to make comparisons between their state and other states because they feel that a policy's success in one state may not guarantee success in their state. The success of a policy is dependent on a variety of factors; therefore, it is difficult to make direct comparisons between states. This study attempted to address this concern in two ways: 1) by using several states as a comparison group rather than a single state, and 2) by comparing the outcome (access to hormonal contraceptives) between women using DPA and not using DPA within states allowing DPA as well as between women using DPA and women not using DPA in Indiana.

First, women from all states which had a direct pharmacy access policy at the time of data collection were invited to participate in the study. By combining all states with a direct pharmacy access policy, more similarities between direct pharmacy access states and Indiana are present. This makes the findings more generalizable to Indiana. Secondly, women's access to hormonal contraceptives was assessed among women who had never used direct pharmacy access, despite living in a state that provides direct pharmacy access. Since women who used a traditional method to obtain hormonal contraceptives reported similar levels of access in both Indiana and states with a direct pharmacy access policy, it is likely that women may experience barriers to contraceptive access similarly across states. If barriers are experienced similarly across states, it would also be

likely that interventions designed to address some of these barriers would have a similar impact across states.

This work can inform policy decision-making regarding if and how to implement a direct pharmacy access policy in Indiana. To date, the majority of states which have implemented a direct pharmacy access policy have been religiously and politically similar. Indiana is largely religiously and politically conservative, which might influence the impact of a direct pharmacy access policy. However, the majority of respondents from Indiana felt direct pharmacy access would make accessing hormonal contraceptives easier and were interested in personally using direct pharmacy access. This suggests that direct pharmacy access, with the proper implementation, may help women overcome barriers to accessing hormonal contraceptives.

5.1 Strengths and Limitations

One limitation of this study is the cross-sectional nature of the research design. To better understand the causal relationship between the implementation of a direct pharmacy access policy and women's access to hormonal contraceptives, it would be necessary to collect longitudinal data on the same participants. Another limitation of this study is the variation in the nature of implementation and time since implementation of direct pharmacy access policies in the states included in the study. This source of variation may cloud the true impact of direct pharmacy access policies on women's access to contraceptives.

The sampling strategy used in this study is both a strength and a limitation. A convenience sample, as used in this study, is not as robust as simple random sampling. However, convenience samples can increase the likelihood of obtaining an adequate sample size, particularly when the target population is small or difficult to reach, as was the case for this study. The number of MechanicalTurk Workers entering the survey quickly plateaued and leaving the survey open longer would have been unlikely to result in any meaningful increase in the sample size. The sample size achieved in this study allowed for a preliminary exploration of the impact of direct pharmacy access on womens' access to hormonal contraceptives.

Finally, the use of a theory that more comprehensively assesses barriers to access to care to guide the creation of the perceived access scale is a strength. By analyzing the dimensions of access separately, this study was able to provide a more detailed look into how pharmacists may impact women's access to hormonal contraceptives. The lack of convergence of a single-factor,

second order factor analysis model to describe total access also supports the idea that access is multi-factorial and should not be reduced to a single concept. Women face many barriers before they ultimately receive hormonal contraceptives or not.

5.2 Considerations for Future Scales

Based upon the data collected, several potential areas for improvement for future scale development have been identified. First, a ceiling effect was observed among data for all six subdimensions of access to hormonal contraceptives. Using a visual analogue scale rather than a Likert-type scale (Voutilainen, Pitkaaho, Kvist, and Vehvilainen-Julkunen 2015) or increasing the number of response anchors may reduce the ceiling effect. Secondly, the scale should be validated among other patient populations to see if the same six dimensions identified in this study persist across other samples with differing demographic characteristics. The scale was written to be nonspecific to provider type. In fact, four health care provider types were included in this study: pharmacist, nurse practitioner, physician assistant, and medical doctor. If privacy continues to emerge as a dimension of access, then the original model as proposed by Levesque et al. (2013) may be incomplete, especially in regards to pharmacist-provided services.

5.3 Considerations for Future Research

Due to the heterogeneous nature of the direct pharmacy access policies, future research should draw large enough sample sizes from each state with a direct pharmacy access policy to assess the variations in women's access to hormonal contraceptives. Variations in insurance reimbursement are likely to affect access, regardless of whether the woman receives hormonal contraceptives from a pharmacist or traditional prescriber. Time since implementation also varies widely between states with direct pharmacy access policies. More women in states that have had direct pharmacy access policies for longer may experience the impact of these policies than in states that have more recently implemented direct pharmacy access policies. But even considering time since implementation may oversimplify the explanation for differences in outcomes that may exist between states. Success of implementation of a policy depends on many contextual factors; therefore, the time it takes for a policy to be fully implemented may be only a few months or many years (Nilsen, Stahl, Roback, and Cairney 2013).

Direct pharmacy access may have varying impact on different subpopulations. For example, women in rural areas may be impacted by direct pharmacy access differently than women living in an urban area. Pharmacist-provided services in the community setting have been shown to improve access to care among those living in rural areas for other health services (Ross and Bloodworth 2012), so the same may be seen with access to hormonal contraceptives. Further research should examine the impact of direct pharmacy access on women from different racial or ethnic backgrounds, since racial disparities exist in contraceptive usage in the United States (Dehlendorf, Park, Emeremni, Comer, Vincett, and Borrero 2014). Young women under the age of 18 may also experience different impact on access to contraceptives than women over 18 years of age. Future research should include older teenagers to assess the impact of direct pharmacy access on their access to hormonal contraceptives.

