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Exploring the Accessibility, Affordability, and Equitability of Telecontraception Platforms and Their Implications for Reproductive Health Care

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EXPLORING THE ACCESSIBILITY, AFFORDABILITY, AND EQUITABILITY OF TELECONTRACEPTION PLATFORMS AND THEIR IMPLICATIONS FOR REPRODUCTIVE HEALTH CARE

by

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ABSTRACT

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Telemedicine has skyrocketed to national attention with the COVID-19 crisis, raising questions about how to best use virtual tools to support public health. One emerging sector of telemedicine is the rise of telecontraception platforms, such as Nurx, Pill Club, and Planned Parenthood Direct. Known as "the Uber for birth control", these platforms represent a growing market and innovative approach that aim to address barriers to obtaining birth control such as geography, cost, time, and gatekeeping by providing contraception and other sexual and reproductive healthcare services directly to consumers (Sundstrom et al. 2019; Grindlay and Grossman 2016; Chuck 2017; Stormo et al. 2011). Contraception historically was and currently is riddled with red tape for women trying to access critical care they need to make decisions about their own bodies and lives. Telecontraception represents an important potential solution to these long-standing issues, yet its impact on women and health care has not yet been studied in depth. What are telecontraception platforms adding to the current landscape of reproductive health care? What problems are they solving and where are they falling short? Using mixed methods, this research aims to address this gap by exploring the accessibility, affordability, and equitability of these growing platforms.

Findings illustrate telecontraception alleviates many existing access barriers. Yet there are mixed findings regarding affordability and equitability. Cost, insurance, and state availability limit the scope of telecontraception and mirror existing systemic challenges women face on the ground. This carries important implications because this research also found that the majority of women across the United States expressed strong pregnancy avoidance attitudes regardless of subgroup. Having a large presence of women legislators alongside other state conditions was linked to telecontraception availability in Republican and Democrat politically controlled states, suggesting that gender and having women in positions of power, in combination with other political, social, and economic state-level factors, is another growing and important factor to consider in advocating for issues related to women such as reproductive rights and policy. Overall, this project identifies areas of progress and opportunities for improvement not only for telecontraception but for health apps and telemedicine more broadly.

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This dissertation is dedicated to all the people out there trying to navigate the healthcare system to get the care they need. I wrote this dissertation during a period of my life where I struggled daily for nearly two years with pain from a relentless health condition. I experienced firsthand the uphill battle of fighting and advocating for your health. The amount of time, energy, and money it requires is exhausting. I say all this to emphasize that the importance of accessible, affordable healthcare cannot be understated. Medical issues do not operate according to money or insurance, but in this country we treat them as if they do. This goes out to everyone out there who has struggled to find the care they deserve. I hope this research helps shed light on some of the promises and pitfalls of an emerging area of telemedicine in the field of reproductive healthcare and contraception, an area which has historically and continues to be riddled with red tape for women trying to access the critical care they need to make decisions about their own bodies and lives.

INTRODUCTION

Telemedicine is a rapidly growing area of healthcare with the potential to cut costs and increase access, particularly for underserved and rural populations (Centers for Disease Control and Prevention 2020). The current COVID-19 crisis has brought telemedicine into the national spotlight. Rates of telehealth visits have increased during the pandemic, expanding access to services and improving reimbursement policies (Koonin et al. 2020; Campos-Castillo and Anthony 2021). One emerging sector of telemedicine is telecontraception platforms, such as Nurx, Pill Club, and Planned Parenthood Direct. Known as "the Uber for birth control", these platforms provide birth control and sexual and reproductive healthcare services directly to consumers and aim to address barriers to obtaining contraception, particularly in the United States (Chuck 2017). The United States is unique in requiring a doctor's prescription for birth control, compared to other countries where it is often free or sold over the counter without a prescription (Drum 2012; Khosla 2015). Furthermore, legislation and orders can also vary across different states, adding another layer of complexity to access (Nash et al. 2020).

Nearly one-third of women report difficulties obtaining prescription contraception, with the most common barriers related to access and affordability (Grindlay and Grossman 2016). Moreover, the COVID-19 pandemic has impacted in-person access to contraception due to economic and logistic barriers (Lindberg et al. 2020). Requests for contraception from Nurx have increased by fifty percent since the beginning of the COVID-19 pandemic (St-Esprit 2021). Telecontraception serves as a potential avenue to help increase access to contraception and sexual and reproductive healthcare services by alleviating obstacles related to geography, cost, and time (Sundstrom et al. 2019; Weigel et al. 2019; Grindlay and Grossman 2016; Rodler et al. 2020; Jain and Mehrotra 2020). Research has demonstrated both family planning provider and

patient support for telecontraception services (Stifani, Avila, and Levi 2021; Sundstrom et al. 2019). However, currently it is unknown whether telecontraception increases access for those who face barriers or whether they provide convenience for those who already have access (Dorland, Fowler, and Morain 2019; Zuniga et al. 2020).

Despite recent media coverage of telecontraception platforms (Rinker 2021; Shieber 2020; Landi 2020; Chuck 2017), research has not yet examined their impact on women in depth or how women experience and evaluate these platforms. By examining how existing inequalities shape contraception access and user evaluations of telecontraception platforms, this research can inform both virtual and in-person healthcare systems. Telemedicine can save time, money, and is linked with high patient and provider satisfaction (Hanson et al. 2019), yet it not known whether these same findings carry over to telecontraception. Users may have positive or negative evaluations of telecontraception, and uptake of these platforms may be patterned by existing systemic disparities such as socioeconomic status. Highlighting user perspectives and evaluations of telecontraception platforms can uncover reasons for using the platform, delineate the pros and cons of using the platforms, and illuminate needs gaps in the traditional in-person healthcare system.

Informed by the ecosocial model of health (Krieger 1994; Krieger 2001), this dissertation examines the multiple, overlapping processes at work in reproductive healthcare and telecontraception ranging from individual attitudes to state-level conditions. The research design uses mixed methods to investigate both micro and macro factors shaping reproductive healthcare access, affordability, and equity with an emphasis on priority populations such as racial and ethnic minority and uninsured women. Using national population analyses, state-level data, and user reviews, I map the state of reproductive health care for a national aggregate sample of

women as well as subsets of women such as priority populations and telecontraception platform users. Together, these findings provide a more comprehensive view of the current landscape and highlight opportunities for improved service delivery in both virtual and in-person healthcare spaces. This dissertation has three aims and is structured sequentially according to these aims.

Aim #1: The Current Landscape of Reproductive Healthcare

The goal of the first aim is to better understand sources of reproductive healthcare access, affordability, and equitability issues. This section of the dissertation aims to provide a picture of the current landscape of reproductive healthcare services, paying particular attention to subgroups of women such as racial and ethnic minority women, uninsured women, low-income women, and women living in metro versus nonmetro areas. Over ten percent of women in the United States are uninsured, and there are still significant racial and ethnic disparities in insurance coverage despite passage of the Affordable Care Act (Kaiser Family Foundation 2021; Shane and Ayyagari 2014; Breslau et al. 2018; Smith and Medalia 2014; O'Hara and Brault 2013). This analysis builds on previous research by *simultaneously* examining multiple aspects of reproductive health such as individual attitudes, interpersonal influences, and institutional policy factors post-Affordable Care Act for key subgroups using a national survey of women. Doing so allows for a more in-depth look into the factors behind reproductive healthcare disparities and whether different levels (individual, interpersonal, institutional) matter more than others to identify areas and opportunities for improvement.

Aim #2: Understanding State-Level Variation in Telecontraception Access

The second aim investigates the state-level conditions that pattern accessibility and availability of telecontraception platforms across the United States. Although telecontraception platforms claim to provide contraception and sexual and reproductive healthcare services directly

to patients, policy and legislation can affect the reach of telecontraception across states by dictating a platform's ability to prescribe and/or dispense medications. Therefore, patients may not be able to access these services if their state has not granted telecontraception platforms the prescribing and dispensing authority. Recent research mapping out telecontraception platform characteristics has identified differences in cost, age requirements, and state availability across platforms (Zuniga et al. 2020; Dorland, Fowler, and Morain 2019). However, it is unknown what affects these different factors. The political, economic, or social conditions within a state can all interact to impact telecontraception platform availability. Using an original dataset constructed from public-use websites, these analyses identify specific combinations of state-level conditions that pattern access and availability of telecontraception platforms across the United States and illustrate the social shaping of technological innovations.

Aim #3: Understanding the Experiences of Telecontraception Users

The goal of Aim #3 is to illuminate user evaluations of telecontraception platforms to gain access to contraception and sexual and reproductive healthcare services. Doing so allows for an on-the-ground perspective of what women experience accessing contraception and reproductive healthcare services both in the virtual and in-person healthcare spheres. Research examining user motivations, experiences, and evaluations of telecontraception platforms is lacking. While there has been research on health and wellness app users as well as informational reproductive health app users (Carroll et al. 2017; Whitfield, Welti, and Manlove 2019; Gressel et al. 2014; Akinola et al. 2019), little research exists on telecontraception platform users and research on their experiences using these platforms. Knowing more about how women experience and evaluate these platforms is important to delineating what telecontraception is adding to the landscape of reproductive healthcare services, specifically whether and how it is

addressing existing barriers to obtain contraception and other sexual and reproductive health services. This is important because it can identify areas where telecontraception may be helping women as well as areas for improvement, and this knowledge can be used to improve both virtual and traditional in-person healthcare spaces. This section of the dissertation aims to address this knowledge gap by analyzing publicly available user reviews for two major telecontraception platforms, Nurx and Planned Parenthood Direct, which represent opposites in terms of size, development stage, and user orientation. Findings from this qualitative analysis illustrate that telecontraception addresses many barriers present in the traditional healthcare system by providing timely access to contraception and connecting patients with on-demand access to supportive, knowledgeable providers and information about birth control options. Support and gratitude for the idea of telecontraception and its services uncover a long-standing need for these types of services for women. Findings also demonstrate that while users share similar motivations for accessing telecontraception platforms, their experiences can differ depending on existing systemic issues such as cost and insurance.

Dissertation Significance and Impact

More informed understandings of reproductive healthcare accessibility, affordability, and equitability on the individual, state, and national levels will allow for more nuanced, targeted refinement of reproductive healthcare service delivery and policy. This can provide more openings for intervention and improvement of reproductive health care for *all* women across the United States. Providing a current snapshot of telecontraception, an emerging area of telemedicine, and the specific factors patterning its availability and impacting user experiences can also inform and improve broader telehealth measures, interventions, and policy. Telecontraception platforms are a rapidly growing area of telemedicine that have the potential to

improve access, affordability, and equitability of reproductive healthcare. While research is beginning to examine these platforms (Zuniga et al. 2020; Dorland, Fowler, and Morain 2019), this study is the first to assess the accessibility, affordability, and equity of these innovative platforms and their impact on women and healthcare in depth.

Findings from this dissertation demonstrate multiple, overlapping influences on contraception access and how these influences are patterned by existing social, economic, and political conditions. Health apps and telemedicine are growing in numbers and demand (Lupton 2018; Carroll et al. 2017; Payne et al. 2015). As these new platforms enter our world, new research will be needed to analyze how they shape and are shaped by current institutions. This dissertation answers this call by examining the specific case of telecontraception. Technological innovations operate within specific contexts, so research is needed to illuminate how emerging technologies such as telecontraception impact, and are impacted by, society. Using a sociological lens to examine these technological innovations allows for a more holistic way of investigating their accessibility and delivery because it encompasses the broader social, economic, and political conditions and context from which these platforms are born and in which they operate. This dissertation analyzes the promises and pitfalls of telecontraception platforms, illuminating areas for improvement in both the virtual and traditional in-person healthcare systems. Findings can help inform legislators, policymakers, stakeholders, researchers, and health practitioners involved with reproductive healthcare and telemedicine, as well as those focused on understanding how emerging technological innovation and change both shapes and is shaped by society.

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AIM #1: Individual, Interpersonal, or Institutional Influences? Using Ecosocial Theory to Examine Disparities in Women's Healthcare Visits

Just over one in ten, or 11.1 million women, in the United States did not have insurance in 2019 (Kaiser Family Foundation 2021). Although the Affordable Care Act (ACA) has increased insurance coverage rates, disparities persist by race and ethnicity (Shane and Ayyagari 2014; Breslau et al. 2018; Smith and Medalia 2014; O'Hara and Brault 2013). Insurance coverage carries implications for health outcomes and disparities, especially for women's access to reproductive healthcare visits. Previous research indicates that healthcare visits are a critical element contributing to health (Antonisse et al. 2018; Collins et al. 2016; Baicker et al. 2013), and quality of women's health care visits can vary by insurance type (Ranji, Gomez, and Salganicoff 2019). Despite the vast amount of literature demonstrating racial/ethnic and socioeconomic disparities in unintended pregnancy (Kim et al. 2016; Finer and Zolna 2016), less is known about the specific factors which contribute towards broader disparities in women's reproductive health, specifically their access to office visits.

Moreover, influences at multiple levels, from attitudes to policy, can affect women's access and experiences of reproductive healthcare. Recent research using the social ecological model (SEM) to investigate factors associated with unintended pregnancy found that intrapersonal, interpersonal, institutional, and policy factors all contributed to racial and ethnic disparities in unintended pregnancy (Kim et al. 2016). In addition to cost and access issues, research on rural reproductive health disparities point to other barriers such as generational habits and attitudes toward health (Smith, Sundstrom, and DeMaria 2019), illustrating that interpersonal influences and individual attitudes may also play a role in health disparities.

Higher numbers of low-income women, immigrant women, and women of color are uninsured compared to white women (Kaiser Family Foundation 2021; Eliason 2019). What

implications does this have for reproductive health disparities? While previous research has examined reproductive healthcare access and affordability before and after ACA (Finer, Sonfield, and Jones 2014; Sonfield et al. 2015), less is known about reproductive healthcare services post-ACA for key population subgroups, such as race/ethnicity, income, and insurance status, and the specific factors which influence women's reproductive healthcare experiences and visits. Recent studies have begun to look into this: Eliason (2019) compared the use of sexual and reproductive health services before and after ACA, and Hammond (2019) examined contraception access by subgroup post-ACA. In addition to access and affordability, women's feelings and attitudes toward contraception and pregnancy are an integral part of reproductive healthcare, since they can drive behavior (Jones 2017). More research is needed on which factors drive reproductive healthcare visits and whether different levels (individual, interpersonal, institutional) matter more than others so that healthcare providers, professionals, and policymakers can better serve the reproductive healthcare needs of all women.

This study builds on previous research by *simultaneously* examining multiple factors of reproductive health, such as individual attitudes, interpersonal variables, and institutional policy factors, post-ACA for key population subgroups using a national survey of women. Moreover, data for this study allows us to go beyond insurance coverage to investigate multiple reproductive healthcare factors, from individual to policy, and how they are patterned across women. Examining the state of in-person reproductive healthcare services for different populations of women can illuminate the accessibility and equitability of reproductive healthcare services as well as individual attitudes and feelings toward pregnancy and contraception, providing a more in-depth look into the factors behind reproductive healthcare disparities. Doing so can help inform researchers, policymakers, and stakeholders about the factors driving

women's reproductive healthcare visits, allowing for more nuanced, targeted refinement of public messaging and education, medical protocols, and reproductive healthcare policy.

LITERATURE REVIEW

Women's Healthcare Visits: An Overview

The Affordable Care Act expanded coverage of preventative healthcare services for women, such as cancer and mental health screenings, prenatal care, and contraceptive method counseling (Health Resources & Services Administration 2019). However, research focused on access to sexual and reproductive health service visits shows that increased access under ACA only tells part of the story. Eliason (2019) looked at racial and ethnic differences in making a sexual or reproductive healthcare visit before and after the dependent care provision of the ACA was passed, which allowed young people to stay on a parent's health insurance plan until their 26th birthday. The young adult population under the age of 26 is disproportionately non-white in the United States (Schaeffer 2019), meaning that this provision of the ACA has the potential to address racial disparities. Although lacking health insurance coverage decreased during this time period, utilization of sexual and reproductive health services did not change for non-Hispanic black women and non-Hispanic white women (Eliason 2019). However, there was an increase in receiving birth control methods or prescriptions for Hispanic women before and after this provision (Eliason 2019). Another study found that although rates of uninsured women declined post-ACA, they did not change for Latinas, either U.S.-born or foreign-born (Jones and Sonfield 2016).

Taken together, the above research illustrates how making a women's healthcare visit can vary depending on many factors ranging from attitudes to access. Research shows that preventative healthcare visits are a critical point of contact that influences healthcare disparities

(Antonisse et al. 2018; Collins et al. 2016; Baicker et al. 2013; Benard et al. 2014). More research is needed to untangle what drives making a visit and whether certain factors matter more than others. Moreover, the type of visit may also matter if there are different influences at play depending on the type of healthcare visit, such as whether it is a preventative visit or a sexual health visit.

Ecosocial Model of Health Theory

Nancy Krieger's (1994) ecosocial framework posits a theory of health that recognizes the dynamic, intertwined nature of individuals and societal structures (Krieger 2014). This theory seeks to explain patterns of health disparities by illustrating particular time-period and context-specific combinations of norms, social structures, policies, institutions, and individual agency as well as the dynamic interrelationships among them. It seeks to move beyond biological causes of health by incorporating social explanations to provide a fuller picture of "'who and what drives current and changing patterns of social inequalities in health'" (Krieger 2001, p. 672). Central to Krieger's theory is the image of a "web" of pathways linking together at multiple levels, and the individual as the embodiment of both their biological and social world; their lived experience (Krieger 2014; Krieger 1994). Both biology and society structure the pathways of embodiment; it is not one or the other because they are interlinked. This framework recognizes the dynamic, multilevel, overlapping processes at work in health outcomes, challenging the separation between an "exogenous" environment and a biological "organism" (Krieger 1994, p. 899). The following review of the literature examines aspects of reproductive healthcare on multiple levels (individual/intrapersonal, interpersonal and institutional), while recognizing that these levels are fundamentally intertwined.

Individual. One important component of the reproductive healthcare "web" of pathways concerns individual attitudes, feelings, and knowledge about contraceptive use and pregnancy. Pregnancy attitudes are often divided into two distinct dimensions: cognitive (intentions) and affective (feelings) (Jones 2017). Cognitive attitudes towards pregnancy consist of an individual's intention to avoid pregnancy, while affective attitudes consist of an individual's feelings towards possible pregnancy (Jones 2017). Research has found that these are two different concepts, and that cognitive attitudes are associated with consistent contraceptive use more than affective attitudes (Jones 2017). Having a strong pregnancy avoidance attitude was associated with ten times higher odds of using contraceptives consistently compared to those who had a weak pregnancy avoidance attitude (Jones et al. 2015). Measures of pregnancy attitudes can change over time, illustrating the need for longitudinal data (Vaisanen and Jones 2015). Knowledge of birth control is another factor in contraceptive use and behavior. Research has found that misinformation and misperceptions about birth control, such as needing to take a break from it or not getting pregnant after stopping a shot, affected contraception use (Kendall et al. 2005; Reed et al. 2014). This misinformation can be particularly risky because it can result in unintended pregnancy. Qualitative research has found that women using contraception inconsistently or not at all had false beliefs about their likelihood of pregnancy, viewing themselves as "safe" from pregnancy since they did not get pregnant after unprotected sex (Reed et al. 2014).

Pregnancy attitudes and feelings can also differ by race/ethnicity, education, and age. One study found that although cognitive attitudes toward pregnancy avoidance were not associated with race/ethnicity, affective attitudes (feelings about experiencing an unplanned pregnancy) were associated with race/ethnicity (Hayford and Guzzo 2013). Another study found

that Hispanic women and white women were more likely to start trying to get pregnant than other racial and ethnic groups, and higher-educated women had a higher likelihood of weaker pregnancy avoidance attitudes (Vaisanen and Jones 2015). These findings illustrate how social structures may impact individual attitudes, such as having more resources to support a pregnancy. Age is also associated with differences in pregnancy avoidance attitudes. One study found that attitudes changed more among older than younger (18 to 24 years) women (Vaisanen and Jones 2015). Research has shown that teens prefer to go to family planning clinics for sexual and reproductive health services (Oglesby 2014; Sugerman et al. 2000), regardless of insurance status: approximately half of teens visiting a Planned Parenthood clinic had health insurance (Sugerman et al. 2000). While cost and confidentiality were cited as important preferences in that study, another study found that patients rated Planned Parenthood highly on additional dimensions of care, such as ease of getting care and medical staff treatment (Oglesby 2014). On the other hand, another study found that Latinas and black women preferred receiving reproductive healthcare at a general health care site (Becker and Tsui 2008). Women's preferences for where to go may be based on the specific context of the facility in which they receive their services. These findings indicate that preferences and attitudes at the individual level do not exist in isolation but rather are shaped by interpersonal and community factors, such as staff interaction with patients and facility type characteristics.

Interpersonal. Interactions between an individual and the people around them, and how they exert a reciprocal influence upon one another, illustrate the interpersonal level of the ecosocial theory (Rimer and Glanz 2005). Patient-provider communication is one example of this reciprocal interaction, and there is an extensive literature devoted to this topic. Doctors and patients influence one another through their interactions, and these interactions can influence

health behavior and outcomes. Research on patient-provider communication during reproductive and sexual health visits illustrate how these interactions can result in different outcomes based on patient characteristics such as sexual orientation (Agénor et al. 2015; Everett et al. 2019) or gender (Emmers-Sommer et al. 2009). Ashton et al. (2003) argue that racial/ethnic health disparities occur as a result of doctor-patient interactions rather than obtaining access to a doctor. Poor communication is posited as the main driver behind racial/ethnic health disparities, more so than provider racial bias or patient preferences, and the authors provide suggestions for how this can be remedied (Ashton et al. 2003).

Research on racial and ethnic disparities in reproductive healthcare specifically has uncovered differences in service delivery preferences and service quality perceptions among black, Latina, and white women (Becker and Tsui 2008). Preferences and perceptions do not exist in a vacuum but are shaped by individual, interpersonal, and institutional factors. Historical abuses and systemic control, surveillance, and sterilization of women of color (Roberts 1999; Salas 2019) may impact their trust and experiences of reproductive healthcare interactions. Research has found that blacks were more likely than whites to report pressure to use contraceptives by a provider (Becker and Tsui 2008), pressure that can be implicit such as through provider tone of voice or imbalanced information favoring certain methods (Gomez and Wapman 2017). Other research did not find differences in contraceptive counseling by race/ethnicity and socioeconomic status of the patient but found that providers largely did not assess patient pregnancy intention, birth control preferences, or allow patients an opportunity to ask questions (Dehlendorf et al. 2017). Educational, interactive decision tools for patients to choose birth control and a printout given to the provider about their preferences prior to a

healthcare visit have been effective in patient-provider communication by allowing patient concerns and preferences to enter the discussion (Holt et al. 2020).

Patient-provider interactions can influence patient behavior such as contraceptive use and pregnancy planning. One study found that contraceptive use was associated with the quality of care from a family planning service provider, with higher predicted probabilities of contraceptive use increasing as the quality of care increased from low, to medium, to high (RamaRao et al. 2003). Having a women's health care visit is linked with consistent contraceptive use (Jones et al. 2015). Another study found that women were less uncertain about their current plan to have a (another) baby if they discussed it with a healthcare provider in the last six months (Jones 2017). Taken together, the research on patient-provider interaction illustrates an important aspect of the ecosocial theory: interactions between women and their doctors can influence feelings and behaviors, and thus health outcomes.

Other interactions and relationships in a woman's life can also influence contraceptive use. Research on African American mother-daughter relationships illustrated that mother-daughter closeness and communication influenced reproductive health care and behavior, with more open communication between mothers and daughters facilitating better communication between daughters and their health care providers (Warren-Jeanpiere 2006). Relationship status and satisfaction has also been linked with sexual health behavior. Relationship status and past use of contraception was significantly associated with contraception use intention (Campo et al. 2012). Choice of method also differed depending on relationship status, with condoms associated with short-term relationships and hormonal methods used during longer-term relationships (Reed et al. 2014). Interestingly, while communication with a sexual partner was positively associated with contraceptive use intention, talking with friends was negatively associated with intention to

use birth control (Campo et al. 2012). Many different relationships and interactions can thus influence women's health behavior and outcomes, ranging from mothers, to friends, to sexual partners.

Institutional and Policy. Larger systematic and policy changes can also affect health behavior and outcomes. Insurance coverage and type of health insurance (for example, public or private) is a key factor associated with health outcomes. Women who are uninsured or have Medicaid insurance have more advanced breast cancer when diagnosed compared to privately insured women and also had higher risk of death and worse survival outcomes (Ayanian et al. 1993), particularly for black and Hispanic women (Halpern et al. 2007). Lacking health insurance or having fee-for-service insurance was associated with lack of breast, colorectal, and cervical cancer screening (Hsia et al. 2000; Garfield, Orgera, Damico 2019). One explanation is that uninsured individuals do not have a regular place to go to for medical care (Garfield, Orgera, Damico 2019; Hsia et al. 2000). A recent Kaiser Family Foundation report found that 50 percent of uninsured individuals did not have a usual source of care, compared to just 11 percent of employer or privately insured individuals (Garfield, Orgera, Damico 2019). Expanding coverage to the uninsured can result in improved healthcare access and outcomes. An enormous body of research on Medicaid expansion under ACA (see Antonisse et al. 2018) illustrates how gaining coverage is associated with a myriad of improved outcomes, such as receipt of preventive care services (Baicker et al. 2013), contraceptive prescriptions (Ghosh, Simon, and Sommers 2017), improved access to doctor visits and prescriptions (Collins et al. 2016), decreased probability of positive depression screening (Baicker et al. 2013), and better physical and mental self-reported health compared to a control group which did not receive the expanded Medicaid access (Finkelstein et al. 2011).

Insurance status carries important consequences for reproductive healthcare costs. While preventive screenings and care are now covered under the ACA, racial and ethnic disparities persist in insurance coverage rates (Shane and Ayyagari 2014; Breslau et al. 2018; O'Hara and Brault 2013) as well as sexual and reproductive health services uptake (Hall, Moreau, and Trussell 2012; Eliason 2019). Higher numbers of low-income women, immigrant women, and women of color are uninsured compared to white women (KFF 2021; Eliason 2019). Another study found that Medicaid expansion and subsidized marketplace coverage under the ACA starting in 2014 decreased the percentage of uninsured women in states that expanded Medicaid, but not for women in states that opted out nor for U.S. and foreign-born Latinas (Jones and Sonfield 2016). Taken together, this research illustrates that policy matters both for health outcomes and disparities. Breslau et al. (2018) argues that these findings illustrate how researchers need to look at both current and historical causes for these disparities and that health equity cannot simply be achieved through policy, such as ACA. This illustrates the importance of looking at multiple levels, such as individual attitudes, patient-provider interactions, and institutional policy factors, because this may illuminate whether some levels impact healthcare disparities more than others.

Significance

As this literature review shows, research on health outcomes and disparities occurs on the individual, interpersonal, and institutional levels. Do all levels matter equally for all types of women, or are some levels more important than others? This study builds on previous work by *simultaneously* examining reproductive healthcare access, affordability, and attitudes post-ACA for important population subgroups using a national survey of women to better understand the relative importance of these different factors (see Figure 1). Specifically, this study looks at

individual, interpersonal, and institutional influences on making a birth control visit and a preventative reproductive healthcare visit using the 2012-2014 Continuity and Change in Contraceptive Use Study (CCCU), a national survey of 4,634 women between the ages of 18 and 39 containing questions surrounding reproductive health attitudes, access, and affordability (Jones 2018).

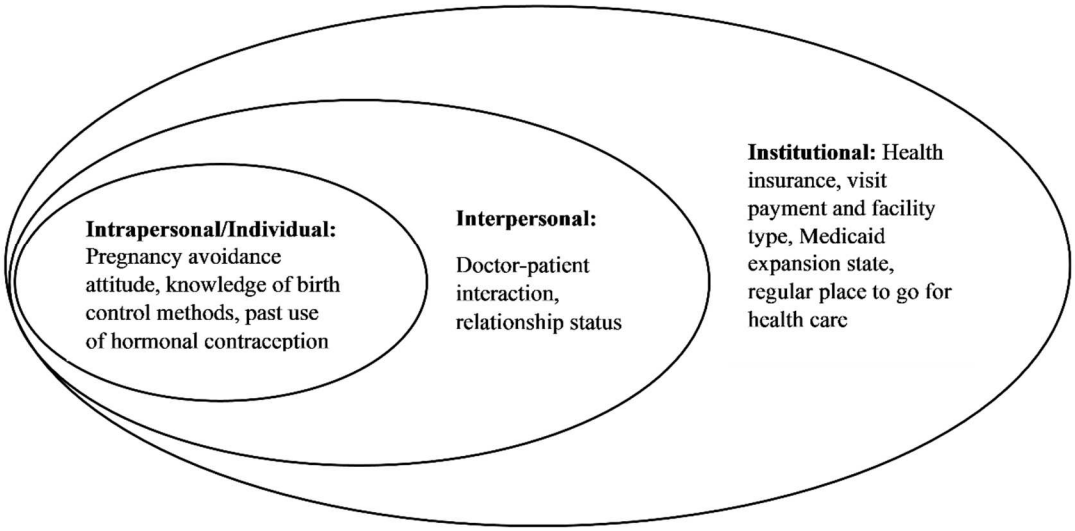

Figure 1. Ecosocial Model of Health: Individual, Interpersonal, and Institutional Influences

Previous research has used the CCCU to examine out-of-pocket contraceptive costs for privately insured women before and after the ACA (Finer, Sonfield, and Jones 2014; Sonfield et al. 2015), reproductive health access by demographic subgroups at Wave 2 in spring 2013 (Hammond 2019), as well as contraceptive use, methods, and attitudes (Jones et al. 2015; Vaisanen and Jones 2015; Jones 2017; Jones 2017; Jones 2018; Jones, Lindberg, and Higgins 2014; Lindberg, Jones, and Higgins 2014). Using the most recent wave of the CCCU (Wave 4, conducted in spring 2014) provides a national picture of reproductive healthcare across groups, allowing for a glimpse into both individual and policy factors that affect reproductive healthcare access and affordability. Moreover, previous research conducted by Jones and Sonfield (2016)

using the CCCU examined whether insurance coverage expanded for women living in states that expanded Medicaid under ACA. This study builds on this research by looking in greater detail at the breakdown of subgroups living in these states and whether women living in these states made a visit for reproductive healthcare due to this expansion. This study also addresses a gap in the literature raised by Hammond (2019) by looking at access and attitudes for women with Medicaid insurance and uninsured women.

METHODS

Sample

Data for this project comes from the 2012-2014 Continuity and Change in Contraceptive Use Study (CCCU), a national survey of 4,634 women between the ages of 18 and 39 containing questions surrounding reproductive health attitudes, access, and affordability (Jones 2018). The CCCU administered four waves of online surveys to the sample every six months. Wave 1 of the study had a response rate of 59% (N=4,634). Retention rates for Waves 2 through 4 were 69% (N=3,207), 75% (N=2,398), and 77% (N=1,842), respectively. The survey contains measures about reproductive access, affordability, and attitudes on a national level and allows for analyses by key subgroup, such as race/ethnicity, socioeconomic status, and insurance status. Moreover, this study uses data from 2014 (Wave 4), a year in which additional policy changes led to some states expanding Medicaid under ACA as well as the creation of the health insurance marketplace. This study builds on previous literature by examining attitudes, interpersonal variables, and access simultaneously in the same national sample of women to provide a comprehensive understanding of reproductive healthcare access and experiences that can inform health education and policy in this area. Informed by the ecosocial model of health theory (Krieger 1994; Krieger 2001; Krieger 2014), the framework for this study recognizes the

multilevel processes at work in reproductive healthcare access, affordability, and equity, from individual attitudes to state and federal-level policies.

Analytic Sample. Data for this study comes from Wave 1 and Wave 4 of the CCCU (N=1,842). Women were asked if they made a women's health care visit for any of the following three reasons in the last six months: visit for birth control or contraception, annual gyn visit or pap smear, or other women's health care (pregnancy-related care, STDs, breast or other exams). A filter variable was created to assess whether a woman made a women's health care (WHC) visit for any of the three reasons in the last six months, or did not make any women's health care visit in the last six months. Out of the total 1,842 Wave 4 women, 1,020 (55.4%) made a WHC visit while 797 (43.3%) did not. I exclude women who did not have a visit (N = 797) as well as cases with missing data on any included variables (N = 63), resulting in a final analytic sample of 982 women.

Analyses of the 797 women who did not make any WHC visit in the last six months illustrated that they were very similar in their demographic characteristics (race/ethnicity, education, employment, marital status, living in a Medicaid expansion state) to those in the final analytic sample, but had higher percentages of using a long-acting reversible contraceptive at the last wave, not dating anyone, and were older. The main differences were that they had higher percentages of not being insured (16.73%, compared to 6.31%) and not having a regular place to go for medical care (29.54%, compared to 12.73%). While these are important differences, the aim of this study is to look at individual, interpersonal, and institutional influences on making a WHC visit, specifically the predictors of making a birth control visit and the predictors of making an annual gynecological or pap smear visit. Since the 797 sample of women did not make any WHC visit in the last six months, we cannot look at visit-specific variables, such as

patient-provider communication or payment type, which may have influenced making a visit. Therefore, we exclude these women because the goal is to uncover information about which factors influence making a birth control visit as well as a preventative reproductive healthcare visit.

Missing Data. Missing data accounted for 6.03 percent (N = 63) of the eligible sample. Robustness checks were conducted to analyze findings with and without the missing data. Although there is no formal rule for when to impute data, low rates of missing data ranging from one to five percent generally do not require imputation models (Little et al. 2014; Social Science Computing Cooperative 2013). Data analyses of the 63 cases with missing data did not indicate concentration of missingness on one variable. The variable with the largest amount of missing data was the birth control visit dependent variable, with 12 cases missing data on that variable. However, since the amount of missing data was over five percent, multiple imputation was conducted in Stata as a robustness check to compare results with listwise deletion results. While there has been a long history of debate regarding imputing values on the dependent variable, research has demonstrated that the values of the dependent variable can be used to give information about the independent variables and the associations among *all* variables (not just those associated with missing data) and therefore should be included in analyses (Young and Johnson 2010; Allison 2000; Social Science Computing Cooperative 2015). Using imputed data can result in less biased data than dropping all cases with missing data (Horton and Kleinman 2007). Findings using imputed data were similar to those using listwise deletion, so listwise deletion results are presented. Additionally, findings comparing results excluding pregnant women were compared to results including pregnant women since being pregnant could influence whether a woman has made a visit for birth control in the last six months. Results are

similar, so pregnant women are retained in all analyses. Supplementary analyses comparing estimation samples are available in Appendix A.

Statistical Analyses

Quantitative data analyses are two-fold. First, cross-tabulations, chi-square tests, and one-way analysis of variance (ANOVA) tests were conducted to test for statistically significant relationships between reproductive health variables and key subgroups of women (race and ethnicity, socioeconomic status, and insurance status) in order to investigate which factors may be influencing disparities in healthcare visits. Second, logistic regression models predicting two different types of visits (birth control visit and women's preventative reproductive healthcare visit) were conducted to better understand which level(s) may be driving reproductive health disparities. All statistical analyses were conducted in SPSS 25.0 (IBM Corp. 2017) and Stata IC 15.1 (StataCorp. 2017). This study was approved by the University of Wisconsin-Milwaukee Institutional Review Board (IRB #20.339).

Measures

Dependent Variables. Reproductive healthcare visit type was measured using two variables, one for a birth control or contraception visit and one for preventive services (annual gynecological visit or pap smear). Despite the expansion of women's healthcare services under ACA, disparities in making a visit persist by race/ethnicity, age, and geographic location (Benard et al. 2014; Shomo 2019; Nardi, Sandhu, and Selix 2016; Eliason 2019). To assess healthcare utilization of preventive and sexual health services, respondents were asked "Did you make a visit for any of the following medical services in the last 6 months?" with the option of responding "yes" or "no" (Jones 2018). The two dependent variables of interest in this study are

whether a respondent made a visit for “an annual gyn visit or pap smear” or “a visit for birth control or contraception” in the last six months (Jones 2018).

Individual Attitudes, Knowledge, and Contraception Use. Cognitive attitude toward pregnancy was used as a measure for pregnancy avoidance attitude, following previous research (Jones et al. 2015; Jones 2017). Women were asked “How important is it to you to AVOID becoming pregnant now?” and could respond on a six-point scale ranging from 1 “not at all important” to 6 “very important” (Jones 2018). Birth control methods knowledge was asked about at Wave 1 (“How much do you know about birth control methods?” (Jones 2018)) and respondents could answer on a scale from 1 “I know nothing” to 6 “I know everything”. Knowledge of birth control methods was treated as a continuous rather than categorical variable in all analyses due to problems with small cell sizes when used in the logit analyses. Hormonal contraception use utilized a recoded variable from GfK, the company that administered the survey, indicating whether the respondent used the birth control pill at any of the previous survey waves, as well as whether they used an implant or IUD at Wave 3 (six months prior to Wave 4).

Interpersonal Variables. Patient-provider communication was assessed using two variables. Discussions with a healthcare provider about pregnancy intention was measured using the question “At your last visit for women's health care, did a doctor or nurse spend time talking with you about your future plans for having or not having children (or more children)?” Contraceptive counseling was measured by using the question “At your last visit for women's health care, did you get information about birth control and pregnancy prevention?” (Jones 2018). Although these questions cannot assess whether the respondent *wanted* to talk about these subjects during their last women’s health care visit, they still provide valuable information on whether providers actually discussed these topics with their patients and whether this differed by

subgroup. Previous research did not find differences in contraceptive counseling by race/ethnicity and socioeconomic status of the patient but found that providers largely did not assess patient pregnancy intention or birth control preferences (Dehlendorf et al. 2017). The last interpersonal variable is relationship status, since previous research demonstrated its link with contraceptive method and use (Reed et al. 2014; Campo et al. 2012). Respondents were asked whether they have been with their current partner for six months or longer, and response options consisted of: "yes", "no", and "yes, though we have broken up and gotten back together during that time" (Jones 2018). A fourth category was coded as "N/A, not in a relationship" if the respondent was not currently dating someone on a regular basis.

Institutional Policy Factors. Having a regular place to go for medical care, living in a state that expanded Medicaid as of December 2013, facility type, and payment method all measure structural, systemic access to reproductive healthcare. Regular place for medical care was measured using the question "Do you have a regular place you go to for medical care?" (yes or no) (Jones 2018). Living in a state that expanded Medicaid was measured as a dichotomous variables (yes or no), and was constructed using a list of states that expanded Medicaid as of December 2013, the time period before Wave 4 of the CCCU was conducted in 2014. Facility type was measured using responses to the question "Thinking about your last visit where you received women's health care, what type of place did you go to?" (Jones 2018). Responses options consisted of: private doctor's office or group practice; Planned Parenthood or other family planning clinic; public health department or community health clinic; student health clinic; or some other type of health care facility (Jones 2018). Responses for student health clinic and some other type of health care facility were combined into one category due to low cell count sizes. Payment method was measured by the question "How did you pay for your last

women's healthcare visit?" with possible responses of: paying some or all of the costs including co-pays myself, insurance paying some or all of the costs, reduced fee, or free services (Jones 2018). Reduced fee and free services were combined into one category due to low cell count sizes.

Key Subgroups. Important population subgroups of the national sample of women were measured using three categorical variables: race and ethnicity, socioeconomic status, and insurance status. Race and ethnicity consisted of five mutually exclusive response options: non-Hispanic white women, non-Hispanic black women, non-Hispanic other women, non-Hispanic multiracial (2 or more races) women, and Hispanic women. Socioeconomic status utilized a recoded variable from GfK, the company that administered the survey, which calculated poverty status based on household income and size. Household income and size were only asked about at Wave 1 in 2012. Insurance status consisted of the following categories: private insurance, Medicaid, marketplace, and uninsured.

Control Variables. Control variables include age, education (less than high school, high school, some college no degree, associate's degree, bachelor's degree, master's degree, or professional or doctorate degree; master's and professional and doctorate degree were combined into one category due to low cell count sizes), employment status (full-time, part-time, or unemployed), marital status (never married, living with partner, married, divorced, or separated; divorced and separated were combined into one category due to low cell count sizes), and nativity status (born in the U.S. or not). Nativity status is an important factor to include in health disparities research because lumping together these two groups can obscure the findings (Krieger 2012). Analyses were run with age as both a continuous and categorical variable, and results were statistically significant with either coding decision. In order to illuminate possible policy

effects of the dependent care coverage provision and based on the histogram cutoffs, the categorical coding of age was retained in analyses (18 to 26, 27 to 30, 31 to 36, and 37 to 39).