CHAPTER 6. CONCLUSION

Women using direct pharmacy access reported significantly lower levels of access than women who visited a traditional prescriber in Indiana or states allowing direct pharmacy access. This finding was consistent across all six dimensions of access: approachability, acceptability, availability and accommodation, affordability, appropriateness, and privacy. However, the majority of women using direct pharmacy access agreed that direct pharmacy access made accessing hormonal contraceptives easier. In addition, women who did not use direct pharmacy access were largely unaware of the service, but felt it would make accessing hormonal contraceptives easier, and were interested in using direct pharmacy access once they had been introduced to the concept. These findings suggest that few women are aware of direct pharmacy access, and only those with the lowest levels of access are seeking out alternatives to obtain contraceptives, such as direct pharmacy access. Further study into changes in access before and after using direct pharmacy access is warranted.

APPENDIX A. COGNITIVE INTERVIEWS

Pre-test Cognitive Interview Questions

Interview Questions

1. First, were there any questions you were not sure how to answer?
    a. If yes, which ones were those?
    b. If yes, why were you not sure how to answer the question?
2. When the survey mentioned “birth control”, what did you think it meant by that?
3. What questions do you think were not relevant to someone’s access to birth control?
    a. Why?
4. Are there any questions you think that many people would find difficult to answer?
    a. If yes, which ones?
5. Why do you think people would have difficulty with those questions?

REFERENCES

Abdus, Salam, Kamila B. Mistry, and Thomas M. Selden. 2015. Racial and ethnic disparities in services and the Patient Protection and Affordable Care Act. *American Journal of Public Health*,105: S668-S675.

Almeida, Ruth A., Lisa C. Dubay, and Grace Ko. 2001. Access to care and use of health services by low-income women. *Health Care Financing Review*, 22(4):27-47.

Agency for Healthcare Research and Quality (AHRQ). 2002. Access to care measures. Available at: https://archive.ahrq.gov/research/findings/nhqrdr/nhdr02/premeasurea.html. Accessed December 6, 2018.

Amazon Mechanical Turk. 2020. Amazon Mechanical Turk. Available at: https://www.mturk.com/. Accessed January 7, 2020.

Ananat, Elizabeth O. and Daniel M. Hungerman. 2012. The power of the pill for the next generation: oral contraception's effects on fertility, abortion, and maternal and child characteristics. *Review of Economics and Statistics*, 94(1):37–51.

Andersen, Ronald M. 1995. Revisiting the Behavioral Model and access to medical care: Does it matter? *Journal of Health and Social Behavior*, 36:1-10.

Andersen, Ronald M., Pamela L. Davidson, and Sebastian E. Baumeister. 2013. Improving access to care. In *Changing the US Health Care System, 4th ed*. Gerald F. Kominski, 33-69. San Francisco, CA: Jossey-Bass.

Archambault, Judith, Dominique Cote, and Marie-France Raynault. 2019. Early childhood education and care access for children from disadvantaged backgrounds: Using a framework to guide intervention. Early Childhood Education Journal, doi: 10.1007/s10643-019-01002-x

Asbell, Bernard. 1995. The Pill: A Biography of the Drug That Changed the World. New York, NY: Random House.

Augustine, Little Flower et al. 2012. Psychometric validation of a knowledge questionnaire on micronutrients among adolescents and its relationship to micronutrient status of 15-19-year-old boys, Hyderabad, India. *Public Health Nutrition*, 15(7):1182-1189.

Ayre, Colin and Andrew John Scally. 2014. Critical values for Lawshe's content validity ratio: Revisiting the original methods of calculation. *Measurement and Evaluation in Counseling and Development*, 47(1):79-86.

Baer Law. 2018. Colorado pharmacists prescribing contraceptives under a new statewide protocol. Available at: https://baerlaw.com/colorado-pharmacists-prescribing-oral-contraceptives-statewide-protocol/?doing_wp_cron=1544124325.4067120552062988281250. Accessed December 6, 2018.

Bailey, Martha J. 2006. More power to the pill: The impact of contraceptive freedom on women's life cycle labor supply. *Quarterly Journal of Economics*, 121(1):289–320.

Bailey, Martha J., Melanie Guldi, Allison Davido, and Erin Buzuvis. 2011. Early legal access: Laws and policies governing contraceptive access, 1960-1980. [Working paper]. University of Michigan. Available at: www-personal.umich.edu/~baileymj/ELA_laws.pdf. Accessed December 6, 2018.

Bashshur, Rashid L., Gary W. Shannon, and Charles A. Metzner. 1971. Some ecological differentials in the use of medical services. *Health Services Research*, 6(1):61-75.

Batra, Priya, Sally Rafie, Zhiwei Zhang, Amay V. Singh, Chloe E. Bird, Aparna Sridhar, and J. Greer Sullivan. 2018. An evaluation of the implementation of pharmacist-prescribed hormonal contraceptives in California. *Obstetrics and Gynecology*, 131(5):850-855.

Beal, Jenny L., Ryan Ades, Veronica Vernon, Tracey A. Wilkinson, and Ashley H. Meredith. Forthcoming. Pharmacists' perceptions, barriers, and potential solutions to implementing a direct pharmacy access policy in Indiana. Medical Care Research and Review, In-Press

Becker, Nora V. 2018. The impact of insurance coverage on utilization of prescription contraceptives: Evidence from the Affordable Care Act. *Journal of Policy Analysis and Management*, 37(3):571-601.