RESULTS

Overall Sample Characteristics

Table 1 illustrates descriptive statistics for all study variables. Approximately half of women made a visit for birth control while over 75% of women made a visit for an annual gynecological visit. Just over 45 percent of women indicated that it is very important to avoid becoming pregnant now, and most of the sample indicated moderately high knowledge of birth control methods. Past use of the pill was the most popular method, with smaller percentages for long-acting reversible contraceptives. For those who made a WHC visit in the last six months, just under half (49%) said their doctor talked to them about their plans for children and 41% got information about birth control and pregnancy prevention. Nearly 82% had been with a partner for six months or longer, and just over 10% were not currently dating anyone. The majority of the sample (83%) went to a private doctor's office or group practice for their last WHC visit, and nearly 75% used insurance to pay for some or all of the costs of the visit. Just over 87% had a regular place for medical care and 65% lived in a state that expanded Medicaid under ACA.

Regarding the key subgroups, over two-thirds of the sample (69%) was non-Hispanic white and 65% were at 200% or above the federal poverty level. Just over 15% of the sample was below the federal poverty level. Approximately 72% had private health insurance, 16% had Medicaid insurance, 6% had marketplace insurance, and just over 6% were uninsured. Almost half (49%) were married, 35% had a bachelor's degree, and 55% were employed full-time. Almost a third (32%) were unemployed. Approximately 10% were foreign-born and 40% were in the age group of 18 to 26 years old, with an overall mean age of 29 years.

Comparing the sample characteristics to 2014-2018 U.S. Census Data on females 16 years and older, black or African American respondents are underrepresented in our sample (9% of our sample, versus national estimate of 13%) as well as white respondents, who represent 69% of our sample versus a national estimate of 76% (United States Census Bureau N.d.). The sample also has slightly higher levels of education, with 35 percent of the sample having a bachelor's degree compared to 32% of women age 25 years and older (U.S. Census Bureau N.d.). Foreign-born women represent nearly 10 percent of our sample compared to national estimates of 14% (U.S. Census Bureau N.d.).

Individual, Interpersonal, and Institutional Reproductive Health Variables by Key Subgroup

Individual Attitudes, Knowledge, and Contraception Use. Table 2 shows individual attitudes, knowledge, and contraception use by key subgroup. The majority of women both within and across all key subgroups reported a strong pregnancy avoidance attitude, with no statistically significant difference among the subgroups. Knowledge of birth control methods differed significantly only among socioeconomic status, although when looking at pairwise comparisons of these means none of the comparisons were statistically significant. The average score for birth control methods knowledge was 4.30 for those at 200% or above the federal poverty level, compared to 4.16 for those below the federal poverty level.

Hormonal contraception use also differed significantly by key subgroup. There were significant racial and ethnic differences in past use of the pill and long-acting reversible contraceptive (LARC; either an implant or IUD). Over half of non-Hispanic white women had used the pill, compared to 36 percent of Hispanic women. Use of a LARC method was highest among Hispanic and multiracial women, and lowest among black and other race women. There were also significant differences in past use of the pill (but not LARC) by socioeconomic status

and insurance type. Higher proportions of high-SES women had used the pill compared to lower SES women. Women with Medicaid insurance had the lowest proportions of past pill use compared to all other insurance types, and privately insured women had the highest proportion of past pill use. Hispanic women reported the highest percentages of past LARC use (17%). Approximately 10% of women in all socioeconomic groups had used a LARC method in the past. Past LARC use was highest for women with private insurance (11%), and lowest for those without insurance (6%).

Interpersonal Variables. Discussions between a patient and provider about future plans for children did not differ significantly by race/ethnicity, socioeconomic status, or insurance status (see Table 3). Approximately half of women reported that their doctor or nurse spent time talking with them about their future plans for having or not having children (or more children) during their last women's health care visit, with other race, low-income, and uninsured women reporting lower rates. On the other hand, contraceptive counseling differed significantly by socioeconomic status and insurance status. As socioeconomic status increased, the percentage of women responding that they got information about birth control and pregnancy prevention decreased. Higher percentages of uninsured women and women with marketplace insurance reported receiving birth control and pregnancy prevention information compared to women with Medicaid or private insurance. The majority of women had been with the same partner for six months or longer, although relationship status differed significantly by subgroup. Over 80 percent of white, Hispanic, and other race/ethnicity women reported being with the same partner for six months or longer uninterrupted. Non-Hispanic black and multiracial women reported the largest percentages of not dating anyone or breaking up and getting back together with their partner in the last six months. The percentage of women reporting being with a partner for six

months or longer was higher for higher-SES women compared to low-SES women. Women with private insurance and uninsured women reported the highest proportions of being with a partner for six months or longer.

Institutional Policy Factors. There were significant differences by subgroup for nearly all the systemic access variables (see Table 4). Hispanic women had the highest rates of being uninsured (18%), compared to all other racial groups which had single-digit rates of no insurance. Rates of private insurance increased as socioeconomic status increased. Low-SES women reported higher proportions of not having a regular place to go for medical care compared to high-SES women. Uninsured women had three to four times the rate of not having a regular place to go for medical care compared to all other insurance types. For those women who did make a women's health care visit in the last six months, there were significant differences in facility type by race, socioeconomic status, and insurance type. While most women went to a private doctor's office or group practice (with the exception of uninsured women), these proportions were highest for white, high-SES, and privately insured women. Just over one in ten black women and one in ten Hispanic women went to Planned Parenthood for their last women's health care visit. The proportion of women going to Planned Parenthood or a public health department or community health clinic were highest among low-SES women. Nearly one in four women with marketplace insurance went to Planned Parenthood or another family planning clinic, compared to 2% of privately insured women.

Most women made a women's healthcare visit, with higher percentages of an annual gynecological visit compared to a visit for birth control or contraception, although none of the differences were statistically significant by subgroup. Women's healthcare visit payment differed significantly by race, socioeconomic status, and insurance type. Approximately one in five non-

Hispanic black, non-Hispanic other, and Hispanic women received free or reduced fee services, compared to 8% of non-Hispanic white and multiracial women. One in four low-income women, and nearly half of uninsured women received free or reduced fee services. Most women (with the exception of uninsured women[1]) paid for their women's health care visit with insurance. Just over 35 percent of uninsured women paid for the visit themselves, compared to approximately 14 percent of privately insured and marketplace-insured women. The majority of women lived in a state that expanded Medicaid under ACA, with the exception of non-Hispanic black women. Uninsured women reported the lowest proportions of living in a state that expanded Medicaid under ACA compared to all other insurance types.

Predictors of Making a Visit for Birth Control or Contraception

Overall Model Fit. Table 5 contains the results of four nested logistic regression models examining individual, interpersonal, and institutional policy factors influencing making a visit for birth control or contraception in the last six months. Likelihood ratio tests comparing model fit indicated that each subsequent model was better fitting than the previous model in which it was nested (Model 2 was a better fit than Model 1, Model 3 was a better fit than Model 2), except when comparing Model 3 and Model 4. The likelihood ratio test favored Model 3 over Model 4, which indicates that adding additional variables did not significantly improve the model fit. This could be due to statistically significant correlations between insurance status and three out of the four institutional policy variables (facility type, visit payment, and regular place for medical care). However, the pairwise correlation coefficients between insurance status and each institutional policy variable ranged from 0.03 to 0.27, indicating that these correlations were

[1] Another survey question asked whether a respondent had insurance during *any* of the last six months, and 15 uninsured women responded "yes". So the 10 uninsured women in Table 4 who used insurance to pay for their last women's healthcare visit most likely had insurance at the time of the visit (within the last six months).

small. Overall, summary goodness-of-fit statistics give an overall picture of model fit but cannot provide information about model components (Hosmer and Lemeshow 2000). While results of the likelihood ratio tests indicate that Model 4 does not provide a significantly improved fit compared to Model 3, the reason for this finding is most likely not due to collinearity issues between insurance status and institutional policy variables.

Birth Control Visit: Model 1. Results shown in Model 1 (health disparities model) indicate that insurance status had a significant influence on making a visit for birth control or contraception. Women with Medicaid insurance had lower odds of making a birth control visit compared to women with private insurance (OR=.55; $p<.05$). Compared to privately insured women, the odds of making a birth control visit are reduced by 45% for women with Medicaid insurance.

Birth Control Visit: Model 2. Model 2 adds individual pregnancy attitudes, knowledge, and contraception use to the base model. Results show that stronger pregnancy avoidance attitudes were significantly associated with greater odds of making a visit for birth control compared to those with weaker pregnancy avoidance attitudes. Women who indicated that it is very important for them to avoid pregnancy right now had 6.22 higher odds of making a birth control visit compared to women who responded that it was not at all important for them to avoid pregnancy right now ($p<.001$). Knowledge of birth control methods did not have a statistically significant influence on making a birth control visit. Past use of the pill was significantly associated with higher odds (OR=5.71; $p<.001$) of making a visit for birth control compared to those who did not use the pill in the past, controlling for other variables. Using a LARC method at the last survey wave did not have a significant effect on making a birth control visit in the last six months.

Birth Control Visit: Model 3. Adding in the interpersonal variables, the odds of making a visit for birth control were over three times larger (OR=3.87) for women who got information about birth control and pregnancy prevention during their last visit, compared to those who did not get this information during their last visit ($p<.001$). Women who were not dating anyone on a regular basis had lower odds of making a visit for birth control compared to women who had been with their partner for six months or longer (OR=.41; $p<.01$). Compared to women who had been with a partner for six months or longer, the odds of making a birth control visit were reduced by 59% for women who were not dating anyone.

Birth Control Visit: Model 4. Adding in the institutional policy factors, women who went to Planned Parenthood or another family planning clinic for a women's health care visit in the last six months had 2.71 higher odds of making a visit for birth control compared to those who went to a private doctor for a women's health care visit ($p<.05$). Visit payment method, having a regular place to go for medical care, and living in a state that expanded Medicaid under ACA did not have a significant effect on making a birth control visit, controlling for other variables. Uninsured women had lower odds of making a visit for birth control compared to privately insured women (OR=.32; $p<.01$). Compared to privately insured women, the odds of making a birth control visit were reduced by 68% for uninsured women. Age had a significant impact on making a birth control visit in all four models, with higher odds for younger women compared to older women.

Predictors of Making an Annual Gynecological or Pap Smear Visit

Overall Model Fit. Table 6 contains the results of four nested logistic regression models examining individual, interpersonal, and institutional policy factors influencing making an annual gynecological or pap smear visit in the last six months. Likelihood ratio tests yielded

mixed findings regarding model fit. Overall, the likelihood ratio tests favored the fuller models with one exception. Results of likelihood ratio tests indicated that adding individual attitudes, knowledge, and contraception use variables (Model 2) significantly improved model fit compared to the base model (Model 1). However, adding interpersonal variables (Model 3) did not significantly improve the model fit compared to Model 2. Adding in institutional policy factors in Model 4 significantly improved model fit compared to Model 3.

Annual Gynecological Visit: Model 1. In Model 1 on Table 6, the base health disparities model, there were significant subgroup differences by race. Non-Hispanic black women had two times higher odds of making an annual gynecological visit compared to white women, controlling for other variables (OR=2.01; $p<.05$). There were no statistically significant differences in making an annual gynecological visit by socioeconomic status or insurance status.

Annual Gynecological Visit: Model 2. Adding in individual pregnancy attitudes, knowledge, and contraception use in Model 2, women with strong pregnancy avoidance attitudes had lower odds of making an annual gynecological visit compared to those with weaker pregnancy avoidance attitudes. Compared to women with weaker pregnancy avoidance attitudes, the odds of making an annual gynecological visit were reduced by 54% for women with strong pregnancy avoidance attitudes (OR=.46; $p<.05$). Knowledge of birth control methods and past use of the pill did not have a significant influence on making an annual gynecological visit, controlling for other variables. The odds of making an annual gynecological visit were nearly twice as high for women who had used a LARC method at the last wave, compared to women who did not (OR=1.86; $p<.05$). Model 2 also illustrates that race remains significant.

Annual Gynecological Visit: Model 3. Model 3 on Table 6 adds in interpersonal variables and demonstrates that women whose doctor or nurse talked about future plans for children at

their last women's health care visit had 1.50 higher odds of making an annual gynecological visit compared to women whose doctors did not discuss this with them ($p<.05$). Contraceptive counseling and relationship status did not have a significant effect on making an annual gynecological visit.

Annual Gynecological Visit: Model 4. Looking at the full model (Model 4), the patterns are similar to Model 3 but facility type has a statistically significant effect on the odds of making an annual gynecological visit. Women who went to Planned Parenthood or another family planning clinic, or a student health clinic/some other type of health care facility in the last six months for a women's health care visit had lower odds of making an annual gynecological visit compared to those who went to a private doctor's office. Compared to women who went to a private doctor's office for their last women's healthcare visit, the odds of making an annual gynecological visit were reduced by 71% for women who went to Planned Parenthood or another family planning clinic for their last women's healthcare visit (OR=.29; $p<.001$). The odds of making an annual gynecological visit were reduced by 56% for women who went to a student health clinic or some other type of healthcare facility for their last WHC visit, compared to those who went to a private doctor's office (OR=.44; $p<.05$).

Visit payment method, having a regular place to go for medical care, and living in a Medicaid expansion state did not have a significant effect on the odds of making an annual gynecological visit, controlling for other variables. However, race and insurance status did have a significant effect on making an annual gynecological visit in Model 4. Non-Hispanic black women had 2.44 higher odds of making an annual gynecological visit compared to non-Hispanic white women ($p<.05$). Women with marketplace insurance had 2.43 higher odds of making an annual gynecological visit compared to women with private insurance ($p<.05$). Age also had a

significant effect on making an annual gynecological visit in all four models, with younger women having significantly lower odds of making a visit compared to older women.

DISCUSSION

This study utilized a nationwide survey of women to examine reproductive healthcare by incorporating information about individual attitudes, interpersonal variables, and institutional policy structures to provide a more holistic view on which elements are most or least influential in making a women's reproductive healthcare visit. Previous research has investigated these issues separately, but this study looks at all these factors together and for key subgroups. Results indicate that while some aspects are shared by all women, such as the majority of women having strong pregnancy avoidance attitudes regardless of subgroup, there are other significant differences patterned by systemic access factors such as race and ethnicity, insurance, and socioeconomic status. These findings illustrate the importance of examining reproductive healthcare both on an aggregate and subgroup level, because they may yield opposite findings. It also demonstrates how focusing solely on individual attitudes or institutional factors can tell different stories, so examining all three levels is important. As the literature review demonstrated, law and policy may not play out the same for all groups of women (Ross et al. 2016; Shane and Ayyagari 2014; Breslau et al. 2018; Smith and Medalia 2014; O'Hara and Brault 2013). This is important because despite shared pregnancy avoidance attitudes, the ability of women to access reproductive healthcare is patterned by existing systemic access inequalities.

Overall, findings from this study indicate that context matters when it comes to reproductive healthcare visits. Many of the patterns which operated in the birth control visit context were the opposite for the annual gynecological visit context. Individual attitudes, interpersonal variables, and institutional policy factors were all important and significant

influences on making a birth control visit, but institutional factors were the main factors driving making an annual gynecological visit. This illustrates that the drivers of sexual/reproductive healthcare visits are different from those of preventative reproductive healthcare visits. Moreover, interpersonal variables were particularly significant in the birth control visit context but not in the annual gynecological visit context. This aligns with previous research which links contraceptive use with relationship status (Campo et al. 2012; Reed et al. 2014). In addition, race was a significant predictor of making an annual gynecological visit but not a birth control visit. Black women had nearly two and a half times the odds of making an annual gynecological visit compared to white women. This could reflect the influence of interpersonal relationships, such as Warren-Jeanpiere's (2006) research on African American mother-daughter relationships and how mothers can strongly influence their daughters to get an annual gynecological visit. It could also reflect more pressure on African American women to get annual checkups or pap smears due to higher incidence and death rates of cervical cancer among minority women compared to white women (Benard et al. 2014; Shomo 2019). More research is needed to illuminate the reasons behind this racial difference in making an annual gynecological visit or pap smear.

Facility type played an important role in both types of women's reproductive healthcare visits. Women who went to Planned Parenthood or another family planning clinic for their last women's healthcare visit had nearly three times higher odds of making a birth control visit than women who went to a private doctor's office, while the opposite was true for preventative reproductive healthcare visits. Moreover, younger women (ages 18 to 26) had three times higher odds of making a visit for birth control or contraception compared to older women, but again the opposite was true for annual gynecological preventative healthcare visits. These findings mirror that of previous research which has shown teens prefer to go to family planning clinics for sexual

and reproductive health services (Oglesby 2014; Sugerman et al. 2000). This may explain why previous research did not find an increase in sexual and reproductive health service utilization due to the dependent coverage of the ACA (Eliason 2019). Teens or other groups of women may prefer to utilize Planned Parenthood for cost and confidentiality (Sugerman et al. 2000), or for additional dimensions of care, such as ease of getting care and medical staff treatment (Oglesby 2014). These findings may also explain why Eliason (2019) did not find an increase in utilization of sexual and reproductive health services after the dependent coverage provision of the ACA passed. Young women may prefer to go to facilities such as Planned Parenthood for birth control to protect their confidentiality, such as if they are still on a parent's health insurance plan and are worried about privacy. This carries important implications for policy, as women who are insured may still utilize public family planning centers for their birth control needs.

Socioeconomic status alone was not a significant predictor of the likelihood of making either a birth control visit or annual gynecological visit. However, insurance status was a key difference and driver of making visits. Uninsured women had lower odds of making a birth control visit compared to privately insured women, despite having the highest pregnancy avoidance attitudes. More research is needed to uncover the reasons behind this finding. It could be due to the cross-tabulation analyses finding that uninsured women had three to four times higher percentages of reporting that they did not have a regular place to go for medical care, compared to other insurance types. Or it could be that uninsured women fall into a "coverage gap", where they make too much to qualify for Medicaid insurance but cannot afford marketplace or private insurance. On the other hand, women with marketplace insurance had over twice the odds of making an annual gynecological visit compared to privately insured women. Marketplace insurance was significantly associated with preventative healthcare visits,

but not birth control visits. Taken together, these findings carry important implications for research on women's health disparities and reproductive healthcare policy. Rather than socioeconomic status, insurance type and status may be a stand-in and important driver of reproductive healthcare disparities.

One final important finding to note is that pregnancy avoidance attitudes were largely the same among all subgroups. There were no statistically significant differences in pregnancy avoidance attitudes by race/ethnicity, socioeconomic status, or insurance status. Most women in each subgroup expressed a strong pregnancy avoidance attitude, with percentages ranging from 53 percent to 63 percent. These findings illustrate that pregnancy avoidance is largely a shared attitude among the majority of women, even by subgroup, and the importance of creating equal reproductive healthcare access for all women. However, hormonal contraception use differed by subgroup, with use varying by race/ethnicity, socioeconomic status, and insurance status. Whether this reflects individual preferences or larger access issues is unknown. Previous research has demonstrated a gap between women's use and preference for certain contraceptive methods, particularly for groups such as the uninsured (Potter et al. 2017).

Limitations

One limitation is that the survey question about obtaining information about birth control and pregnancy prevention during the last women's healthcare visit did not ask if the information was requested or not, so it is unclear whether information was provided to the patient upon their request or not. Previous research has shown racial differences in pressure to use contraceptives by a clinician (Becker and Tsui 2008), raising questions about whether this information was given by patient request or not. However, including these visit questions can yield valuable information as to whether different levels matter equally or if some are more important than

others in healthcare visits, so it is imperative that they are included in the analyses. Another limitation to note is that the patterns and findings noted in this study may change drastically given the current COVID-19 pandemic, with many out of work and either losing employer-sponsored health coverage or not being able to afford insurance, as well as the Trump administration's attempts to abolish the Affordable Care Act. Both factors raise questions about insurance coverage and the future of healthcare, and could shift the findings and patterns found in this study in a major way.

CONCLUSION

As Krieger (2012) has written in her discussion of ecosocial theory, there are many different pathways of embodiment. In the words of Nancy Krieger, "no one is an individual one day and a member of a population another. Each person is both, simultaneously" (Krieger 2012:939). This study examined individual attitudes, interpersonal variables, and institutional policy factors to further untangle the web of reproductive health disparities, while recognizing that these influences are dynamic, overlapping, and co-constitutive. Findings illustrate that the relative importance of each level can depend on the context of the healthcare visit, such as whether a woman is seeking preventative reproductive healthcare or birth control. The factors that influence making a reproductive healthcare visit are different for birth control visits versus preventative visits. Individual attitudes and interpersonal interactions played a larger role in making a birth control visit than a preventative health care visit. Institutional variables such as insurance status and facility type mattered in both cases. These findings demonstrate the importance of looking at multiple levels, such as individual attitudes, doctor-patient interactions, and institutional policy factors, because the importance of each factor depends on the type of medical care involved. Considering the context in which services are received and the factors

influencing making a particular type of healthcare visit is essential because this can influence service uptake and shed light on where providers and policymakers can direct their efforts.

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Table 1. Aggregate Sample Characteristics (N=982)

	N	% or Mean (S.D.)
Dependent Variables		
Made a visit for birth control or contraception in the last six months	982	100.00
Yes	497	50.61
No	485	49.39
Made a visit for an annual gynecological visit or pap smear in the last six months	982	100.00
Yes	748	76.17
No	234	23.83
Individual Attitudes, Knowledge, & Contraception Use		
Pregnancy avoidance attitude	982	100.00
1 Not at all important to avoid pregnancy	128	13.03
2	36	3.67
3	71	7.23
4	109	11.10
5	98	9.98
6 Very important to avoid pregnancy	447	45.52
N/A (currently pregnant)	93	9.47
Knowledge of birth control methods *(scale of 1 to 6, from 1 "I know nothing" to 6 "I know everything)*	982	4.24 (1.02)
Used the pill at T1, T2, or T3	982	100.00
Yes	463	47.15
No	519	52.85
Used LARC method (IUD or implant) at T3	982	100.00
Yes	98	9.98
No	884	90.02
Interpersonal Variables		
Last WHC Visit: Doctor or nurse talked about plans for children	982	100.00
Yes	480	48.88
No	502	51.12
Last WHC Visit: Got information about birth control and pregnancy prevention		
Yes	403	41.04
No	579	58.96
Relationship status	982	100.00
Been together for 6 months or longer	801	81.57
Broken up but back together	27	2.75
Not together for 6 months or longer	53	5.40
N/A, not dating anyone	101	10.29
Institutional Policy Factors		
Last WHC visit – Facility	982	100.00
Private doctor's office or group practice	819	83.40
Planned Parenthood or other family planning clinic	62	6.31
Public health department or community health clinic	67	6.82
Student health clinic or some other type of health care facility	34	3.46
Last WHC visit - Payment	982	100.00
I paid some or all of the costs myself (including any insurance co-pays)	136	13.85
My insurance paid some or all of the costs	733	74.64
I received services at a reduced fee or the services were free	113	11.51
Regular place to go for medical care	982	100.00
Yes	857	87.27
No	125	12.73
Lives in a state that expanded Medicaid under ACA (as of December 2013)	982	100.00
Yes	639	65.07
No	343	34.93

Key Subgroups		
Race and ethnicity	982	100.00
White, Non-Hispanic	679	69.14
Black, Non-Hispanic	84	8.55
Other, Non-Hispanic	42	4.28
Hispanic	139	14.15
2+ Races, Non-Hispanic	38	3.87
Socioeconomic status	982	100.00
Less than 100%	149	15.17
100-199%	195	19.86
200%+	638	64.97
Insurance status	982	100.00
Private health insurance that I get through my job, school, a family member or that I pay for myself	705	71.79
Medicaid or some other government-sponsored health insurance	158	16.09
I don't have health insurance	62	6.31
Insurance obtained through a health insurance marketplace or exchange, such as www.healthcare.gov	57	5.80
Control Variables		
Marital Status	982	100.00
Married	478	48.68
Never married	303	30.86
Living with partner	162	16.50
Divorced or separated	39	3.97
Education	982	100.00
Less than high school	38	3.87
High school	107	10.90
Some college, no degree	226	23.01
Associate's degree	96	9.78
Bachelor's degree	348	35.44
Master's degree or professional or doctorate degree	167	17.01
Employment	982	100.00
Full-time	544	55.40
Part-time	121	12.32
Unemployed	317	32.28
Foreign-born	982	100.00
Yes	98	9.98
No	884	90.02
Age	982	100.00
18-26	389	39.61
27-30	254	25.87
31-36	258	26.27
37-39	81	8.25
Age, continuous (range: 18-39)	982	28.61 (5.15)

Table 2. Individual Pregnancy Attitudes, Knowledge, and Contraception Use, by Key Subgroup

	Race and Ethnicity					Socioeconomic Status			Insurance			
	White	Black	Other	Multiracial	Hispanic	Less than 100%	100-199%	200%+	Private	Medicaid	Marketplace	Uninsured
Pregnancy avoidance attitude												
1 Not at all important to avoid pregnancy	13.11	17.86	14.29	7.89	10.79	13.42	12.82	13.01	12.34	16.46	12.28	12.90
2	4.12	1.19	4.76	2.63	2.88	2.01	4.10	3.92	4.40	1.27	1.75	3.23
3	7.22	4.76	4.76	13.16	7.91	10.07	7.18	6.58	7.09	6.96	10.53	6.45
4	11.63	10.71	9.52	7.89	10.07	7.38	11.79	11.76	11.91	8.86	7.02	11.29
5	11.05	8.33	9.52	7.89	6.47	6.04	10.26	10.82	10.64	9.49	10.53	3.23
6 Very important to avoid pregnancy	42.71	50.00	45.24	52.63	54.68	51.68	43.08	44.83	44.68	43.04	47.37	59.68
Currently pregnant	10.16	7.14	11.90	7.89	7.19	9.40	10.77	9.09	8.94	13.92	10.53	3.23
Chi-square test of independence	X^2 (24, *N*=982)=18.26, *p*=.790					X^2 (12, *N*=982)=10.35, *p*=.585			X^2 (18, *N*=982)=21.19, *p*=.270			
Birth control methods knowledge												
Mean	4.24	4.42	4.31	4.39	4.06	4.16	4.11	4.30	4.24	4.12	4.42	4.32
Standard Deviation	(.97)	(1.16)	(1.07)	(1.08)	(1.14)	(1.16)	(1.13)	(.95)	(.97)	(1.16)	(1.24)	(1.02)
N	679	84	42	38	139	149	195	638	705	158	57	62
One-way ANOVA	F(4,977)=2.01, p=.091					F(2,979)=3.11, p=.045			F(3,978)=1.46, p=.224			
Used pill at T1, T2, or T3												
Yes	50.96	41.67	38.10	42.11	35.97	40.94	37.95	51.41	50.92	31.65	45.61	45.16
No	49.04	58.33	61.90	57.89	64.03	59.06	62.05	48.59	49.08	68.35	54.39	54.84
Chi-square test of independence	X^2 (4, *N*=982)=13.70, *p*=.008					X^2 (2, *N*=982)=13.58, *p*=.001			X^2 (3, *N*=982)=19.42, *p*=.000			
Used implant or IUD at T3												
Yes	9.28	5.95	2.38	13.16	17.27	10.07	9.23	10.19	10.92	8.23	7.02	6.45
No	90.72	94.05	97.62	86.84	82.73	89.93	90.77	89.81	89.08	91.77	92.98	93.55
Chi-square test of independence	X^2 (4, *N*=982)=13.23, *p*=.010					X^2 (2, *N*=982)=0.15, *p*=.926			X^2 (3, *N*=982)=2.65, *p*=.448			

Table 3. Interpersonal Variables, by Key Subgroup

	Race and Ethnicity					Socioeconomic Status			Insurance			
Doctor or nurse spent time talking with you about your future plans for having or not having children (or more children) at last women's health care visit	White	Black	Other	Multiracial	Hispanic	Less than 100%	100-199%	200%+	Private	Medicaid	Marketplace	Uninsured
Yes	49.48	44.05	42.86	60.53	47.48	46.98	46.15	50.16	48.94	50.00	52.63	41.94
No	50.52	55.95	57.14	39.47	52.52	53.02	53.85	49.84	51.06	50.00	47.37	58.06
Chi-square test of independence	X^2 (4, *N*=982)=3.67, *p*=.453					X^2 (2, *N*=982)=1.21, *p*=.546			X^2 (3, *N*=982)=1.60, *p*=.660			
Got information about birth control and pregnancy prevention at last women's health care visit												
Yes	39.03	47.62	50.00	50.00	41.73	53.02	36.92	39.50	37.87	45.57	54.39	53.23
No	60.97	52.38	50.00	50.00	58.27	46.98	63.08	60.50	62.13	54.43	45.61	46.77
Chi-square test of independence	X^2 (4, *N*=982)=5.32, *p*=.256					X^2 (2, *N*=982)=10.83, *p*=.004			X^2 (3, *N*=982)=12.26, *p*=.007			
Been together with partner for six months or longer												
Yes	83.65	58.33	88.10	73.68	85.61	71.81	83.59	83.23	84.68	72.78	68.42	80.65
Yes, though we have broken up and gotten back together during that time	1.77	10.71	0.00	5.26	2.88	4.70	3.08	2.19	1.70	6.33	5.26	3.23
No	4.57	8.33	4.76	13.16	5.76	10.07	4.10	4.70	3.83	9.49	10.53	8.06
N/A, not dating anyone	10.01	22.62	7.14	7.89	5.76	13.42	9.23	9.87	9.79	11.39	15.79	8.06
Chi-square test of independence	X^2 (12, *N*=982)=52.89, *p*=.000					X^2 (6, *N*=982)=13.84, *p*=.031			X^2 (9, *N*=982)=29.14, *p*=.001			

Table 4. Reproductive Healthcare Institutional Policy Factors, by Key Subgroup

	Race or Ethnicity					Socioeconomic Status			Insurance			
	White	Black	Other	Multiracial	Hispanic	Less than 100%	100-199%	200%+	Private	Medicaid	Marketplace	Uninsured
Current insurance												
Private	77.32	52.38	71.43	76.32	55.40	24.16	57.95	87.15	-	-	-	-
Medicaid	13.25	29.76	19.05	18.42	20.14	51.68	25.13	5.02	-	-	-	-
Marketplace	5.30	9.52	7.14	2.63	6.47	10.07	6.15	4.70	-	-	-	-
I don't have health insurance	4.12	8.33	2.38	2.63	17.99	14.09	10.77	3.13	-	-	-	-
Chi-square test of independence		X^2 (12, *N*=982)=68.27, *p*=.000				X^2 (6, *N*=982)=285.73, *p*=.000						
Regular place to go for medical care												
Yes	88.07	84.52	88.10	86.84	84.89	82.55	82.56	89.81	90.92	84.18	84.21	56.45
No	11.93	15.48	11.90	13.16	15.11	17.45	17.44	10.19	9.08	15.82	15.79	43.55
Chi-square test of independence		X^2 (4, *N*=982)=1.70, *p*=.790				X^2 (2, *N*=982)=10.59, *p*=.005				X^2 (3, *N*=982)=63.31, *p*=.000		
Place where you last received women's health care												
Private doctor's office or group practice	88.37	67.86	80.95	73.68	71.94	65.77	74.36	90.28	92.20	67.72	66.67	38.71
Planned Parenthood or other family planning clinic	4.42	10.71	7.14	13.16	10.79	16.11	7.69	3.61	2.41	11.39	24.56	20.97
Public health dept. or community health clinic	4.27	17.86	7.14	7.89	12.23	12.75	12.31	3.76	2.27	18.35	7.02	29.03
Student health clinic or some other type of health care facility	2.95	3.57	4.76	5.26	5.04	5.37	5.64	2.35	3.12	2.53	1.75	11.29
Chi-square test of independence		X^2 (12, *N*=982)=50.39, *p*=.000				X^2 (6, *N*=982)=73.27, *p*=.000				X^2 (9, *N*=982)=211.70, *p*=.000		
Made a visit in the last 6 months												
Annual gyn visit or pap smear												
Yes	74.96	85.71	83.33	68.42	76.26	73.83	73.33	77.59	77.16	74.05	82.46	64.52
No	25.04	14.29	16.67	31.58	23.74	26.17	26.67	22.41	22.84	25.95	17.54	35.48
Chi-square test of independence		X^2 (4, *N*=982)=7.21, *p*=.125				X^2 (2, *N*=982)=2.02, *p*=.364				X^2 (3, *N*=982)=6.65, *p*=.084		
Visit for birth control or contraception												
Yes	50.66	52.38	42.86	44.74	53.24	57.72	50.26	49.06	50.78	46.20	57.89	53.23
No	49.34	47.62	57.14	55.26	46.76	42.28	49.74	50.94	49.22	53.80	42.11	46.77

Chi-square test of independence	X^2 (4, *N*=982)=2.02, *p*=.731					X^2 (2, *N*=982)=3.64, *p*=.162			X^2 (3, *N*=982)=2.62, *p*=.455			
Women's health care visit payment												
Respondent paid	13.11	13.10	14.29	10.53	18.71	11.41	13.33	14.58	14.04	4.43	14.04	35.48
Insurance paid	78.50	65.48	66.67	81.58	61.87	63.09	68.21	79.31	81.84	69.62	63.16	16.13
Free or reduced fee	8.39	21.43	19.05	7.89	19.42	25.50	18.46	6.11	4.11	25.95	22.81	48.39
Chi-square test of independence	X^2 (8, *N*=982)=31.90, *p*=.000					X^2 (4, *N*=982)=56.23, *p*=.000			X^2 (6, *N*=982)=207.71, *p*=.000			
Lives in a state that expanded Medicaid												
Yes	65.83	47.62	78.57	73.68	65.47	65.77	69.23	63.64	63.12	77.22	68.42	53.23
No	34.17	52.38	21.43	26.32	34.53	34.23	30.77	36.36	36.88	22.78	31.58	46.77
Chi-square test of independence	X^2 (4, *N*=982)=16.05, *p*=.003					X^2 (2, *N*=982)=2.09, *p*=.351			X^2 (3, *N*=982)=15.54, *p*=.001			

Table 5. Nested Logistic Regression Models: Likelihood of Making a Visit for Birth Control or Contraception

	Model 1 **Health Disparities Model** OR (95% CI)	**Model 2** **Model 1+ Individual Attitudes, Knowledge, & Contraception Use** OR (95% CI)	**Model 3** **Model 2 + Interpersonal Variables** OR (95% CI)	**Model 4** **Model 3+Institutional Policy Factors** OR (95% CI)
Individual Attitudes, Knowledge, & Contraception Use				
Pregnancy avoidance attitude				
2		2.73* (1.13 - 6.63)	2.39 (.95 - 6.00)	2.46 (.97 - 6.24)
3		3.45** (1.68 - 7.09)	3.05** (1.43 - 6.51)	3.04** (1.41 - 6.52)
4		3.62*** (1.91 - 6.85)	2.67** (1.37 - 5.23)	2.59** (1.31 - 5.11)
5		4.78*** (2.45 - 9.30)	3.32** (1.64 - 6.70)	3.27** (1.61 - 6.63)
6 Very important to avoid pregnancy		6.22*** (3.60 - 10.75)	4.44*** (2.47 - 7.99)	4.39*** (2.43 - 7.94)
Currently pregnant		.23** (.10 - .58)	.26** (.11 - .67)	.26** (.10 - .65)
Knowledge of birth control methods		1.07 (.91 - 1.25)	1.06 (.90 - 1.25)	1.08 (.91 - 1.28)
Past use of the pill		5.71*** (4.07 - 8.00)	5.56*** (3.90 - 7.92)	5.89*** (4.10 - 8.47)
LARC at last wave		.71 (.43 - 1.19)	.81 (.47 - 1.38)	.82 (.48 - 1.41)
Interpersonal Variables				
Visit: Doctor or nurse talked about future plans for children			.69 (.47 - 1.03)	.71 (.47 - 1.06)
Visit: Got info about birth control and pregnancy prevention			3.87*** (2.58 - 5.79)	3.79*** (2.52 - 5.71)
Relationship status				
Broken up but back together			1.79 (.58 - 5.53)	1.59 (.52 - 4.85)
Not together for six months or longer			.61 (.30 - 1.26)	.54 (.26 - 1.15)
Not dating anyone			.41** (.22 - .74)	.38** (.21 - .69)
Institutional Policy Factors				
Visit: Facility type				
Planned Parenthood or other family planning clinic				2.71* (1.16 - 6.30)
Public health dept. or community health clinic				1.85 (.86 - 3.95)
Student health clinic or some other type of healthcare facility				1.03 (.41 - 2.57)
Visit: Payment				
Insurance paid				1.10 (.67 - 1.80)
Reduced fee or free services				1.36 (.65 - 2.86)
Has a regular place to go for medical care				.69 (.39 - 1.19)
Lives in a state that expanded Medicaid under ACA				.89 (.63 - 1.27)

Key Subgroups				
Race and ethnicity				
Black	.85 (.51 - 1.40)	1.08 (.60 - 1.92)	.97 (.53 - 1.77)	.88 (.47 - 1.62)
Other	.93 (.45 - 1.92)	1.20 (.51 - 2.83)	1.01 (.41 - 2.48)	1.05 (.43 - 2.61)
Hispanic	1.21 (.79 - 1.86)	1.52 (.91 - 2.52)	1.45 (.86 - 2.46)	1.41 (.83 - 2.41)
Multiracial	.63 (.31 - 1.27)	.67 (.30 - 1.48)	.55 (.24 - 1.26)	.50 (.21 - 1.18)
Socioeconomic status				
100-199%	.75 (.46 - 1.22)	.78 (.44 - 1.37)	.89 (.49 - 1.62)	.88 (.48 - 1.61)
200%+	.74 (.46 - 1.20)	.58 (.33 - 1.02)	.64 (.35 - 1.16)	.65 (.36 - 1.19)
Insurance status				
Medicaid	.55* (.35 - .87)	.88 (.52 - 1.49)	.73 (.41 - 1.28)	.61 (.34 - 1.11)
Uninsured	.83 (.45 - 1.51)	.69 (.34 - 1.39)	.54 (.26 - 1.14)	.32** (.14 - .75)
Marketplace	1.03 (.57 - 1.88)	1.29 (.62 - 2.68)	1.09 (.50 - 2.35)	.81 (.36 - 1.81)
Control Variables				
Marital status				
Never married	1.89*** (1.34 - 2.66)	.87 (.57 - 1.31)	1.28 (.79 - 2.07)	1.35 (.83 - 2.20)
Living with partner	1.67* (1.11 - 2.53)	1.05 (.65 - 1.72)	1.26 (.76 - 2.10)	1.22 (.73 - 2.04)
Divorced or separated	1.45 (.73 - 2.88)	.77 (.34 - 1.70)	.94 (.39 - 2.24)	.97 (.40 - 2.34)
Employment status				
Part-time	1.94** (1.22 - 3.07)	1.58 (.93 - 2.68)	1.71 (.98 - 2.98)	1.64 (.93 - 2.88)
Full-time	1.40* (1.00 - 1.95)	1.34 (.90 - 1.98)	1.39 (.93 - 2.08)	1.35 (.90 - 2.04)
Educational attainment				
High school	.70 (.31 - 1.57)	.72 (.29 - 1.80)	.49 (.19 - 1.29)	.60 (.23 - 1.60)
Some college, no degree	.89 (.42 - 1.90)	1.12 (.47 - 2.65)	.72 (.29 - 1.80)	.85 (.34 - 2.14)
Associate's degree	.80 (.34 - 1.87)	.82 (.31 - 2.15)	.58 (.21 - 1.58)	.65 (.24 - 1.81)
Bachelor's degree	.71 (.33 - 1.55)	.75 (.31 - 1.81)	.49 (.19 - 1.26)	.57 (.22 - 1.47)
Master's, professional, or doctorate degree	.61 (.26 - 1.39)	.72 (.28 - 1.86)	.45 (.16 - 1.21)	.51 (.18 - 1.39)
Age				
18-26	4.02*** (2.29 - 7.04)	3.61*** (1.90 - 6.84)	3.13** (1.60 - 6.12)	3.01** (1.53 - 5.93)
27-30	2.17** (1.24 - 3.83)	2.26* (1.18 - 4.31)	2.19* (1.11 - 4.29)	2.17* (1.10 - 4.30)
31-36	1.87* (1.06 - 3.29)	1.81 (.96 - 3.44)	1.76 (.90 - 3.42)	1.79 (.91 - 3.52)
Foreign-born	.89 (.53 - 1.50)	.66 (.36 - 1.20)	.59 (.32 - 1.10)	.57 (.31 - 1.07)
Constant	.46 (.18 - 1.20)	.07*** (.02 - .27)	.09** (.02 - .38)	.10** (.02 - .53)
Observations	982	982	982	982
Log-likelihood	-624.81	-493.29	-461.89	-455.02
Log-likelihood ratio test p-value		.000	.000	.056

Note. *** p<.001, ** p<.01, * p<.05. Reference categories are respectively: White; Less than 100% FPL; Private insurance; Married; Unemployed; Less than High School; Age 37-39; Not foreign-born; Pregnancy avoidance attitude of 1; No past use of the pill; No LARC at last wave; Doctor didn't talk about future plans for children; Didn't get information about birth control; Together for six months or longer; Private doctor's office; Respondent paid; No regular place for medical care; Lives in a state that did not expand Medicaid under ACA.