Berenbrok, Lucas A., Nico Gabriel, Kim C. Coley, and Inmaculada Hernandez. 2020. Evaluation of frequency of encounters with primacy care physicians vs visits to community pharmacies among Medicare beneficiaries. *Journal of the American Medical Association Network Open*, 3(7):1-9.

Berg, Cynthia J., Andrea P. MacKay, Cheng Qin, and William M. Callaghan. 2009. Overview of maternal morbidity during hospitalization for labor and delivery in the United States. *Obstetrics and Gynecology*, 113:1075-1081.

Berg Cynthia J., William M. Callaghan, Carla Syverson, and Zsakeba Henderson. 2010. Pregnancy-related mortality in the United States, 1998 to 2005. *Obstetrics and Gynecology*, 116(6):1302-1309.

Blair, Johnny, Ronald F. Czaja, and Edward A. Blair. 2014. *Designing Surveys: A Guide to Decisions and Procedures, 3rd ed*. Thousand Oaks, CA: Sage Publishers.

Boateng, Godfred O., Torsten B. Neilands, Edward A. Frongillo, Hugo R. Melgar-Quinonez, and Sera L. Young. 2018. Best practices for developing and validating sclaes for health, social, and behavioral research: A primer. *Frontiers in Public Health*, 6(149) Article 149:1-18.

Brown, Timothy A. 2015. *Confirmatory Factor Analysis for Applied Research*. 2nd ed. The Guilford Press, New York, NY.

Burleigh, Tyler, Ryan Kennedy, & Scott Clifford. 2018. How to screen out VPS and international respondents using Qualtrics: A protocol. Available at: https://ssrn.com/abstract=3265459. Accessed January 10, 2020.

Burwell v. Hobby Lobby Stores, Inc. 573 U.S. _ (2014).

Chapter Ph 2400. (2019). Pharmacist initiation and dispensing of hormonal contraceptives. Available at: https://www.oplc.nh.gov/pharmacy/documents/ph2400-20190821.pdf. Accessed January 11, 2020.

CloudResearch. 2020. Understanding geolocation and their connection to data quality. Available at: https://www.cloudresearch.com/resources/blog/understanding-geolocations-and-their-connection-to-data-quality/. Accessed March 18, 2020.

Code of the District of Columbia. 2020. § 3–1202.08. Board of Pharmacy and Advisory Committee on Clinical Laboratory Practitioners. Available at: https://code.dccouncil.us/dc/council/code/sections/3-1202.08.html. Accessed January 11, 2020.

Cole, Megan B., Amal N. Trivedi, Brad Wright, and Kathleen Carey. 2018. Health insurance coverage and access to care for community health center patients: Evidence following the Affordable Care Act. Journal of General Internal Medicine, 33(9):1444-1446.

Comstock Law of 1871. 42nd Cong. Sess. III, Chp. 258, p. 598-600.

Cook, Elizabeth A., Karen B. Farris, Elizabeth Chrischilles, and Mary Aquilino. 2012. Relationship between availability of contraceptive products and pharmacists as information sources. *Journal of the American Pharmacists Association*, 52:342-348.

Culyer, A.J. and Adam Wagstaff. 1993. Equity and equality in health and health care. *Journal of Health Economics*, 12:431-457.

CVS pharmacy. Get birth control prescribed and filled on your schedule. Available at: https://www.cvs.com/content/pharmacy/womens-health/faq. Accessed July 24, 2020.

Daniels, Kimberly, Jo Jones, and Joyce C. Abma. 2013. Use of emergency contraception among women aged 15-44: United States, 2006-2010. *National Center for Health Statistics Data Brief*, 112:1-8.

Daniels, Kimberly, William D. Mosher, and Jo Jones. 2013. Contraceptive methods women have ever used: United States, 1982-2010. *National Health Statistics Reports*, 62:1-16.

Dehlendorf, Christine, Seo Young Park, Chetachi A. Emeremni, Diane Comer, Kathryn Vincett, and Sonya Borrero. 2014. Racial/ethnic disparities in contraceptive use: variation by age and women's reproductive experiences. *American Journal of Obstetrics and Gynecology, 210*(6):e526-529.

Deja, Erin N. and Joseph L. Fink III. November 16, 2016. Pharmacists prescribing birth control: Improving access and advancing the profession. Pharmacy Times. Available at: https://www.pharmacytimes.com/publications/issue/2016/november2016/pharmacists-prescribing-birth-control-improving-access-and-advancing-the-profession. Accessed December 6, 2018.

Dennis, Sean A., Brian M. Goodson, & Chris Pearson. 2019. Online worker fraud and evolving threats to the integrity of MTurk data: A discussion of virtual private servers and limitations of IP-based screening procedures. Behavioral Research in Accounting. Forthcoming. https://dx.doi.org/10.2139/ssrn.3233954.

DiStefano, Christine, Min Zhu, and Diana Mindrila. 2009. Understanding and using factor scores: Considerations for the applied researcher. *Practical Assessment, Research, and Evaluation*, 14(20):1-11.

Devlieger, Ines, Axel Mayer, and Yves Rosseel. 2016. Hypothesis testing using factor score regression: A comparison of four methods. *Educational and Psychological Measurement*, 76(5):741-770.

Dhont, Marc. 2011. Non-contraceptive benefits of oral contraceptives. *Open Access Journal of Contraception*, 2:119-126.

Dimensions.ai. Patient-centred access to health care: conceptualising access at the interface of health systems and populations. Available at: https://badge.dimensions.ai/details/id/pub.1000501862/categories. Accessed November 27, 2018.