Table 6. Nested Logistic Regression Models: Likelihood of Making an Annual Gynecological Visit

	Model 1 **Health Disparities Model**	**Model 2** **Model 1+ Individual Attitudes, Knowledge, & Contraception Use**	**Model 3** **Model 2 + Interpersonal Variables**	**Model 4** **Model 3+Institutional Policy Factors**
	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
Individual Attitudes, Knowledge, & Contraception Use				
Pregnancy avoidance attitude				
2		.98 (.34 - 2.81)	1.04 (.36 - 3.00)	1.003 (.35 - 2.88)
3		.97 (.41 - 2.27)	1.05 (.45 - 2.48)	1.06 (.44 - 2.53)
4		.73 (.36 - 1.48)	.80 (.39 - 1.65)	.84 (.41 - 1.74)
5		.54 (.27 - 1.10)	.62 (.30 - 1.28)	.64 (.31 - 1.33)
6 Very important to avoid pregnancy		.46* (.26 - .83)	.54* (.30 - .99)	.56 (.31 - 1.04)
Currently pregnant		.29*** (.15 - .57)	.30** (.15 - .60)	.31** (.16 - .61)
Knowledge of birth control methods		1.01 (.87 - 1.19)	1.02 (.87 - 1.20)	1.01 (.86 - 1.19)
Past use of the pill		1.25 (.89 - 1.75)	1.30 (.92 - 1.83)	1.25 (.88 - 1.78)
LARC at last wave		1.86* (1.01 - 3.40)	1.80 (.98 - 3.32)	1.82 (.98 - 3.37)
Interpersonal Variables				
Visit: Doctor or nurse talked about future plans for children			1.50* (1.04 - 2.16)	1.45 (1.00 - 2.10)
Visit: Got info about birth control and pregnancy prevention			.76 (.52 - 1.11)	.84 (.56 - 1.24)
Relationship status				
Broken up but back together			1.18 (.40 - 3.51)	1.17 (.39 - 3.51)
Not together for six months or longer			1.27 (.58 - 2.74)	1.39 (.63 - 3.07)
Not dating anyone			.76 (.42 - 1.35)	.78 (.43 - 1.41)
Institutional Policy Factors				
Visit: Facility type				
Planned Parenthood or other family planning clinic				.29*** (.14 - .56)
Public health dept. or community health clinic				.56 (.28 - 1.10)
Student health clinic or some other type of healthcare facility				.44* (.20 - .98)
Visit: Payment				
Insurance paid				1.01 (.62 - 1.63)
Reduced fee or free services				.80 (.40 - 1.58)
Has a regular place to go for medical care				1.00 (.62 - 1.64)
Lives in a state that expanded Medicaid under ACA				.98 (.69 - 1.38)

Key Subgroups				
Race and ethnicity				
Black	2.01* (1.02 - 3.95)	2.10* (1.05 - 4.18)	2.11* (1.05 - 4.23)	2.44* (1.18 - 5.04)
Other	1.09 (.44 - 2.71)	1.24 (.49 - 3.14)	1.33 (.52 - 3.39)	1.46 (.55 - 3.87)
Hispanic	1.02 (.63 - 1.66)	1.02 (.62 - 1.67)	1.00 (.61 - 1.64)	1.06 (.64 - 1.77)
Multiracial	.75 (.36 - 1.56)	.74 (.35 - 1.58)	.69 (.32 - 1.47)	.81 (.37 - 1.76)
Socioeconomic status				
100-199%	.92 (.54 - 1.56)	.97 (.57 - 1.66)	.95 (.55 - 1.64)	.92 (.52 - 1.60)
200%+	.96 (.56 - 1.62)	.99 (.58 - 1.70)	.98 (.57 - 1.68)	.88 (.50 - 1.53)
Insurance status				
Medicaid	1.00 (.61 - 1.66)	1.05 (.63 - 1.77)	1.04 (.61 - 1.75)	1.23 (.70 - 2.14)
Uninsured	.57 (.30 - 1.06)	.56 (.29 - 1.06)	.57 (.30 - 1.09)	.93 (.44 - 1.97)
Marketplace	1.66 (.79 - 3.48)	1.77 (.83 - 3.74)	1.76 (.82 - 3.75)	2.43* (1.09 - 5.40)
Control Variables				
Marital status				
Never married	1.29 (.87 - 1.91)	1.38 (.90 - 2.12)	1.55 (.96 - 2.50)	1.53 (.94 - 2.49)
Living with partner	1.29 (.81 - 2.06)	1.35 (.83 - 2.19)	1.38 (.85 - 2.25)	1.46 (.89 - 2.41)
Divorced or separated	1.68 (.66 - 4.29)	1.68 (.64 - 4.37)	1.72 (.64 - 4.63)	1.66 (.61 - 4.51)
Employment status				
Part-time	.71 (.44 - 1.15)	.65 (.39 - 1.06)	.64 (.39 - 1.06)	.69 (.41 - 1.15)
Full-time	1.36 (.94 - 1.99)	1.27 (.87 - 1.86)	1.26 (.86 - 1.85)	1.29 (.87 - 1.92)
Educational attainment				
High school	2.25 (.94 - 5.39)	2.63* (1.08 - 6.40)	2.57* (1.04 - 6.33)	2.10 (.83 - 5.31)
Some college, no degree	1.55 (.70 - 3.47)	1.60 (.70 - 3.63)	1.62 (.70 - 3.72)	1.37 (.58 - 3.25)
Associate's degree	1.43 (.58 - 3.51)	1.63 (.65 - 4.09)	1.54 (.61 - 3.91)	1.35 (.52 - 3.51)
Bachelor's degree	2.05 (.89 - 4.71)	2.22 (.95 - 5.18)	2.14 (.91 - 5.06)	1.87 (.77 - 4.54)
Master's, professional, or doctorate degree	2.15 (.86 - 5.32)	2.21 (.88 - 5.59)	2.20 (.86 - 5.62)	1.94 (.74 - 5.09)
Age				
18-26	.24** (.10 - .54)	.24** (.10 - .57)	.23** (.10 - .56)	.23** (.10 - .56)
27-30	.23** (.10 - .54)	.25** (.11 - .59)	.24** (.10 - .57)	.23** (.10 - .55)
31-36	.44 (.19 - 1.02)	.46 (.19 - 1.09)	.44 (.18 - 1.04)	.40* (.17 - .97)
Foreign-born	1.81 (.93 - 3.50)	1.80 (.92 - 3.53)	1.84 (.94 - 3.63)	1.98 (.98 - 3.99)
Constant	4.43* (1.38 - 14.24)	5.62* (1.36 - 23.27)	4.69* (1.11 - 19.81)	6.50* (1.29 - 32.78)
Observations	982	982	982	982
Log-likelihood	-508.80	-495.28	-491.88	-480.93
Log-likelihood ratio test p-value		.001	.237	.003

Note. *** p<.001, ** p<.01, * p<.05. Reference categories are respectively: White; Less than 100% FPL; Private insurance; Married; Unemployed; Less than High School; Age 37-39; Not foreign-born; Pregnancy avoidance attitude of 1; No past use of the pill; No LARC at last wave; Doctor didn't talk about future plans for children; Didn't get information about birth control; Together for six months or longer; Private doctor's office; Respondent paid; No regular place for medical care; Lives in a state that did not expand Medicaid under ACA.

AIM #2: Controlling Birth Control? State-Level Conditions Influencing Availability of Telecontraception Platforms

Telemedicine is a growing area of healthcare with the potential to cut costs and increase access, particularly for underserved and rural populations (Centers for Disease Control and Prevention 2020). The current COVID-19 crisis is raising many questions about health care delivery and the use of telemedicine. One emerging segment of telemedicine is the rise of telecontraception platforms, such as Nurx, Planned Parenthood Direct, and Pill Club, which deliver birth control directly to consumers through the mail or pharmacy pickup. These platforms represent a growing market and innovative approach that aims to address barriers in obtaining contraception in the United States. On-demand birth control services can help meet the needs of women who reside far from clinics or in contraceptive deserts, who lack the time or resources to go to a doctor to obtain or refill a birth control prescription, or who face long wait times for an appointment (Sundstrom et al. 2019; Grindlay and Grossman 2016; Chuck 2017). Research has demonstrated women's positive attitudes toward telecontraception, such as the potential to reduce wait times and increase knowledge of birth control methods (Sundstrom et al. 2019).

However, currently it is not known whether telecontraception platforms increase accessibility to contraception for those who face barriers or whether they simply make it more convenient for those who already have access (Dorland, Fowler, and Morain 2019; Zuniga et al. 2020). Recent studies have begun to look at issues of access by mapping out characteristics across telecontraception platforms, such as cost, age requirements, and state availability (Zuniga et al. 2020; Dorland, Fowler, and Morain 2019). As access to the internet and apps increase, online platforms increasingly employ a rhetoric of "choice" and "empowerment" (Lupton 2016; Lupton 2018). However, consumers are still subject to laws and policies regarding the dispensing

and prescribing of birth control. One study found that 39 percent of requests did not get filled from Nurx (Wollum et al. 2018). Barriers due to policy, legislation, cost, or insurance may all be possible explanations for why these requests were not filled. Policy and legislation can affect the reach of telecontraception platforms across states by dictating a platform's ability to prescribe and/or dispense medications, limiting the ability of patients to access these services, yet less is known about what affects these factors. Technological innovations are subject to the social context from which they emerge (MacKenzie and Wajcman 1999). Political, social, economic, and legislative factors all combine to influence state climates. Therefore, theoretical and sociological issues are at stake in an investigation of what influences states to provide access and availability to telecontraception.

This research addresses this knowledge gap by using fuzzy-set qualitative comparative analysis (fsQCA; Ragin 2000; Ragin 2008a; Ragin 2008b) to investigate state-level conditions found in states with high availability of telecontraception platforms. This method provides an opportunity for new insights on the social, economic, political, and legislative influences on technological innovations such as telecontraception because it focuses on the *combinations* of these multiple influences associated with telecontraception availability in a state. Reproductive rights activism often focuses on political factors, but other state-level conditions can also influence policy in combination with other conditions. Using fsQCA can provide a more realistic picture of the influences on telecontraception availability because it investigates how state-level conditions combine and operate with one another to pattern access. Telemedicine implementation is affected by various stakeholders with competing interests and visions (Greenhalgh et al. 2012). Despite their powerful influence on decision-making, research examining the role of political and cultural characteristics of telemedicine play in controlling

access to telemedicine are understudied (Wade, Gray, and Carati 2017). What combination of state-level conditions influence telecontraception platform availability? Investigating the state-level conditions that pattern availability of telecontraception platform services is critical to illuminate the ability of these platforms to offer equitable access to telecontraception, or whether reproductive healthcare disparities remain despite these emerging technologies. Providing an analysis of state-level conditions affecting telecontraception platform access and availability can also help inform broader telehealth measures, interventions, and policy, areas of increasing importance during the current COVID-19 pandemic.

LITERATURE REVIEW

Overview of Telecontraception Platforms

Nurx, Planned Parenthood Direct, and Pill Club are all examples of telecontraception platforms which provide birth control and other reproductive healthcare services via an app or website. Telecontraception platforms deliver birth control directly to customers or provide a prescription that a customer can pick up at a pharmacy. Customers download the app or go to the company website, create a profile with their contact information, and answer health history questions. Platforms differ on the degree of interaction between patients and providers, such as messaging versus video consultations (Dorland, Fowler, and Morain 2019). Users have the option to use an existing prescription or request a new prescription. They also have the option to use insurance or pay out of pocket. While billing through insurance for contraception costs nothing to the customer under the Affordable Care Act (with the exception of religious employers who may choose not to cover contraception (U.S. Centers for Medicare & Medicaid Services 2020)), the cost of paying for birth control without a prescription varies depending on the platform and whether the drug is a brand name or a generic equivalent. A licensed member of

the medical team in the user's state (either a doctor, nurse practitioner, or physician assistant) then reviews, fills, and sends the prescription directly to the customer.

Telecontraception platforms are growing in number and reach. Previous research has identified more than eight telecontraception platforms providing birth control prescriptions by mail or pharmacy pickup (Dorland, Fowler, and Morain 2019; Zuniga et al. 2020), with additional platforms available outside of the U.S. only (Ibis Reproductive Health 2020). Nurx, a startup telecontraception company, provides care to over 300,000 patients monthly (Shieber 2020; Landi 2020). Less is known about who utilizes telecontraception platforms, although limited research has been conducted on Nurx users and attitudes toward telecontraception in general (Wollum et al. 2018; Sundstrom et al. 2019). One study found that contraception requests on the Nurx platform jumped from 3 per day in 2015 to 127 per day in 2017 (Wollum et al. 2018). According to Nurx's founder, the largest amount of sign-ups comes from Texas, a state with the highest number of contraceptive deserts in the United States (Chuck 2017).

The Social Shaping of Technology

The social shaping of technology (SST) is a theoretical framework arguing that technological design and advances are inseparable from the social context in which they emerge (MacKenzie and Wajcman 1999). Social, economic, and political factors influence technology at all stages, from design to implementation. Many different choices, decisions, and actors are involved with technology so that technology and society cannot be considered distinct entities; rather, they are intertwined and mutually shape one another (Kitchin 2014; Latour 1987; Winner 1986; O'Neil 2016; Devlin 2018; Eubanks 2018; Cowen 1983). Despite these mutually reinforcing factors, rhetoric around technology still often portrays technological innovations and inventions as a "techno-utopia" where technology is viewed as the solution to all of humanity's

problems (Rogers 1995; Winner 1986; Wajcman 2004; Nakamura 2009; boyd & Crawford 2012; Mosco 2014; Devlin 2018; Zuboff 2019). This rhetoric ignores the power, control, and tools that certain groups hold over others at all stages of technological innovation.

Prescription birth control is a prime example of SST. Many different political and social decisions, factors, and stakeholders shape and are shaped by this technology. Even as technology advances to produce online platforms that can aid in the delivery of healthcare through a tap on a smartphone, legislation affects access to prescriptions and birth control. Mort and Finch (2005:68) argue that the telemedicine literature paints telemedicine as a neutral, "value free" technology but that it cannot be separated from place-based political contexts. Stakeholders with competing interests and visions can affect the implementation of telemedicine initiatives (Greenhalgh et al. 2012), and legislation is one area in which this plays out. States dictate whether a telecontraception platform can prescribe and dispense prescription birth control. Thus, although these platforms aim to meet the reproductive healthcare needs of women across the United States through technological innovation, the ability of women everywhere to access these services is not patterned equally due to on-the-ground as well as policy factors. These competing forces illustrate that technological innovations are not a value-free, neutral occurrence but are heavily influenced by the social, economic, and political conditions present as they emerge.

Political and Legislative Influences on Contraception

By design, internet platforms of all kinds aim to disrupt the restrictions of place, allowing individuals around the globe access to information, goods, and services that may not be available where they live. However, platforms can be subject to place-based regulation, and regulation is influenced by regional stakeholders. Although platforms are portrayed as technology without borders, platforms are still very much shaped by on-the-ground forces such as gatekeepers and

local decision-makers (Zuboff 2019; Srnicek 2017). Regulations can affect the reach of telecontraception platforms across states by dictating a platform's ability to prescribe and/or dispense medications. Thus, regulatory forces shaped by local political and social contexts can expand or limit the power of telecontraception platforms to reach the individuals that demand their services.

For example, in the United States, access to telecontraception platform services differs by state: Nurx provides telecontraception services to 30 states and Pill Club prescribes to 42 states (Nurx Inc. 2020; Pill Club 2020). These lists frequently change as telecontraception platforms gain authority and access to more and more states. Furthermore, regulatory practices can produce discrepancies in what a platform can provide even within a single state. As one example, Pill Club can dispense to customers in North Dakota but cannot write prescriptions for these residents (Pill Club 2020). States differ on their telemedicine policies such as reimbursement, yet research has not examined the causes of these differences (Trout et al. 2017). Research investigating telemedicine implementation has found that policy and legislation is a determinant and prerequisite for successful telemedicine initiatives (Broens et al. 2007).

Legal barriers are replacing technological barriers in telemedicine implementation (Daley 2000). For example, Nurx has cited anti-abortion groups and conservative lawmakers as two sources of resistance to telecontraception platforms (Chuck 2017). Conflicting stakeholders and interests place different values on particular aspects of telemedicine, such as clinical quality versus return on investment, and these competing visions and priorities can affect telemedicine implementation (Greenhalgh et al. 2012). Debates and tensions among these stakeholders, such as physicians, pharmacists, pharmaceutical and insurance companies, may also play a role in lobbying in ways that influence legislation in specific states. Despite the influential role politics

play in telemedicine initiatives, limited research has been conducted on the political and cultural characteristics of telemedicine (Wade, Gray, and Carati 2017; Greenhalgh et al. 2012; Bareiss 2001).

States are a major player in this process because they determine where telecontraception platforms can prescribe and dispense contraception to customers. The ability of a platform to provide its services to customers is thus not solely up the platform and the technology but is dictated by regulations which act as a gatekeeper. Therefore, although platforms are in the process of adding more states to their lists, customers in different states may not have equal access to these services. Less is known about which specific state-level factors influence the availability and access of telecontraception platforms across states. For example, Nurx's co-founder cited wait times for doctor licensing approval as the main obstacle to gaining access in each state (Klabusich 2017). Other political, economic, and social factors beyond licensing may also influence state policy on telecontraception platform access and availability.

The proportion of women to men in state legislative roles. One important factor which could influence state-level policy on telecontraception platform access and availability is the proportion of women to men in state-level policymaking roles. These positions of power create and influence policy, so it is possible that having greater proportions of women with interest in women's issues, such as reproductive healthcare access, could result in increased availability of telecontraception platforms. Rising numbers of women in the legislature means that women's representation in policymaking positions is increasing, along with the potential to push for legislation representing women's issues. States with higher proportions of women representatives propose more bills pertaining to women, children, and families compared to men and also compared to states with lower proportions of women representatives (Volden, Wiseman

& Wittmer 2018; Thomas 1991; Saint-Germain 1989), regardless of political party (Volden, Wiseman and Wittmer 2018). International research has also found that women legislators were more likely to represent and advance women's rights and interests compared to male legislators (Tam 2020; Tam 2017). The organizational environment, in terms of support through increased representation and proportions of women in these roles, is hypothesized to play a role in these findings (Thomas 1991; Saint-Germain 1989). However, one study found that while women legislators introduced more bills on women's issues, they have lower success rates of becoming law (Volden, Wiseman and Wittmer 2018).

State-level political party dominance. Another important factor to consider in telecontraception platform policy and legislation is the political control of a state. States can be categorized as Democrat, Republican, split, or nonpartisan depending on the partisan composition of the state legislature and governor (National Conference of State Legislatures 2020). Divergent values and viewpoints of each political party are linked with reproductive healthcare issues such as women's access to birth control and abortion, which are then translated into policy, restrictions, and legislation. These beliefs largely coincide with political party affiliation: a survey by Pew Research Center (2019) found that 82 percent of Democrats support legal abortion, compared to 36 percent of Republicans. At the state level, actions to overturn Roe vs. Wade largely consist of Republican lawmakers and anti-abortion groups (Sonmez 2020).