Doonan, Michael. 2013. American Federalism in Practice: The Formulation and Implementation of Contemporary Health Policy. Washington, D.C: Brookings Institution Press.

Dutton, Diana. 1986. Financial, organizational and professional factors affecting health care utilization. *Social Science and Medicine*, 23:721-735.

Eisenstadt v. Baird. 405 U.S. 438 (1972).

Elflein J. 2019. Amount of time U.S. primary care physicians spent with each patient as of 2018. Available at: https://www.statista.com/statistics/250219/us-physicians-opinion-about-their-compensation/. Accessed July 25, 2020.

Etonogestrel. *Micromedex Solutions*. Truven Health Analytics, Inc. Ann Arbor, MI. Available at: http://www.micromedexsolutions.com. Accessed October 24, 2018.

Finer, Lawrence B. and Mia R. Zolna. 2014. Shifts in intended and unintended pregnancies in the United States, 2001-2008. *American Journal of Public Health*, 104(Suppl 1):S43-S48.

Finer, Lawrence B. and Mia R. Zolna. 2016. Declines in unintended pregnancy in the United States, 2008-2011. *The New England Journal of Medicine*, 374:843-852.

Firth, Jamie, Liz Hamel, and Mollyann Brodie. 2014. Data note: Differences in public opinion on the ACA's contraceptive coverage requirement, by gender, religion, and political party. *Kaiser Family Foundation*. Available at: https://www.kff.org/womens-health-policy/poll-finding/data-note-differences-in-public-opinion-on-the-acas-contraceptive-coverage-requirement-by-gender-religion-and-political-party/. Accessed December 6, 2018.

Foster, Diana G., Ram Parvataneni, Heike Thiel de Bocanegra, Carrie Lewis, Mary Bradsberry, and Philip Darney. 2006. Number of oral contraceptive pill packages dispensed, method continuation, and costs. *American College of Obstetricians and Gynecologists*, 108(5):1107-1114.

Frost, Jennifer J., Lori Frohwirth, and Mia R. Zolna. 2016. Contraceptive needs and services, 2014 update. Guttmacher Institute. Available at: https://www.guttmacher.org/sites/default/files/report_pdf/contraceptive-needs-and-services-2014_1.pdf. Accessed December 6, 2018.

Gardner, Jacqueline S., Leslie Miller, Donald F. Downing, Stephanie Le, David Blough, and Solmaz Shotorbani. 2008. Pharmacist prescribing of hormonal contraceptives: Results of the Direct Access study. *Journal of the American Pharmacists Association*. 48(2):212-221.

Gilliam, Melissa L. and Maida Hernandez. 2007. Providing contraceptive care to low-income, African American teens: The experience of urban community health centers. *Journal of Community Health*. 32(4):231-244.

Glied, Sherry and Adlan Jackson. 2017. The future of the Affordable Care Act and insurance coverage. *The American Journal of Public Health*, 107(4):538-540.

Goad, Jeffery A., Michael S. Taitel, Leonard E. Fensterheim, and Adam E. Cannon. 2013. Vaccinations administered during off-clinic hours at a national community pharmacy: Implications for increasing patient access and convenience. *Annals of Family Medicine*, 11(5):429-436.

Goldin, Claudia and Lawrence F. Katz. 2002. The power of the pill: oral contraceptives and women's career and marriage decisions. *Journal of Political Economy*, 110(4):730–770.

Griswold v. Connecticut. 381 U.S. 479 (1965).

Grogan, Sarah, Mark Conner, David Willits, and Paul Norman. 1995. Development of a questionnaire to measure patients' satisfaction and general practitioners' services. *British Journal of General Practice*, 45:525-529.

Hall, Kelli Stidham, Caroline Moreau, and James Trussell. 2012. Determinants of and disparities in reproductive health service use among adolescent and young adult women in the United States, 2002-2008. *American Journal of Public Health*, 102:359-367.

H.B. 182, 1st Session of the 65th Legislature. (2019) (enacted). Available at: https://legislature.idaho.gov/wp-content/uploads/sessioninfo/2019/legislation/H0182.pdf. Accessed July 13, 2020.

H.B. 2583, 2nd Session of the 84th Legislature. (2019) (enacted). Available at: http://www.wvlegislature.gov/Bill_Status/bills_text.cfm?billdoc=hb2583%20intr.htm&yr=2019&sesstype=RS&i=2583. Accessed January 11, 2020.

H.B. 2681, 64th Cong. (2015) (enacted). Available at: http://lawfilesext.leg.wa.gov/biennium/2015-16/Pdf/Bills/House%20Passed%20Legislature/2681-S2.PL.pdf. Accessed December 6, 2018.

HealthCare.gov. Affordable Care Act (ACA). Available at: https://www.healthcare.gov/glossary/affordable-care-act/. Accessed October 18, 2018.

Health Resources and Services Administration. 2017. Women's preventive services guidelines. Available at: https://www.hrsa.gov/womens-guidelines-2016/index.html#guidelines%20concerning. Accessed October 21, 2018.

Herman, Patricia M., Jill J. Rissi, and Michele Walsh. 2011. Health insurance status, medical debt, and their impact on access to care in Arizona. *American Journal of Public Health, 101*(8):1437-1443.

HeyDoctor. Available at: https://www.heydoctor.co. Accessed October 27, 2018.

Hilverding, Austin T. and Natalie A. DiPietro Mager. 2017. Pharmacists' attitudes regarding provision of sexual and reproductive health services. *Journal of the American Pharmacists Association*, 57:493-497.

Hock, H. 2008. The pill and the college attainment of American women and men, [Working Paper], Washington, DC: Mathematica Policy Research.

Hoj, Stine Bordier, Brendan Jacka, Nanor Minoyan, Andreea Adelina Artenie, Julie Bruneau. 2019. Conceptualising access in the direct-acting antiviral era: An integrated framework to inform research and practice in HCV care for people who inject drugs. *International Journal of Drug Policy*, 72:11-23.

H.R. 2879, 78th Cong. (2015) (enacted). Available at: https://olis.leg.state.or.us/liz/2015R1/Downloads/MeasureDocument/HB2879/Enrolled. Accessed November 26, 2018.

H.R. 613. (2017) (enacted). Available at: http://mgaleg.maryland.gov/2017RS/bills/hb/hb0613e.pdf. Accessed December 6, 2018.

Hu, Li-tze and Peter M. Bentler. 2009. Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. Structural Equation Modeling: A Multidisciplinary Journal, 6;1:1-55.

Irwin, Adriane N., Olivia C. Stewart, Viet Q. Nguyen, and Andrew S. Bzowyckyj. 2018. Public perception of pharmacist-prescribed self-administered non-emergency hormonal contraception: An analysis of social media comments. [IN PRESS].

Johnson, Kay et al. 2006. Recommendations to improve preconception health and health care: A report of the CDC/ATSDR preconception care work group and the select panel on preconception care. *Morbidity and Mortality Weekly Report*, 55(RR06):1-23.

Kaiser Family Foundation. 2016. Uninsured rate among the nonelderly population, 1972-2016. Menlo Park, CA.

Kaiser Family Foundation. 2018. State requirements for insurance coverage of contraceptives. Menlo Park, CA.

Kaskowitz, Alexa P., Nichole Carlson, Mark Nichols, Alison Edelman, and Jeffrey Jensen. 2007. Online availability of hormonal contraceptives without a health care examination: effect of knowledge and health care screening. *Contraception*, 76:273-277.

Kavanaugh, Megan L. and Jenna Jerman. 2018. Contraceptive method use in the United States: trends and characteristics between 2008, 2012 and 2014. *Contraception*, 97:14-21.

Kost, Kathryn. 2015. Unintended pregnancy rates at the state level: Estimates for 2010 and trends since 2002. Guttmacher Institute.
Available at: https://www.guttmacher.org/sites/default/files/report_pdf/stateup10.pdf.

Laerd Statistics. 2017. Binomial logistic regression using SPSS Statistics. Statistical tutorials and software guides. Available at: https://statistics.laerd.com/.

Landau, Sharon C., Molly Parker Tapias, and Belle Taylor McGhee. 2006. Birth control in reach: A national survey on women's attitudes toward and interest in pharmacy access to hormonal contraception. *Contraception*, 74:463-470.

Landau, Sharon C., Kathleen Besinque, Frances Chung, Ingrid Dries-Daffner, and Nicole Monastersky Maderes. 2009. Pharmacist interest in and attitudes toward direct pharmacy access to hormonal contraception in the United States. *Journal of the American Pharmacists Association*, 49:43-50.

Late, Michele. 2014. Burwell nominated to succeed Sebelius as next HHS secretary. *The Nation's Health*, 44(5):7.

Lauver, Diane. 1992. A theory of care-seeking behavior. *Journal of Nursing Scholarship*, 24(4):281-287.

Layman, Geoffrey C. 1997. Religion and political behavior in the United States: The impact of beliefs, affiliations, and commitment from 1980 to 1994. *American Association for Public Opinion Research*, 61(2):288-316.

Lemonaid Health. Available at: https://www.lemonaidhealth.com. Accessed October 27, 2018.

Leonard, Kimberly. 2015. After Hobby Lobby, a way to cover birth control. U.S. News and World Report. Available at: https://www.usnews.com/news/articles/2015/07/10/after-hobby-lobby-ruling-hhs-announces-birth-control-workaround. Accessed October 21, 2018.

Lessard LN, Karasek D, Ma S, et al. Contraceptive features preferred by women at high risk of unintended pregnancy. Perspectives on Sexual and Reproductive Health. 2012;44(3):194-200.

Levesque, Jean-Frederic, Mark F. Harris, and Grant Russell. 2013. Patient-centred access to health care: Conceptualising access at the interface of health systems and populations. *International Journal for Equity in Health*, 12:1-18.

Levonorgestrel. *Micromedex Solutions*. Truven Health Analytics, Inc. Ann Arbor, MI. Available at: http://www.micromedexsolutions.com. Accessed October 24, 2018.

Liang, Bryan A., Tim K. Mackey, and Kimberly M. Lovett. 2012. Suspect online sellers and contraceptive access. *Contraception*, 86:551-556.

Loughran, David S. and Julie M. Zissimopoulos. 2009. Why wait? The effect of marriage and childbearing on the wages of men and women. *Journal of Human Resources*, 44(2):326–349.

Lu, Sunny, Sally Rafie, Jeffrey Hamper, Rebecca Strauss, and Lisa Kroon. 2019. Characterizing pharmacist-prescribed hormonal contraception services. *Contraception, 99*:239-243.

Margolis, Peter A., Timothy Carey, Carole M. Lannon, Joanne L. Earp, Linda Leininger. 1995. The rest of the access-to-care puzzle: Addressing structural and personal barriers to health care for socially disadvantaged children. *Archives of Pediatrics and Adolescent Medicine*, 149:541-545.

Matherly, Ted. 2018. A panel for lemons? Positivity bias, reputation systems and data quality on MTurk. European Journal of Marketing, 53(2):195-223.