Anti-abortion groups and social conservatives support Republican administrations and pressure these political administrations for restrictive policies on birth control and abortion (Bryson, Légier, and Ribieras 2018; Dreweke 2018). For example, legislation by the Trump administration allows employers to decline contraception coverage for their employees based on personal religious or moral reasons (U.S. Centers for Medicare & Medicaid Services 2020;

Adamczyk 2020). Nearly half of the states in the U.S. have some type of law dictating actions surrounding moral or religious objections to filling certain prescriptions, such as oral contraceptives or emergency contraception (Chiarello 2011). Some states have a "conscience clause" for medical providers that allows them to opt out of medical processes or procedures for moral or religious reasons, while other states have "duty-to-dispense" laws or "refuse-and-refer" laws which entail stricter enforcement of filling prescriptions (Chiarello 2011; Berlinger 2008; Harrington 2006).

Given this link between state political party control and reproductive healthcare policy and legislation, it is logical that this connection would extend to telecontraception. Platforms which aim to increase the accessibility and availability of birth control may be at odds with the ideology and beliefs of certain political groups and parties who hold the power to write the rules and policies dictating their use. On the other hand, similar viewpoints which align with the philosophy of accessible, available birth control could accelerate policies and legislation granting the authority of telecontraception platforms to dispense and prescribe birth control in a state. Research is needed to illuminate whether the connection between state-level political party and access to contraception extends to telecontraception.

Economic Factors Shaping Telecontraception Platform Availability

State conditions affecting the access and availability of telecontraception platforms may also be driven by economic considerations, such as the impact of federal policies that influence state funding for reproductive health, the proportion of uninsured women in a state, and the proportion of rural to urban residents, which can also shape state-level health care delivery costs. Telemedicine is often discussed in terms of cutting costs and increasing healthcare access, particularly for underserved and rural populations (Centers for Disease Control and Prevention

2020). States have their own economic and financial constraints which may shape the availability of telecontraception platforms. For example, some states have had to make financial decisions regarding their budgets for family planning clinics in response to the Trump administration's "gag rule" barring clinics from providing abortion referrals if they receive federal funds under Title X (Modern Healthcare 2020). The gag rule has diminished the capacity of family planning clinics to provide services to their patients, with some states more impacted than others (Dawson 2020). These political decisions and changes at the federal level have effects at the state level, typically by restricting access to federal funds, which can then affect state-level policy. States that face funding constraints on family planning services such as contraception may be more open to telecontraception platforms to mitigate the financial pressures as well as provide services to patients in need.

The proportion of uninsured women in a state. Related to this issue are the economic and financial pressures of states to meet the needs of their uninsured populations. Just over 11 percent of women aged 19 to 64, or 11.1 million women, in the United States were uninsured in 2019 (Kaiser Family Foundation 2021). Family planning clinics provide free or reduced fee services but given the increased economic and financial pressures faced by states regarding family planning clinic funding, patients may face increasing barriers to accessing the care they need. Although the Affordable Care Act (ACA) has increased insurance coverage rates, disparities persist by race and ethnicity (Shane and Ayyagari 2014; Breslau et al. 2018; Smith and Medalia 2014; O'Hara and Brault 2013). Rates of uninsurance are not patterned equally and can exacerbate existing economic disparities. States with higher numbers of uninsured women may thus look to other, market-based options such as telecontraception platforms in attempt to

alleviate some of the financial and economic pressure to ensure reproductive healthcare access to their uninsured populations.

The proportion of a state population that is rural. Telecontraception platforms also have the potential to overcome geographic restrictions and barriers to accessing in-person reproductive healthcare, provided that women have access to the internet. States with larger rural populations may have limited resources for family planning clinics and services. Geographical barriers and smaller populations can pose issues of access and service availability for patients in need of reproductive healthcare services, such as long wait or travel times (Sundstrom et al. 2019). There may be fewer clinics in rural areas which could place greater pressure on existing clinics. States with higher numbers of rural residents may thus turn to telehealth initiatives to better serve the needs of their populations. A qualitative interview study of women living in rural South Carolina found that women discussed the potential of telehealth contraception to fill an existing gap by reducing cost, wait, and travel times and also providing knowledge and information about different contraception options (Sundstrom et al. 2019).

Rural areas may also have a smaller variety of contraception options. For example, a nationwide survey of community health centers showed that rural and suburban community health centers provide less options for contraception compared to urban health centers, such as long-acting reversible contraception options like IUDs and implants as well as emergency contraception such as Plan B (Packtor 2018). Less access to long-acting reversible contraception methods and emergency contraception can raise the risk of unintended pregnancy (Packtor 2018). One study found higher adolescent birth rates for women living in rural areas with health professional shortages compared to women living in urban counties (Orimaye et al. 2020). States with rural populations may grant greater prescribing and dispensing authority to

telecontraception platforms since they can provide an array of contraception options and information, while also reducing access issues such as long wait or travel times.

METHODS

Data

This study draws from an original dataset constructed from a variety of public-use websites of state-level factors for all fifty states hypothesized to influence telecontraception platform access and availability. The method of fsQCA is well-suited for this research question because it allows for an investigation of multiple factors such as the social, economic, political, and legislative conditions across states and how they combine to pattern telecontraception availability. The total sample size of 50 fits the characteristics of fsQCA, which is suitable when analyzing small samples like this one (Fainshmidt et al. 2020). As an analytical tool, fsQCA is used to analyze samples that are larger than case studies but smaller than those needed to support multiple regression analyses (Fainshmidt et al. 2020). Missing data was minimal; one variable had three missing values and another variable had one missing value, so the final sample size was 46 states. This study was approved by the University of Wisconsin-Milwaukee Institutional Review Board (IRB #20.339).

Measures

Outcome variable. The outcome variable for this study is the *availability of telecontraception platforms* in each state as of 2019. This is operationalized as the number of companies providing telecontraception services that are available to residents in a state. Information about telecontraception platform availability across states comes from previous research that mapped out characteristics across telecontraception platforms, such as cost, age requirements, and state availability (Zuniga et al. 2020; Dorland, Fowler, and Morain 2019). The

number of telecontraception platforms available in each state as of February 2019 was obtained from Dorland, Fowler, and Morain's (2019) research and compiled into a dataset. This outcome variable serves as a proxy for policy regarding the dispensing and prescribing authority of a telecontraception company in a state, since it measures the number of companies available to provide telecontraception services to residents within a given state. The number of platforms ranged from two to five or more services. Telecontraception platform availability was coded as "high" if the number of services were three or more, and "low" if a state had two services. This was coded as a dichotomous variable (1 = high availability; 0 = low availability). Sensitivity analyses were conducted using alternative categorizations of all variables used in this study (see Appendix B).

Condition variables. Four condition variables were hypothesized to pattern telecontraception platform availability: state political control, proportion of women legislators in each state, proportion of a state population that is rural, and proportion of uninsured women. Data for state political control and proportion of women legislators are from 2019 and were obtained from the National Conference of State Legislatures (NCSL) website (National Conference of State Legislatures 2019; National Conference of State Legislatures 2020). *State political control* examines the party control of each state legislature and governorship. Values consisted of 1 = Democrat control, 0 = Republican control, and 0.5 = divided state control. There was one missing value for this state control variable (Nebraska, which has a nonpartisan unicameral state legislature). This variable groups together state legislature control (Democrat, Republican, or divided) and governor (Democrat or Republican). Sensitivity analyses separated out this single variable into two separate variables. Since fsQCA software does not count cases with values of 0.5 on any of the causal conditions, states with divided state control needed to be

coded as values of 0.4 or 0.6 (Charles Ragin, personal communication, March 4, 2021). This is because a value of 0.5 represents an exact middle ground and needs to be categorized "into" or "out of" a condition. States with divided state control were categorized as 0.4 (more Republican) or 0.6 (more Democrat) based on results of the last four presidential elections ("Red States and Blue States," n.d.).

Coding for *proportion of women legislators* took into consideration the degree of membership (Ragin 2008a). Degree of membership can be calibrated into various qualitative breakpoints to indicate membership in a set; this is referred to as "fuzzy set" data (Ragin 2008a). Qualitative comparative analysis uses either fuzzy set or crisp set data. With fuzzy set data like this, variables can be coded either as 0 (non-membership) to 1 (full membership), but thresholds and breakpoints can be set to delineate the level of membership in that condition (Devers et al. 2013). Researchers must determine these various cut points (Devers et al. 2013), first by drawing on substantive and theoretical knowledge if possible, but in the absence of this guidance, technical criteria like distribution of cases can be used (Devers et al. 2013). Values for percent women legislators in each state ranged from 14% to 52%, and were coded into four categories reflecting the degree of membership in this variable: "fully in", "more in than out", "more out than in", and "fully out" (Ragin 2008). Small percentages of women legislators in a state were coded as either "fully out" or "more out than in" of the category. For example, if a state had a small proportion of women legislators, such as 14 percent, it would be coded as "fully out". Proportions of women legislators that were 33% and above were classified as 1 (fully in), less than 20% as 0 (fully out), 20-25% as 0.33 (more out than in), and anything from 26 to 32 was 0.67 (more in than out).

Proportion of a state population that is rural was obtained from the United States Department of Agriculture Economic Research Service (2020) website. Data from 2019 was collected and calculated by dividing the rural (nonmetro) population by the total population each state. Three states were missing this information (Delaware, New Jersey, and Rhode Island). Values for percent rural population ranged from 1% to 69% and were coded into three categories. Proportions of a state population that is rural that were less than 20% were classified as 0 ("fully out" using the language of fsQCA), 20-26% as 0.5 ("neither fully in nor fully out"), and anything above 26% as 1 ("fully in"). Since fsQCA software does not allow values of 0.5 as mentioned earlier (Charles Ragin, personal communication, March 4, 2021), states with values of 0.5 were coded as 0.4 if they had values of 20-22% rural population (less rural) and coded as 0.6 if they had values of 23-26% rural population (more rural).

Proportion of uninsured women were obtained from the Guttmacher Institute Data Center website and represent the percentage of women aged 15 to 44 who were uninsured as of 2017 (Guttmacher Institute 2020). Percent uninsured women ranged from 3% to 24%. Values that were 10% and above were coded as 1 (fully in), 8-9% were coded as 0.67 (more in than out), 7% as 0.33 (more out than in), and anything 6% or less as 0 (fully out).

Analytic Plan

Qualitative comparative analysis (Ragin 2000; Ragin 2008a; Ragin 2008b) is often used to analyze small samples like this one and can be particularly helpful for health services researchers because it can illuminate characteristics of interventions which produce a given outcome (Kane et al. 2014). This method also acts as a link between quantitative and qualitative analytical camps because it allows researchers to use both precision and substantive knowledge in their construction of membership scores (Ragin 2008a). Similar methods that examine combinations of variables acting together, such as latent class analysis (LCA), require large

sample sizes (Park and Yu 2018). Other similar methods such as discriminant class analysis requires a minimum sample size of 20 for four or five predictor variables, but researchers are strongly urged against using this method with low sample sizes (Poulsen and French 2008), and cluster analysis requires multiplying the number of variables by 70 to generate the appropriate sample size (Dolnicar et al. 2014). Given current knowledge about sample size and various analytical approaches, fsQCA is the best approach here (Ragin 2008b).

Qualitative comparative analysis differs from standard methods such as multiple regression because it focuses on configurations of cases as packages, or sets, of relations (Ragin 2000; Ragin 2008a). It preserves the complexity and variation across both conditions and cases, allowing for an analysis of multiple combinatory factors leading to an outcome. As a method, fsQCA is well-suited to the analyses conducted in this study because it examines specific *combinations* of state-level conditions associated with availability of telecontraception platforms. States are not a homogenous group; they have unique characteristics that can reflect competing interests. Therefore, fsQCA can capture this variation and examine patterns in telecontraception platform availability across states. There can be many different combinations of state-level conditions leading to an outcome, and fsQCA allows researchers to examine each of these possible combinations (Ragin 2008a). Once the variables are correctly constructed, different possible combinations of state-level conditions can be identified. Researchers can then conduct additional analyses to examine the coverage and consistency of various combinations leading to a particular outcome (Ragin 2008a).

The analysis proceeds in three steps. First, state-level factors hypothesized to pattern telecontraception platform availability were collected and compiled into a raw data table and variables were constructed to reflect degree of membership in a set. Second, fsQCA software

was used to identify all possible combinations of causal conditions patterning telecontraception platform availability (Ragin and Davey 2016; Ragin 2018). Third, the algorithm in fsQCA was used to evaluate solution consistency and coverage measures (Ragin and Davey 2016; Ragin 2018). Sensitivity analyses were conducted and used different categorical constructions of key variables to examine how robust solutions, consistency, and coverage measures were to different operationalizations of key condition variables (see Appendix B).

RESULTS

Table 7 documents the values for both the outcome and condition measures for all fifty states. This table shows descriptively the number of telecontraception platforms available in a state, the proportion of women legislators, state political party control, the proportion of uninsured women, and the proportion of a state population that is rural. Since fsQCA software eliminates cases with missing values, the four states with missing values (Delaware, Nebraska, New Jersey, and Rhode Island) were dropped from all subsequent analyses.

Table 8 documents all possible combinations of condition variables generated from the dataset. The number of combinations is based on the number of condition variables, so in this analysis using four condition variables there are 16 possible combinations of state-level conditions ($2^4 = 16$) (Ragin 2008a; Ragin 2018). The number column represents the number of states that are sorted into a particular combination (Ragin 2008a, p. 131; Ragin 2018). The next set of columns in Table 8 document consistency scores generated from the fsQCA analysis (Ragin 2008a). These scores are used to help identify viable combinations linking specific conditions to the outcome from combinations that are less likely to result in the outcome, given these conditions (Ragin 2008a). Raw scores document the degree of membership in the outcome, while PRI (proportional reduction in inconsistency) and SYM (symmetric version of PRI) scores

document alternative ways of measuring consistency (Ragin 2018; Ragin 2015). All scores range from a low of 0 (indicating no consistency) to a high of 1 (indicating perfect consistency). Table 8 shows that consistency scores across the different measures (raw, PRI, and SYM) were identical in all combinations. Values for consistency should be at least 0.80 or higher to be considered viable combinations of state-level conditions linking specific conditions to the outcome, although researchers can test different consistency cutoff values to see their effect on the results (Ragin 2018). Here, the general cutoff of 0.80 was used, resulting in eight out of the eleven configurations coded as substantially consistent. Robustness analyses were also conducted using an alternative cutoff value; see Appendix B. Each configuration was assigned a 1 if it met or exceeded the cutoff value or "0" if it was less than the consistency cutoff value. The last column of Table 8 illustrates all combinations that were identified as exhibiting the outcome based on the consistency cutoff score of 0.80.

Combinations of State-Level Conditions Linked to Telecontraception Platform Availability

Table 9 documents the identification of three key combinations of state-level conditions associated with telecontraception platform availability. First, the conditions associated with each combination are delineated by either "Yes" or "No" to indicate high or low presence of a condition in a particular combination ("N/A" indicates that the condition was neither present nor absent). Thus, two combinations (#2, #3) identify the *proportion of women legislators* in a state as a key factor, in combination with other conditions, associated with telecontraception platform availability. Similarly, having Republican *state political control* is important in producing telecontraception platform availability in two combinations (#1, #3) in combination with other conditions. The states associated with each combination are listed next, followed by the

consistency and coverage scores for each combination. Maps illustrating the combinations of states found in each combination are shown in Figure 2.

Solution consistency and coverage scores represent the scores for the entire solution; specifically, the entire body or combination of combinations taken together. Consistency indicates the percentage of cases with a combination of conditions which also exhibit the outcome; they range from a low of zero (no consistency) to a high of one (perfect consistency), with values of at least 0.75 interpreted as identifying meaningful combinations (Ragin 2008a; Legewie 2013). The individual consistency scores associated with each of the three identified combinations exhibit high consistency ($0.85 – 1.0 > 0.75$) with an overall solution consistency of 0.91. Thus, the results in Table 9 demonstrate that all three combinations of state-level factors, both individually and taken together as a whole, represent meaningful conditions that are associated with telecontraception platform availability.

Coverage indicates how well a combination of state-level conditions accounts for the outcome instance by measuring if the combination is empirically relevant or important to the outcome (Ragin 2008a; Legewie 2013). Coverage scores range from a low of zero (no coverage) to a high of one (high coverage). Raw coverage measures the percentage of cases exhibiting the outcome that are explained by the combinations of conditions in a combination, while unique coverage measures the percentage of cases in the outcome explained by each individual condition in a combination (Ragin 2018). Although there are no formal guidelines on cutoffs for coverage scores, its values have been compared to R^2 ranging from zero to one (Legewie 2013; Thiem 2010). Table 9 documents both coverage scores for each combination (ranging from 0.24 to 0.32) and the solution as a whole (0.62). Combinations can have high consistency but low coverage, or vice versa, but this information can still be meaningful from either an empirical or

theoretical standpoint (Ragin 2008a). Ragin (2008a) explains how consistency is similar to the idea of "significance" and coverage is similar to the idea of "strength" in correlation statistical analyses. These two measures of consistency and coverage analyze how well the combinations display the outcome and which conditions are most relevant or important for exhibiting the outcome.

The results in Table 9 document that all four state-level conditions are relevant for evaluating the outcome of telecontraception platform availability. Put differently, there is not a single condition variable that was not utilized in these analyses, indicating that these state-level conditions are necessary if cultivating greater telecontraception access is a policy goal. Some combinations may not contain a condition, but others do, which indicates that there is more than one combination of conditions that coexist with telecontraception platform availability in a state. Ten states exhibit the first combination of state-level conditions, fifteen states display the second combination of conditions, and seven states show the third combination of conditions associated with telecontraception platform availability.

Combination #1. The first combination documents cases in which telecontraception platform availability is present when there is Republican state political control, a presence of uninsured women, and the absence of a rural population (consistency = .85; coverage = .24). Ten states exhibited this combination (Arizona, Florida, Georgia, Indiana, Louisiana, North Carolina, South Carolina, Tennessee, Texas, and Utah). Figure 2 shows that these states are mostly clustered in the southwestern and southeastern regions of the United States. Two states (Louisiana and Utah) exhibit this combinations of conditions but lead to low telecontraception platform availability (2 services available in their states). The goal of fsQCA is to identify configurations of conditions linked to an outcome with high consistency, meaning that there will

be few or no cases with an outcome value of zero (Charles Ragin, personal communication, March 5 and 10, 2021). Although this combination of conditions contains two cases which lead to low telecontraception platform availability, it yields a high consistency score of .85 which illustrates that this combination is a strong subset of the outcome. Percent women legislators was not a necessary condition to telecontraception platform availability for this combination.

Combination #2. The second combination illustrates that telecontraception platform availability is present when there is a presence of women legislators, Democratic state political control, and an absence of a rural population (consistency = 1.0, coverage = .32). Fifteen states exhibited this combination (California, Colorado, Connecticut, Hawaii, Illinois, Massachusetts, Maryland, Michigan, Minnesota, Nevada, New York, Oregon, Pennsylvania, Virginia, and Washington). Looking at Figure 2, these states are grouped into regions within the northern half of the United States; there are no southern states in this combination of conditions. The consistency score of 1.0 represents perfect consistency, indicating strong identification of a combination of conditions to the outcome. Raw coverage is .32, illustrating that this combination of conditions is relevant or important to the outcome. The percentage of uninsured women in a state was not a necessary condition to telecontraception platform availability for this combination.

Combination #3. The third combination consists of a presence of women legislators, Republican state political control, and a presence of uninsured women. Seven states exhibit this combination of conditions (Alaska, Arizona, Florida, Georgia, Idaho, Kansas, and Montana). As Figure 2 shows, these states are concentrated in the western and southeastern regions of the United States. Three states in this third combination (Arizona, Florida, and Georgia) also appeared in the first combination. The finding that these three states belonged to multiple

combinations illustrates how there are multiple pathways to telecontraception platform availability. Specifically, the focus of fsQCA is on the *combinations of conditions* across each grouping of states rather than the individual states themselves. States can be in more than one combination because each combination illustrates the shared pertinent combination of conditions linked to an outcome across these specific cases. This third combination exhibited high consistency (.91) and coverage (.25), indicating this is a meaningful and relevant combination of conditions to the outcome.

Finally, the overall solution consistency and coverage scores for all three combinations are high (solution consistency = .91, solution coverage = .62), indicating that these three total combinations are meaningful and relevant combinations to the outcome of telecontraception platform availability. In total, the three combinations contain 29 states which indicates that most states in the U.S. are represented in this analysis. States that did not appear in any of the three combinations may have some other, unmeasured state-level conditions that are also important to telecontraception access but have yet to be investigated.