Matthews, Anne et al. 2019. The demand and supply side determinants of acces to maternal, newborn and child health services in Malawi. *Maternal and Child Health Journal*, 23:1556-1563.

Maven Clinic. Available at: https://www.mavenclinic.com. Accessed October 27, 2018.

Michals, Debra. 2017. *Margaret Sanger*. National Women's History Museum, 2017. Available at: https://www.womenshistory.org/education-resources/biographies/margaret-sanger. Accessed October 18, 2018.

Mooney, G.H. 1983. Equity in health care: confronting the confusion. *Effective Health Care*, 1(4):179-185.

Mortensen, Karoline H. and Taylor L. Hughes. 2018. Comparing Amazon's MechanicalTurk platform to conventional data collection methods in health and medical research literature. *Journal of General Internal Medicine*, 33(4):533-538.

National Alliance of State Pharmacy Associations (NASPA). Pharmacists authorized to prescribe birth control in more states. 05.04.2017. Available at: https://naspa.us/2017/05/pharmacists-authorized-prescribe-birth-control-states/. Accessed October 28, 2018.

National Association of Chain Drug Stores (NACDS). 2015. Improve patients' access to pharmacist services. Available at: http://www.nacds.org/pdfs/government/ProviderStatus_Issue_Brief.pdf. Accessed July 24, 2020.

Newkirk, Vann R. 2017. Trump reverses Obama rule on birth control. *The Atlantic*. Available at: https://www.theatlantic.com/politics/archive/2017/10/the-trump-administration-dismantles-the-contraceptive-mandate/542298/. Accessed October 21, 2018.

New Mexico Protocol for Pharmacist Prescription of Hormonal Contraceptives. 2016. Available at: http://www.rld.state.nm.us/uploads/files/OCConfirmedFinalJune2016.pdf. Accessed December 6, 2018.

Nieveen, Janet L., Lani M. Zimmerman, Susan A. Barnason, Bernice C. Yates. 2008. Development and content validity testing of the Cardiac Symptom Survey in patients after coronary artery bypass grafting. *The Journal of Acute and Critical Care*, 37(1):17-27.

Nilsen, Per, Christian Stahl, Kerstin Roback, and Paul Cairney. 2013. Never the twain shall meet? A comparison of implementation science and policy implementation research. *Implementation Science*, 8(63):1-12.

Nurx. Available at: https://www.nurx.com Accessed October 27, 2018.

Office of the Federal Register. 2017. Religious exemptions and accommodations for coverage of certain preventive services under the Affordable Care Act. Available at: https://www.federalregister.gov/d/2017-21851. Accessed October 21, 2018.

Oregon Board of Pharmacy. Oregon pharmacists prescribing of contraceptive therapy. Available at: https://www.oregon.gov/pharmacy/pages/contraceptiveprescribing.aspx. Accessed November 26, 2018.

Pandia Health. Available at: https://www.pandiahealth.com. Accessed October 27, 2018.

Pazol, Karen et al. 2018. Contraceptive use among women at risk for unintended pregancy in the context of public health emergencies – United States, 2016. *Morbidity and Mortality Weekly Report*, 67(32):898-902.

Pedreira, Rhaine Borges Santos, Saulo Vasconcelos Rocha, Clarice Alves dos Santos, Lelia Renata Carneiro Vasconcelos, and Martha Cerqueira Reis. 2016. Content validity of the Geriatric Health Assessment instrument. *Einstein Sao Paulo*, 14(2):158-177.

Peters, David H., Anu Garg, Gerry Bloom, Damian G. Walker, William R. Breiger, M. Hafizur Rahman. 2007. Poverty and access to health care in developing countries. *Annals of the New York Academy of Sciences*, 1136:161-171.

Peterson, Christina Hamme, N. Andrew Peterson, and Kristen Gilmore Powell. 2017. Cognitive interviewing for item development: Validity evidence based on content and response processes. *Measurement and Evaluation in Counseling and Development*, 50(4):217-223.

Pew Research Center. Religious Landscape Study. 2018. Available at: www.pewforum.org. Accessed December 5, 2018.

Pew Research Center. Party affiliation by state. 2014. Available at: www.pewforum.org. Accessed December 5, 2018.

Planned Parenthood. Our history. 2018. Available at: https://www.plannedparenthood.org/about-us/who-we-are/our-history. Accessed October 18, 2018.

Planned Parenthood Direct. Available at: https://www.plannedparenthooddirect.org. Accessed October 27, 2018.

PlushCare. Available at: https://www.plushcare.com. Accessed October 27, 2018.

Potter, Joseph E., Sarah McKinnon, Kristine Hopkins, Jon Amastae, Michele G. Shedlin, Daniel A. Powers, and Daniel Grossman. 2011. Continuation of prescribed compared with over-the-counter oral contraceptives. *Obstetrics and Gynecology*, 117(3):551-557.

Priest, Kelsey C., Honora Englander, Dennis McCarty. 2020. "Now hospital leaders are paying attention": A qualitative study of internal and external factors influencing addition consult services. *Journal of Substance Abuse Treatment*, 110:59-65.

Prjkt Ruby. Available at: https://www.prjktruby.com. Accessed October 27, 2018.

Rafie, Sally, Megan Haycock, Samantha Rafie, Sophia Yen, and Cynthia C. Harper. 2012. Direct pharmacy access to hormonal contraception: California physician and advanced practice clinician views. *Contraception*, 86:687-693.

Rafie, Sally, and Shareen Y. El-Ibiary. 2011. Student pharmacist perspectives on providing pharmacy-access hormonal contraception services. *Journal of the American Pharmacists Association*, 51(6):762-765.

Rafie, Sally and Sharon Landau. 2019. Opening new doors to birth control: State efforts to expand access to contraception in community pharmacies. Available at: https://birthcontrolpharmacist.com/.

Ramsay, Jean, John L. Campbell, Sara Schroter, Judith Green, and Martin Roland. 2000. The General Practice Assessment Survey (GPAS): Tests of data quality and measurement properties. *Family Practice*, 17(5):372-379.

Raviele, Kathleen M. 2015. Levonorgestrel "emergency contraception" how does it work? *Issues in Law and Medicine*, 30(2):237-240.

Rice, Whitney S. et al. 2019. Accessing Pre-exposure Prophylaxis (PrEP): Perceptions of current and potential PrEP users in Brimingham, Alabama. *AIDS and Behavior*, 23:2966-2979. Charlotte, NC: Information Age Publishing, Inc.

Rindskopf, David and Patrick E. Shrout. 2019. Chapter 6: Logistic regression with floor and ceiling effects: Fixed and random effects models, in *Advances in Latent Class Analysis*, pg 147-166.

Rodriguez, Maria I., Bharti Garg, Shannon M. Williams, Jessica Souphanavong, Kaitlin Schrote, and Blair G. Darney. 2020. Availability of pharmacist prescription of contraception in rural areas of Oregon and New Mexico. *Contraception, 101*(3):210-212.

Rodriguez, Maria I., Alyssa Hersh, Lorinda B. Anderson, Daniel M. Hartung, and Alison B. Edelman. 2019. Association of pharmacist prescription of hormonal contraception with unintended pregnancies and Medicaid costs. *Contraception, 133*(6):1238-1246.

Rodriguez, Maria I., Frances M. Biel, Jonas J. Swartz, Lorinda Anderson, and Alison B. Edelman. 2018. Pharmacists' experience with prescribing hormonal contraception in Oregon. *Journal of the American Pharmacists Association*, *58*(6):608-613.

Ross, John and Karen Hardee. 2013. Access to contraceptive methods and prevalence of use. *Journal of Biosocial Science*, 45:761-788.

Ross, Leigh Ann and Lauren S. Bloodworth. 2012. Patient-centered health care using pharmacist-delivered medication therapy management in rural Mississippi. *Journal of the American Pharmacists Association, 52*(6):802-809.

Salkever, David S. 1976. Accessibility and the demand for preventive care. *Social Science and Medicine*, 10:469-475.

Satorra, Albert and Pete M. Bentler. 1994. Corrections to test statistics and standard errors in covariance structure analysis. In *Latent variables analysis: Applications for developmental research*. 399-419. SAGE Publications, Inc.

Schindler, A.E. 2013. Non-contraceptive benefits of oral hormonal contraceptives. *International Journal of Endocrinology and Metabolism*, 11(1):41-47.

Schmidt, Samantha. October 19, 2018. Trump administration set to expand religious exemptions to birth control coverage. The Washington Post. Available at: https://www.washingtonpost.com/religion/2018/10/19/trump-administration-set-expand-religious-exemptions-birth-control-coverage/?noredirect=on&utm_term=.b2cb44604f38. Accessed October 21, 2018.

Seavey, John W., Semra A. Aytur, and Robert J. McGrath. 2014. *Health Policy Analysis: Framework and Tools for Success*. New York, NY: Springer Publishing Company.

S.B. 184. (2018). (enacted). Available at: https://le.utah.gov/~2018/bills/static/SB0184.html. Accessed December 6, 2018.

S.B. 513. 29th Cong. (2017). (enacted). Available at: https://www.capitol.hawaii.gov/session2017/bills/SB513_CD1_.HTM. Accessed November 26, 2018.

S.B. 999. (2016). (enacted). Available at: https://leginfo.legislature.ca.gov/faces/billVotesClient.xhtml?bill_id=201520160SB999. Accessed December 6, 2018.

S.B. 1677. 109th Cong. (2016) (enacted). Available at: https://legiscan.com/TN/bill/SB1677/2015. Accessed December 6, 2018.

Sheehan, Kim Bartel. 2017. Crowdsourcing research: Data collection with Amazon's Mechanical Turk. *Communication Monographs*, 85(1):140-156.

Shengelia, Bakhuti, Christopher J.L. Murray, and Orvill B. Adams. 2003. Beyond access and Utilization: Defining and Measuring Health System Coverage. In *Health Systems Performance Assessment: Debates, Methods, and Empiricism*. Paul Di Filippo, 221-231. 2003. Proquest Ebook Central.

Shotorbani, Solmaz, Leslie Miller, David K. Blough, and Jacqueline Gardner. 2006. Agreement between women's and providers' assessment of hormonal contraceptive risk factors. *Contraception*, 73:501-506.

Smoley, Brian A. and Christa M. Robinson. 2012. Natural family planning. *American Family Physician*, 86(10):924-928.

Sobel, Laurie, Alina Salganicoff, and Ivette Gomez. 2018. State and federal contraceptive coverage requirements: Implications for women and employers. Kaiser Family Foundation. Available at: https://www.kff.org/womens-health-policy/issue-brief/state-and-federal-contraceptive-coverage-requirements-implications-for-women-and-employers/. Accessed October 21, 2018.