DISCUSSION

This study utilized fsQCA to analyze combinations of state-level factors linked to telecontraception platform availability. Although telecontraception platforms are growing in number and scope, access to their services is not patterned equally across the United States. Thus, despite arguments about the "disruptive" nature of emerging platforms and technologies, where a woman lives can determine whether she can access telecontraception. Despite the growing number and scope of healthcare platforms, research has yet to examine the state-level conditions that have important effects on the on-the-ground experiences of women attempting to access these services. This study serves as a first step to help better understand how key state-

level features, alone or in combination with others, might be important for access to telecontraception. Although there are sixteen possible combinations that could occur, it is noteworthy that the analyses uncovered three combinations of state-level conditions linked to telecontraception platform availability with very high consistency.

One major finding from this study is that having a large presence of women in state policymaking roles alongside other political and economic state-level conditions is an important ingredient for availability of telecontraception platforms, aligning with previous research that points to the importance of higher proportions of women legislators proposing bills related to women's rights and issues (Tam 2020; Tam 2017; Volden, Wiseman & Wittmer 2018; Thomas 1991; Saint-Germain 1989). Importantly, the presence of women legislators in combination with other state-level conditions was linked to telecontraception platform availability in both Republican and Democrat politically controlled states. This is interesting since many public and policy discussions surrounding birth control and reproductive rights often focus solely on political party. Robustness analyses examined whether this condition variable of women legislators is an indicator of larger Democratic political party control, since there are greater numbers of women legislators in the Democratic party compared to the Republican party (Blazina and Desilver 2021; National Conference of State Legislatures 2019). Results of this robustness analysis produced similar findings but lower coverage scores (see Appendix B), indicating that the partisan composition of women legislators in combination with other social, economic, and political conditions is less relevant in leading to telecontraception platform availability than the percentage of women legislators in combination with other factors.

The gender makeup of legislative bodies may operate as a force in and of itself in influencing policies affecting women, as seen in previous work which found that states with

higher proportions of women representatives propose more bills pertaining to women, children, and families compared to men and also compared to states with lower proportions of women representatives, regardless of political party (Volden, Wiseman & Wittmer 2018; Thomas 1991; Saint-Germain 1989). It may be that women legislators have firsthand, personal experience with hurdles or barriers to accessing birth control and reproductive healthcare services, which could drive their decisions and actions. Future research is needed on how women legislators prioritize and make decisions about telecontraception policy and legislation.

The number of women in political positions of power is growing. In earlier research on the proportion of women in state legislatures, percentages ranged from 3 to 30% in 1988 (Thomas 1991). Now, women in the legislature range from 14 to 52%, and 2019 yielded the largest number of women elected at a single time (National Conference of State Legislatures 2019). As more women move into policymaking roles, their ability to push issues and influence decisions may increase. Many discussions surrounding birth control and reproductive rights often focus on political party. Findings from this study suggest that gender and having women in positions of power, in combination with other political and economic state-level factors, is another growing and important factor to consider in legislation and policy related to women's issues such as reproductive health rights and policy. This also carries implications for broader policy issues related to women, suggesting another channel through which advocacy groups can push for change.

Another important combination of state-level factors leading to high telecontraception platform availability was Republican state political control and the economic pressures of a state. Two out of the three combinations require Republican state political control but also have a high percentage of uninsured women. This suggests that states may take into consideration the needs

of their populations or respond to pressures regarding these populations, despite political party ideology towards contraception. Republican-controlled states may also endorse telecontraception platform services as a market-based solution to the needs of their population because they align with their ideology of business model market solutions to healthcare. It also may be that states are facing greater pressures on public family planning clinics due to the Trump administration's gag rule, causing states to turn to market-based solutions such as telecontraception platforms that can grant these options to women living in these states. Looking at the set of these states, some have large populations and thus may have larger uninsured populations and metropolitan areas (such as Florida and Texas). This may also contribute to the finding of why the *absence* of a rural population was linked to telecontraception platform availability because states with non-rural populations may have larger metropolitan areas with greater numbers of uninsured residents. On the other hand, it could also be that states with large rural populations may be less likely to deviate from socially conservative policies.

One last important pattern to note is the geographical clustering of states in the different combinations. Overall, the combinations illustrate distinct groupings of geographical regions. For example, the first combination is concentrated among states in the southwest and southeast regions of the United States. Neighboring states may share similarities not just in their geographical location but also in their attitudes, ideologies, and demographics. These regions can be viewed as "cultural groups" with their own set of political cultures and values (Elazar 1984). Even the names of these groupings are conceptualized as mini-regions: "New England" is one such example of a geographical region of a group of states "bound by the tightest of social and historical ties" despite differences among these states (Elazar 1984:138). Previous research has classified these regions into three political cultures: individualistic, moralistic, and traditionalistic

(Elazar 1984). Thus, states may share similar norms from which they operate to address new technological innovations such as telecontraception. States may also look to each nearby states for guidance when passing legislation, such as through the processes of diffusion, isomorphism, or legitimacy (Scott 2014; Rogers 1995). Communication and social networks across these clusters of states may be a key factor operating in the availability of telecontraception platforms. As these platforms are a new, innovative technology, states may look to nearby neighbors for guidance or tap into their communication networks in the face of uncertainty. These findings suggest that adoption of new technological innovations may first occur across geographical regions rather than nationwide.

Technologies shape and are shaped by their social context. This study illustrates how political, economic, and social factors pattern the accessibility and availability of telecontraception platforms across the United States. Technologies "are the products of social processes and social choices" (Saetnan 2000, p. 3), and telecontraception platforms are one example that illustrates how on-the-ground decisions affect technological designs and use, and vice versa. Findings from this study demonstrate how the path to telecontraception availability is not one-size-fits-all. Rather, there are many different decisions, choices, and possibilities to arrive at this outcome. Some states, such as Arizona, Florida, and Georgia, belonged to more than one combination linked with telecontraception platform availability. This illustrates the configurational nature of fsQCA which emphasizes the *combinations of conditions* linked to an outcome, rather than "independent variables" having separate effects on an outcome used in other forms of quantitative analyses (Ragin 2008a). Rather than viewing the states as separate entities operating independently, fsQCA considers the whole package of states that share a common pattern of conditions linked to an outcome. Thus, states can be in more than one

combination because they have multiple possible relevant configurational conditions linked with telecontraception platform availability.

Limitations

These results should be interpreted with a few limitations in mind. First, it is important to remember that telecontraception platform availability as the outcome variable in this study served as a proxy for policy regarding the dispensing and prescribing authority of a telecontraception company in a state. There may be other, missing factors not accounted for which influence the availability of telecontraception platforms in a state such as administrative policies or hurdles to telecontraception implementation. Another limitation to note is that this study uncovered four condition variables important to telecontraception policy, but there are undoubtedly many other important conditions that pattern telecontraception platform availability across states. One of the strengths of fsQCA is its ability to delineate the many different combinations that lead to an outcome. However, there are other possible conditions or factors that could pattern telecontraception access that have not been investigated yet, such as state laws allowing pharmacists to prescribe and provide contraceptives or states that expanded Medicaid under the Affordable Care Act. This may explain why 17 out of the 46 states in this sample did not fit the combinations of conditions linked to telecontraception platform availability in this study because they may have other unmeasured state-level conditions that are also important to telecontraception access.

CONCLUSION

The case of telecontraception platforms is a prime example of the social shaping of technology because it illustrates that social, economic, and political conditions influence the design, implementation, and use of new innovations like telemedicine. Previous generations of

women have attempted to use the technology of their day to gain access to health information and products that were not available in their local area. In 1873, a federal law made it illegal to send contraception information and devices through the U.S. mail (May 2010). Today, many women are turning to telecontraception platforms to access birth control. Yet reproductive health products are still not available to all women because political climates regulate the ability of a platform to prescribe or dispense contraception, just as we regulated the mail—another "place-disrupting" technology—in the nineteenth century. This study demonstrates that conditions at the state level are an essential and important area of study when looking at telecontraception access, as well as telemedicine and telehealth policy broadly. Technological innovations alone are not enough. They require the right social conditions to work as intended. Qualitative comparative analysis provides an innovative and informative approach for policymakers, stakeholders, and researchers to examine the state-level factors that pattern access to telecontraception, illuminating opportunities for intervention and improvement of reproductive healthcare across the United States.

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Table 7. Descriptive Table of Outcome and Condition Variables

State	Number of Telecontraception Platforms	Women Legislators (%)	Political Party Control	Uninsured Women (%)	Rural Population (%)
Alabama	3	16	Republican	14	23
Alaska	4	38	Republican	15	33
Arizona	5	39	Republican	13	5
Arkansas	3	24	Republican	11	37
California	5	31	Democrat	9	2
Colorado	5	47	Democrat	10	12
Connecticut	5	33	Democrat	7	5
Delaware	2	24	Democrat	7	---
Florida	5	30	Republican	18	3
Georgia	5	31	Republican	19	17
Hawaii	3	32	Democrat	5	19
Idaho	3	31	Republican	16	32
Illinois	5	36	Democrat	9	11
Indiana	5	24	Republican	11	22
Iowa	5	29	Republican	5	40
Kansas	3	28	Split	11	31
Kentucky	4	23	Republican	7	41
Louisiana	2	16	Split	10	16
Maine	3	39	Democrat	11	41
Maryland	3	39	Split	8	3
Massachusetts	5	29	Split	3	1
Michigan	5	36	Split	6	18
Minnesota	5	32	Split	6	22
Mississippi	2	14	Republican	17	53
Missouri	5	25	Republican	13	25
Montana	5	30	Split	11	65
Nebraska	5	29	---	12	34
Nevada	3	52	Democrat	15	9
New Hampshire	2	34	Split	7	37
New Jersey	5	31	Democrat	11	---
New Mexico	2	36	Democrat	12	33
New York	5	32	Democrat	7	7
North Carolina	4	25	Split	15	21
North Dakota	4	21	Republican	10	50
Ohio	5	27	Republican	7	20
Oklahoma	2	22	Republican	20	34
Oregon	4	40	Democrat	9	16
Pennsylvania	5	27	Split	7	11
Rhode Island	5	38	Democrat	6	---
South Carolina	4	16	Republican	16	14
South Dakota	4	24	Republican	12	51
Tennessee	5	16	Republican	11	22
Texas	5	24	Republican	24	11
Utah	2	24	Republican	11	10
Vermont	3	40	Split	5	65
Virginia	5	26	Split	12	12
Washington	5	42	Democrat	8	10
West Virginia	2	14	Republican	8	38
Wisconsin	5	27	Split	7	26
Wyoming	5	16	Republican	17	69

Table 8. All Combinations of State-Level Conditions Linked to Telecontraception Platform Availability

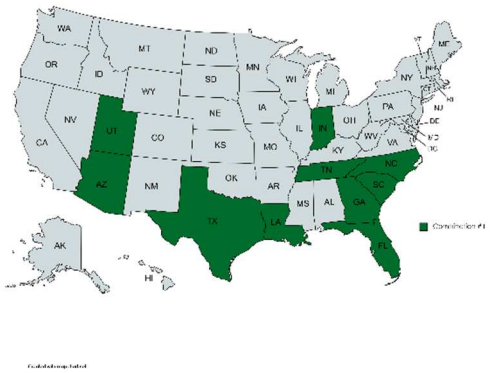
Combination	Condition Variables				Number	State	Consistency			
	Women Legislators	State Political Control	Uninsured Women	Rural Population			Raw	PRI	SYM	Meets or Exceeds Consistency Cutoff of .80
1	0	0	1	1	9	AL, AR, MS, MO, ND, OK, SD, WV, WY	.76	.76	.76	0
2	1	1	1	0	8	CA, CO, IL, MD, NV, OR, VA, WA	1.0	1.0	1.0	1
3	1	1	0	0	7	CT, HI, MA, MI, MN, NY, PA	1.0	1.0	1.0	1
4	0	0	1	0	7	IN, LA, NC, SC, TN, TX, UT	.83	.83	.83	1
5	1	0	1	1	4	AK, ID, KS, MT	.90	.90	.90	1
6	1	0	1	0	3	AZ, FL, GA	.94	.94	.94	1
7	1	1	0	1	3	NH, VT, WI	.73	.73	.73	0
8	1	1	1	1	2	ME, NM	.65	.65	.65	0
9	1	0	0	0	1	OH	1.0	1.0	1.0	1
10	0	0	0	1	1	KY	.86	.86	.86	1
11	1	0	0	1	1	IA	.87	.87	.87	1
12	0	0	0	0	0					
13	0	1	0	0	0					
14	0	1	1	0	0					
15	0	1	0	1	0					
16	0	1	1	1	0					

Table 9. Key Combinations of State-Level Conditions Linked to Telecontraception Platform Availability

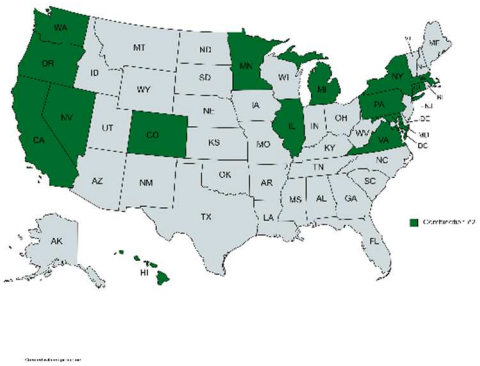
	Combination #1	Combination #2	Combination #3
Conditions			
Women Legislators	N/A	Yes	Yes
State Political Control (Dem)	No	Yes	No
Uninsured Women	Yes	N/A	Yes
Rural Population	No	No	N/A
States with this combination of conditions	AZ, FL, GA, IN, LA, NC, SC, TN, TX, UT	CA, CO, CT, HI, IL, MA, MD, MI, MN, NV, NY, OR, PA, VA, WA	AK, AZ, FL, GA, ID, KS, MT
Consistency	.85	1.0	.91
Raw coverage	.24	.32	.25
Unique coverage	.10	.27	.11
Solution consistency	.91		
Solution coverage	.62		

Note. "Yes" = high presence of a condition; "No" = low presence of a condition.

COMBINATION #1



COMBINATION #2



COMBINATION #3

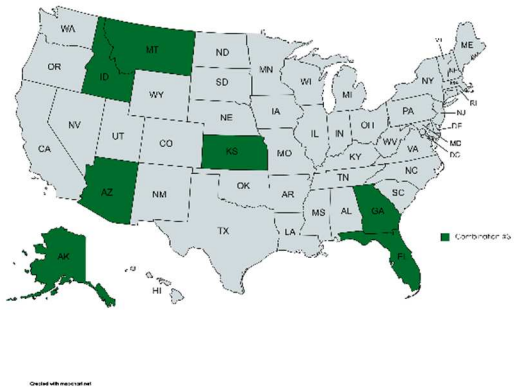


Figure 2. Maps Showing States Associated with Each Combination of State-Level Conditions Linked to Telecontraception Platform Availability
(Source: Mapchart.net 2020).

AIM #3: An Analysis of User Reviews from Nurx and Planned Parenthood Direct: What User Experiences Reveal About Mobile Apps for Reproductive Health

Health apps and telemedicine are growing in numbers and demand, particularly with the current COVID-19 crisis (Lupton 2018; Carroll et al. 2017; Payne et al. 2015). One growing segment is the rise of telecontraception platforms that aim to provide accessible birth control and reproductive healthcare services via an app or website. Telemedicine can save time and money and is linked with high patient and provider satisfaction (Hanson et al. 2019), yet it is not known whether these same findings carry over to telecontraception. Given that nearly one-third of women reported difficulties obtaining prescription birth control or refills (Grindlay and Grossman 2016), telecontraception serves as a potential solution to address important existing access barriers such as geography (Chuck 2017; Sundstrom et al. 2019), time (Rodler et al. 2020; Jain and Mehrotra 2020), and cost (Weigel et al. 2019; Grindlay and Grossman 2016).

Despite recent media coverage of telecontraception platforms (Stengel 2020; Basu 2019; Chuck 2017), research examining women's experiences and evaluations of telecontraception platforms is lacking. Nurx, a startup telecontraception company, provides care to over 300,000 patients monthly (Shieber 2020; Landi 2020). While there has been research on health app users, such as their demographic characteristics and health behaviors (Carroll et al. 2017), little research exists on telecontraception platform users and their experiences using these platforms. Existing research has looked at telecontraception requests (Wollum et al. 2018; Martinez et al. 2020), experiences of those who requested PrEP (pre-exposure prophylaxis) (Hughes and Koester 2019), and rural women's perceptions of the idea of telecontraception (Sundstrom et al. 2019). There are also studies on the users of online informational reproductive health apps (Whitfield, Welti, and Manlove 2019; Gressel et al. 2014; Akinola et al. 2019).

Research has shown that women value accessible contraception. One study found that over two-thirds of women in the United States would use contraception available directly from pharmacists, with higher interest among low-income and uninsured women (Landau, Tapias, and McGhee 2006). Another study found that 39 percent of U.S. women would be likely to use a progestin-only birth control pill if it was available over the counter, particularly if they are insured or tried to get a birth control prescription in the last year (Grindlay and Grossman 2018). However, it is unknown whether these same patterns and attitudes carry over to telecontraception platforms, nor the main reasons why women seek contraception outside of an in-person doctor visit. Highlighting user evaluations of telecontraception platforms can uncover motivations for using the platform, delineate the pros and cons of using the platforms, and illuminate needs gaps in the traditional in-person healthcare system, an area of growing importance during the current COVID-19 pandemic. Doing so can help inform reproductive health policy and services both in telemedicine and traditional in-person healthcare systems.

To address this gap in knowledge, this study analyzed user reviews for two major telecontraception platforms: Nurx and Planned Parenthood Direct. These platforms represent two contrasting entities in terms of their size, stage of development, and user orientation. While Nurx is an online startup company operating completely in the virtual sphere, Planned Parenthood has been around for over 100 years and has local, physical locations where users can go for in-person appointments (Planned Parenthood Federation of America Inc. 2021). Therefore, these two telecontraception platforms offer varying degrees of telehealth services, name recognition, and user orientations to their platform. Findings from this study illustrate that while there are similarities in user evaluations of telecontraception services, there are important differences by platform. These insights indicate that while similar factors underlie women's motivations for

accessing telecontraception, their experiences can differ across telecontraception platforms. Most importantly, user reviews of both platforms illuminate areas in which telecontraception is addressing existing barriers to contraception as well as identify areas for improvement.

LITERATURE REVIEW

User Reviews and Health Care Experiences

Mobile apps have been used in many different types of health interventions, ranging from diet and physical activity to mental health, and there are now over 31,000 health-related apps (Payne et al. 2015). Analysis of user reviews is a growing way of studying apps because they can yield valuable insights about user experiences. "User experience" is a term originally used in the human-computer interaction field but is now a growing term applied to various other contexts and settings (Araz 2018). Studies of user experience examine the interaction between a user and an artifact in a certain context (Araz 2018). App designers have a goal in mind about what they would like users to experience when they create an app (Araz 2018). Thus, analyzing user experiences can uncover whether these apps are producing the desired experience for users.

User experience is also important from a sociological standpoint since it incorporates and relies upon context. When looking at user experience, there is more than just the "user" and the "app": the user and app interact in a certain context or situation (Araz 2018). All three factors are necessary when studying user experience. Studying user reviews of health apps can yield valuable insights about these three factors: the user, the object, and the context. User reviews can illuminate what users find valuable about an app, how and why they use an app, and requests for desired features (Stawarz et al. 2018; Genc-Nayebi and Abran 2017; Caldeira et al. 2017). This information can provide a greater understanding of social life and the broader social context, since it can uncover motivations and reasons for using an app. Technology can provide solutions

that purport to make life easier and solve existing problems. Apps are an example of this, in that users may turn to an app for a problem or a need (Light, Burgess, and Duguay 2018).

Technological innovations such as apps arise from a particular social context (MacKenzie and Wajcman 1999). Studying apps can thus reveal information about societal dynamics and areas of sociocultural and economic transformation (Light, Burgess, and Duguay 2018). From a sociological standpoint, analysis of apps can move beyond simply the functionality of apps to reveal deeper insights about its users, its intentions, and its cultural meanings – what researchers have termed "the walkthrough method" (Light, Burgess, and Duguay 2018). This method fuses science, technology, and cultural studies into one to provide a framework for critically analyzing an app (Light, Burgess, and Duguay 2018). At its core, this method recognizes that culture and technology shape one another and users experience a technology in a particular social context or culture (Light, Burgess, and Duguay 2018). In practice, it highlights the cultural discourses embedded in an app's interface and how this might influence user interactions with an app (Light, Burgess, and Duguay 2018). The walkthrough method examines an app's vision, operating model, and governance, then moves to features and functions such as registration and entry, everyday use/activities, and app suspension or closure (Light, Burgess, and Duguay 2018). Using this method can yield insights about the vision and the larger context in which these apps are developed and can be combined with interviews or content analysis of user reviews or discussions to provide a fuller picture of how users adapt and apply the app in their life.