Sonfield, Adam, and Rachel Benson Gold. 2012. Public funding for family planning, sterilization and abortion services, FY 1980-2010. New York: Guttmacher Institute. Available at: https://www.guttmacher.org/sites/default/files/report_pdf/public-funding-fp-2010.pdf. Accessed December 6, 2018.

Sonfield, Adam, Kinsey Hasstedt, and Rachel Benson Gold. 2014. Moving forward: Family planning in the era of health reform. Guttmacher Institute. Available at: https://www.guttmacher.org/sites/default/files/report_pdf/family-planning-and-health-reform.pdf. Accessed December 6, 2018.

Sonfield, Adam and Kathryn Kost. 2015. Public Costs from Unintended Pregnancies and the Role of Public Insurance Programs in Paying for Pregnancy-Related Care: National and State Estimates for 2010, New York: Guttmacher Institute. Available at: http://www.guttmacher.org/pubs/public-costs-of-UP-2010.pdf. Accessed December 6, 2018.

Spector, Paul E. 1992. *Summated Rating Scale Construction: An Introduction*. Newbury Park, CA:Sage Publications.

Speidel, J. Joseph, Corinne H. Rocca, Kristen M.J. Thompson, and Cynthia C. Harper. 2013. Pregnancy: Not a disease but still a health risk. *Contraception*, 88:481-484.

StataCorp. 2019. *Stata Statistical Software: Release 16*. College Station, TX: StataCorp LLC.

Stevens, J.P. (1992). Applied multivariate statistics for the social sciences (2nd ed.). Hillsdale, NJ: Erlbaum.

Stewart, Derek and Susan Klein. 2014. The use of theory in research. *International Journal of Clinical Pharmacy*, 38:615-619.

Tabachnick, Barbara G. and Linda S. Fidell. 2007. *Using multivariate statistics* (5th ed.) Upper Saddle River, NJ: Pearson Allyn & Bacon.

Terwee, Caroline B., Sandra D.M. Bot, Michael R. de Boer, Danielle A.W.M. van der Windt, Dirk L. Knol, Joost Dekker, Lex M. Bouter, Henrica C.W. de Vet. 2007. Quality criteria were proposed for measurement properties of health status questionnaires. *Journal of Clinical Epidemiology*, 60:34-42.

The Pill Club. Available at: https://www.thepillclub.com. Accessed October 27, 2018.

Trussell, James, Elizabeth G. Raymond, and Kelly Cleland. 2014. Emergency contraception: A last chance to prevent unintended pregnancy. *Contemporary Readings in Law and Social Justice*, 6(2):7-38.

Tucker, Ledyard R. 1971. Relations of factor score estimates to their use. *Psychometrika*, 36:427-436.

Ulipristal acetate. *Micromedex Solutions*. Truven Health Analytics, Inc. Ann Arbor, MI. Available at: http://www.micromedexsolutions.com. Accessed October 24, 2018.

Upadhya, Krishna K., Anne E. Burke, Arik V. Marcell, Kamila Mistry, and Tina L. Cheng. 2015. Contraceptive service needs of women with young children presenting for pediatric care. *Contraception*, 92:508-512.

Virtuwell. Available at: https://www.virtuwell.com. Accessed October 27, 2018.

Voutilainen, Ari, Taina Pitkaaho, Tarja Kvist, and Katri Vehvilainen-Julkunen. 2015. How to ask about patient satisfaction? The visual analogue scale is less vulnerable to confounding factors and ceiling effect than a symmetric Likert scale. *Journal of Advanced Nursing*, 72(4):946-957.

Walters, Kelly, Dimitri A. Christakis, and Davene R. Wright. 2018. Are Mechanical Turk worker samples representative of health status and health behaviors in the US? *PLOS One*, 13(6):1-10.

Waters, Hugh R. 2000. Measuring equity in access to health care. *Social Science and Medicine*, 51:599-612.

Wehby, George L. and Wei Lyu. 2018. The impact of the ACA Medicaid expansions on health insurance coverage through 2015 and coverage disparities by age, race/ethnicity, and gender. *Health Services Research*. DOI: 10.1111/1475-6773.12711.

Wen, Hefei, Benjamin G. Druss, and Janet R. Cummings. 2015. Effect of Medicaid expansions on health insurance coverage and access to care among low-income adults with behavioral health conditions. *Health Services Research, 50*(6):1787-1809.

White, Katharine O'Connell and Carolyn Westhoff. 2011. The effect of pack supply on oral contraceptive pill continuation: A randomized control trial. *Obstetrics and Gynecology*, 118(3):615-622.

Wilkinson, Tracey A., Courtney Miller, Samantha Rafie, Sharen Cohen Landau, and Sally Rafie. 2018. Older teen attitudes toward birth control access in pharmacies: A qualitative study. *Contraception*, 97:249-255.

Wolf, Richard. December 21, 2017. Second federal judge blocks Trump contraception rule. USA Today. Available at: https://www.usatoday.com/story/news/politics/2017/12/21/second-federal-judge-blocks-trump-contraception-rule/974820001/. Accessed October 21, 2018.

Zajacova, Anna and Elizabeth M. Lawrence. 2018. The relationship between education and health: Reducing disparities through a contextual approach. *Annual Review of Public Health*, 39:273-289.

Zamanzadeh, Vahid, Akram Ghahramanian, Maryam Rassouli, Abbas Abbaszadeh, Hamid Alavi-Majd, Ali-Reza Nikanfar. 2015. Design and implementation content validity study: Development of an instrument for measuring Patient-Centered Communication. *Journal of Caring Sciences*, 4(2):165-178.