Overview of Telecontraception Platforms

Nurx, LemonAid, Pill Club, and Planned Parenthood Direct are all examples of online platforms which provide birth control via an app or website. Known colloquially as "the Uber for birth control" (Brown 2016; Chuck 2017), these platforms aim to increase access to a variety of

reproductive healthcare services such as birth control, sexually transmitted infection (STI) testing and treatment, urinary tract infection (UTI) treatment, and emergency contraception by providing access to on-demand providers for consultations and shipping prescriptions directly to customers or to their pharmacy. Users download the app or go to the company website, create a profile with their contact information, and answer health history questions. Costs for birth control vary depending on the platform, insurance status or type, and whether a drug is a brand name or a generic equivalent. Some platforms charge a consultation fee.

During consultations, patients are provided access to on-demand providers who can discuss needs, concerns, and provide information and education about different options. Patients can interact directly with a provider and ask questions on their schedule when it is convenient for them. The degree of interaction can vary depending on the platform, such as messaging versus a video consultation. Once a patient has selected an option, a licensed member of the medical team in the user's state (either a doctor, nurse practitioner, or physician assistant) reviews, fills, and sends the prescription directly to the customer. However, policy and legislation affect the reach of a platform by dictating its ability to prescribe and/or dispense medication. Therefore, customers may not have equal access to these services simply due to the state they live in.

In-Person Reproductive Health Care Interactions vs. Telecontraception

In-person visits. Obtaining prescription contraception or reproductive health care typically requires an in-person visit to a healthcare provider in a medical setting such as a doctor's office or clinic (Hariton and Tracy 2019). Visits for contraception are considered preventive care and are covered under the Affordable Care Act (ACA) by most insurance plans, although religious employers may choose not to cover contraception (U.S. Centers for Medicare & Medicaid Services 2020). Patients who do not have insurance or are not eligible for Medicaid

pay out-of-pocket for a visit, although some clinics offer discounted rates or free services under certain programs which can vary by state. This preventive care is called a "well-woman visit" and consists of obtaining health history, screenings, and counseling depending on the patient's age and family history (The American College of Obstetricians and Gynecologists 2020). The well-woman visit provides an opportunity for a provider to assess a woman's overall health, although taking a blood pressure reading is the only test that is medically necessary for starting hormonal contraceptive use (Centers for Disease Control and Prevention 2017).

Ideally, an in-person visit for contraception consists of a dialogue between the patient and provider regarding information and options. There are mixed findings regarding how these interactions play out and these can vary depending on different factors. Research has found that black women were more likely than white women to report pressure to use contraceptives by a provider (Becker and Tsui 2008), pressure that can be implicit such as through provider tone of voice or imbalanced information favoring certain methods (Gomez and Wapman 2017). Other research did not find differences in contraceptive counseling by race or ethnicity or socioeconomic status of the patient but found that providers largely did not assess patient pregnancy intention, birth control preferences, or allow patients an opportunity to ask questions (Dehlendorf et al. 2017). Educational, interactive decision tools for patients to choose birth control and a printout given to the provider about their preferences prior to a healthcare visit have been effective in patient-provider communication by allowing patient concerns and preferences to enter the discussion rather than being dictated by the provider's presumptive expertise (Holt et al. 2020).

There are both benefits and drawbacks to requiring an in-person visit to obtain prescription birth control. Benefits include speaking with a provider one-on-one to get

information and ask questions about different birth control options, assessing overall health and vital signs, and zero cost under ACA (if a patient has insurance). There are also certain birth control methods that must be physically carried out in person, such as insertion of an implant or intrauterine device (IUD). Drawbacks include time, transportation, cost (if uninsured), and a non-indicated invasive pelvic exam, which research has shown is not necessary for prescribing birth control (Ellison et al. 2021; Stormo et al. 2011). Other drawbacks can influence the quality of care such as limited time to cover all the information, answer patient questions, or complete additional tasks such as screenings, as well as other provider interaction issues such as pressure, imbalanced information, or lack of patient input (Becker and Tsui 2008; Gomez and Wapman 2017; Dehlendorf et al. 2017).

Telecontraception "visits". Research on telemedicine illustrates that it reduces or eliminates many barriers associated with in-person visits. Convenience is a major factor in telemedicine studies because patients can access healthcare providers and services outside of normal business hours (Jain and Mehrotra 2020; Rodler et al. 2020). Patients also receive access to on-demand providers who can provide information and education about different options, discuss concerns, and answer questions, in comparison to an in-person visit where a provider may be pressed for time due to juggling multiple tasks such as assessing a woman's whole health history or conducting other screenings. The ability to discuss options with a provider was mentioned as a benefit of telecontraception, as rural women indicated that this could provide knowledge and information about different contraception options (Sundstrom et al. 2019). In contrast, research on in-person visits found that providers largely did not assess a patient's pregnancy intention, birth control preferences, or allow patients an opportunity to ask questions (Dehlendorf et al. 2017). Barriers such as long wait times for an appointment, time taken off

work to go to an appointment, transportation issues, and an invasive, non-indicated pelvic exam are all eliminated through telecontraception.

Research has demonstrated both family planning provider and patient support for telecontraception services (Stifani, Avila, and Levi 2021; Sundstrom et al. 2019). Despite this support, uptake of its services varies. A recent report found that contraceptive management represented 65 percent of all reproductive health telemedicine claims for those with employer-sponsored health insurance plans (Weigel et al. 2019). Rates of telemedicine use are higher for those with private insurance, higher income, and living in suburban and urban areas (Weigel et al. 2019; Jain and Mehrotra 2020). One explanation for this finding is that most telecontraception platforms do not accept Medicaid, and there can be cost issues if a platform provider is not considered in-network (Weigel et al. 2019). In contrast, users visiting an in-network provider for birth control in a traditional healthcare setting can have those reproductive healthcare services covered at no cost under ACA. Depending on insurance, patients may end up paying more using these platforms than visiting a healthcare provider in person (Weigel et al. 2019). Cost and coverage are two important potential explanations for low uptake rates of telecontraception services, despite patient and provider support for these platforms (Stifani, Avila, and Levi 2021; Sundstrom et al. 2019).

Barriers to Accessing Contraception

Nearly one-third of women reported difficulties obtaining prescription birth control or refills (Grindlay and Grossman 2016). The most common barriers related to the in-person visit include long appointment wait times, requirements of in-person exam or pap smears, transportation issues, not having a regular place to go for health care, and cost or insurance concerns, with uninsured and Spanish-speaking women more likely to report barriers to

accessing contraception (Grindlay and Grossman 2016). Barriers are such a large factor in obtaining contraception that The American College of Obstetricians and Gynecologists (2019) published a committee opinion expressing their support and recommendation of over-the-counter hormonal contraception.

Geography. By removing the in-person visit requirement, telecontraception can help meet the needs of women in contraceptive deserts or rural areas who reside far from clinics (Chuck 2017; Sundstrom et al. 2019). Elimination of geographical barriers is a frequently cited benefit of telemedicine, but the research is mixed. One study found that rural women discussed the potential of telecontraception to fill an existing gap by reducing cost, wait, and travel times (Sundstrom et al. 2019). However, another study found that patients using telemedicine lived in urban areas with higher income and most did not live in a primary care health professional shortage area (Jain and Mehrotra 2020). This suggests that the idea of telemedicine might operate differently than its implementation, since in practice it may not address geographical barriers due to lack of awareness of telemedicine services, internet access, or cost (Jain and Mehrotra 2020). State-level legislation and policy can also affect the reach of telemedicine across states by dictating a platform's ability to prescribe and/or dispense medications. Thus, although telecontraception platforms are designed to increase access to contraception, access can still be limited depending on place-based regulation.

Medical gatekeeping. Another important barrier to obtain contraception is medical gatekeeping. Although not medically necessary, many women report that their doctor requires pelvic exams prior to prescribing hormonal contraception (Mencimer 2012; Ellison et al. 2021). For example, one study found that 71.6 percent of obstetrician-gynecologists and 67.7 percent of family/general practitioners reported routine use of pelvic examinations as a requirement for

hormonal contraception (Stormo et al. 2011). However, blood pressure is the only test that is medically necessary for starting hormonal contraceptive use (Centers for Disease Control and Prevention 2017). Pelvic exams are "not necessary before initiation of combined hormonal contraceptives because it does not facilitate detection of conditions for which hormonal contraceptives would be unsafe" (CDC 2017; Westhoff, Jones, and Guiaha 2011; Stewart et al. 2001; The American College of Obstetricians and Gynecologists 2015). These exams carry the risk of over-testing and false positives, anxiety, pain, and distress due to their invasiveness, and women may avoid the doctor altogether due to pelvic exams (Rabin 2014; Stormo et al. 2011). In contrast, telecontraception platforms only require blood pressure or a brief health overview, complying more with scientific findings regarding birth control prescriptions than in-person providers. Consequently, telecontraception platforms provide a direct challenge to the traditional healthcare system linking birth control prescriptions with exams by eliminating the need to see a provider in person and undergo an invasive, non-indicated exam to receive birth control.

Policy and legislation. Access to birth control is heavily influenced by policy and legislation. Nearly half of the states in the U.S. have some type of law dictating actions surrounding moral or religious objections to filling certain prescriptions, such as oral contraceptives or emergency contraception (Chiarello 2011). Some states have a "conscience clause" for medical providers, which allows them to opt out of medical processes or procedures due to moral or religious reasons (Chiarello 2011; Berlinger 2008; Harrington 2006). Other states have "duty-to-dispense" laws or "refuse-and-refer" laws which entail stricter enforcement of filling prescriptions (Chiarello 2011). Legislation by the Trump administration allows employers to decline contraception coverage for their employees based on personal religious or moral reasons (U.S. Centers for Medicare & Medicaid Services 2020; Adamczyk 2020).

Telecontraception platforms aim to reduce these barriers by facilitating women's access to doctors and pharmacists who believe in accessible birth control.

Overall, existing research highlights how barriers to obtaining contraception are linked with the requirement of an in-person visit. Telecontraception aims to alleviate many of these barriers through its technology, but no studies to date have examined these claims through an analysis of users' experiences, as revealed by reviews. Research is needed to illuminate whether telecontraception platforms provide a viable alternative to in-person birth control visits by addressing barriers related to obtaining contraception, such as those related to geography and medical gatekeeping, as well as how and why users use these apps. Qualitative research using analysis of user reviews allows for an in-depth study of the meanings and experiences of telecontraception platform users, an advantage that cannot be captured through experimental design or survey questionnaires (Atieno 2009). Furthermore, user reviews represent a source of information and insights from many people (Frie et al. 2017) and thus can illuminate why women are using telecontraception platforms and their evaluations of these services on a larger scale. Illuminating motivations, reasons, and experiences using telecontraception can shed light on the potential of telecontraception to address existing barriers as well as identify unmet needs and areas for improvement related to obtaining contraception in the traditional healthcare system.

METHODS

Sample

There are currently 17 telecontraception platforms that provide reproductive health services in the United States (Ibis Reproductive Health 2021). Telecontraception platforms that did not write birth control prescriptions, did not contain any user reviews, or only offered services to one or a few states were excluded. Telecontraception platforms that provided user

reviews only on their company website or a specialty review website were also excluded due to concerns about company control of this content. Telehealth platforms which offered birth control as one of a myriad of health services were also excluded because user reviews contained information on unrelated issues (e.g., ordering contacts). After these exclusions, two strictly telecontraception platforms (Nurx and Planned Parenthood Direct) remained which cover the largest number of states, contain the largest number of user reviews, and represent two contrasting stages of development in the emerging field of telecontraception platforms.

While Nurx is an online startup company founded in 2015 and currently has over 16,000 user reviews (Crunchbase Inc. 2021; Nurx Inc. 2021), Planned Parenthood Direct began as a pilot program in six states and has over 200 user reviews (Lovett 2019; Google Play 2021). Nurx and Planned Parenthood Direct are opposites of the telecontraception platform spectrum, representing contrasts in size, development stage, and user orientation. While Nurx operates completely in the virtual sphere, Planned Parenthood Direct also lets users request in-person appointments at their local Planned Parenthood location (Lovett 2019). Planned Parenthood has also been around for over 100 years and so may have greater name recognition and familiarity, which could make the transition to telemedicine easier for some patients who have visited its in-person locations (Planned Parenthood Federation of America Inc. 2021).

Data

User reviews were collected using AppFollow, an open-source tool specializing in app analytics, to compile all user reviews for Nurx and Planned Parenthood Direct. AppFollow contained reviews for these two platforms beginning in 2017, so data for this study contains user reviews posted on either platform between 2017 through January 2021. The data for user reviews is publicly available on either the website or app of the telecontraception platform. Publicly

available data of user reviews in app stores represents an opportunity to naturally investigate consumer perspectives (Nicholas et al. 2017). Thus, a qualitative analysis of a convenience sample of user reviews is the best method for this exploratory research question because it serves as a way to unobtrusively garner user evaluations and experiences with using this emerging service of telecontraception platforms. This study was approved by the University of Wisconsin-Milwaukee Institutional Review Board (IRB #20.339).

Due to concerns about companies controlling the content of reviews, reviews were collected from the Google Play Store and Apple App Store rather than the company websites. Nurx had 269 reviews on the Google Play Store and 1,055 reviews on the Apple App Store. Nurx was initially only available through the Apple App Store, which could explain why the number of reviews are so much higher for that platform. In addition, although the majority of smartphone users around the world use the Android system, iOS is the most popular mobile operating system in North America (Afilias Technologies Limited 2019; Chadha 2018). The length of user reviews varied from a few sentences to a couple paragraphs. Since a user could theoretically post a review on both platforms, duplicate usernames were checked using SPSS 27.0 (IBM Corp. 2020). Nurx had one duplicate user review and username, which brought that sample size down to 1,323 reviews. Planned Parenthood Direct had 283 reviews on the Google Play Store and 239 reviews on the Apple App Store, resulting in a total of 522 reviews. There were no duplicate reviews or usernames for Planned Parenthood Direct.

Analytic Plan

Qualitative data analysis was used to conduct a thematic analysis of user reviews from these two telecontraception platforms. Thematic analysis is conducted in several steps, starting with generating initial codes, grouping codes into themes, and defining and refining the themes

(Braun and Clarke 2006). In this study, several codes were expected to capture themes hypothesized to emerge from the data based on the previous literature review illustrating research on barriers to obtaining contraception, such as medical gatekeeping and issues pertaining to policy and legislation. Additional themes, such as those capturing interactions with online clinicians or the ease of use of the app itself emerged from the data during the coding process. Codes were combined, refined, or added in an iterative process, going back and forth between the user reviews and the codes. This approach followed previous research conducting a qualitative analysis of user reviews which utilized thematic analysis (Stawarz et al. 2018). All user reviews were coded and analyzed using Dedoose software (Dedoose 2020). Appendix C provides further detail on the codes developed for this study and their frequency in both the Nurx and Planned Parenthood Direct User reviews. User reviews were analyzed separately for each platform, then compared to analyze similarities and differences.

RESULTS

A Brief Walkthrough of Telecontraception App Visions

I first draw on the walkthrough method to provide a brief overview of the vision and claims made by the two telecontraception apps as a way to examine cultural and social meanings embedded within these apps (Light, Burgess, and Duguay 2018). This can yield insights about the purpose, vision, and larger context in which these apps are created and used. Combined with user reviews, this provides a fuller picture of user experience of telecontraception apps. Nurx and Planned Parenthood Direct both have different philosophies and motives regarding their rationale for providing telecontraception. While Nurx aims to transform and disrupt the existing healthcare system, Planned Parenthood Direct focuses more on providing access, autonomy, and education. These different philosophies are illustrated in the company mission statements and websites. For

example, the mission statement of Nurx is “Our mission is putting you in control of your own health!” (Comparably 2021). The Nurx homepage uses large, attention-grabbing headlines in all capital letters such as “Expert care from your home” and “We’re on a mission to transform healthcare” (Nurx Inc. 2021). Overall, the Nurx homepage conveys the message that they value the patient and have a vision of transforming healthcare yet still draws on traditional language of medicine and healthcare to emphasize the legitimacy of their services through references to “expert care” and “your medical team” (Nurx Inc. 2021).

In contrast, the Planned Parenthood Direct homepage does not make claims about changing healthcare but instead provides brief, clear information on obtaining reproductive healthcare services virtually. Their focus is not on “transforming” healthcare because they have been providing in-person reproductive healthcare services within the healthcare sphere for over 100 years (Planned Parenthood Federation of America Inc. 2021) but rather on providing and fighting for affordable reproductive healthcare. Their mission statement focuses on access, affordability, autonomy, advocacy, and education (Planned Parenthood Federation of America Inc. 2021). This is reflected on their homepage through its straightforward approach to providing clear, concise information and education about reproductive healthcare access and cost. For example, the homepage contains practical aspects such as a step-by-step explanation of how their services work and a map of the U.S. where users can select their state and are given a short, bulleted list of the costs and services available to them (Planned Parenthood Direct 2020). Both telecontraception homepages also have a woman of color prominently featured at the top of the homepage, possibly to convey inclusiveness. This is especially important in the reproductive healthcare sphere, where historical abuses and systemic control, surveillance, and sterilization of women of color (Salas 2019; Roberts 1999) may impact their trust and experiences of

reproductive healthcare interactions, and also during a time period in the United States where racial injustice and discrimination is at the forefront of national and global attention.

Overview of Themes

User reviews for both Nurx and Planned Parenthood Direct largely yielded the same major themes. Codes for each platform were analyzed, grouped, and categorized into five themes: 1) access and timeliness of apps, 2) clinician interaction, 3) cost and affordability, 4) support for the idea of telecontraception, and 5) platform development. Although the user reviews for both platforms yielded similar themes, the codes within each theme could have different meanings depending on the platform. This is discussed in the cost and affordability and platform development subsections.

Access and Timeliness of Apps

Approximately one in five user reviews across both platforms (N=243 Nurx reviews; N=101 Planned Parenthood Direct reviews) cited problems with in-person healthcare visits to obtain birth control which were alleviated by using telecontraception. Not having to take time off work, having a busy schedule, and waiting months to wait for an appointment with a booked in-person provider were the most common codes under this theme. This is particularly important in the case of birth control, where time is of the essence:

> *I couldn't find an appointment for birth control before when I'm supposed to put a new ring, when I downloaded the app I got my prescription in less than 5 hours! (PP Direct user)*
>
> *This app is amazing and saved my skin when I needed birth control asap. My employer provided health insurance was cancelled, my prescription then void, and I wasn't able to have access to BC through my hospital. I logged on to the app, in literally less than an hour I talked to a Dr, verified my identity, and had BC pills sent directly to my home. I received them in 2 days! This app and Planned Parenthood are life savers and I wish I could give them 10 stars! (PP Direct user)*
>
> *I found myself unemployed and without health insurance, and my healthcare provider cut off my birth control prescription. With only a week to try and find a new prescription, I was freaking out for sure. (Nurx user).*

> *My obgyn was refusing to fill my birth control prescription unless I went in to see them, but wouldn't give me an appointment for a couple months, so I decided to try out the app to see if I could my prescription before then. I use birth control for menstrual/hormonal regulation so for me it's very stressful not having it. I signed up for the app on a Sunday and the Monday immediately afterwards they had given me a prescription… (Nurx user).*

This theme of access and timeliness of apps illustrates the drawbacks of certain characteristics of the in-person healthcare system and how telecontraception alleviates many of these barriers. In the current in-person system, obtaining contraception is tied to an in-person visit with a provider. This presents barriers, such as not being able to get a timely appointment or insurance tied to employment. The above quotes illustrate how timeliness is an integral component of birth control which can present a major barrier if women cannot get a timely appointment with a provider or lost insurance tied to their job. Obtaining a refill of an existing prescription in a traditional healthcare setting still requires an in-person visit from a provider, so telecontraception platforms represent a way for women to access birth control on their schedule when they need it. The words "lifesaver" and "game changer" were commonly used to describe these platforms: references to these terms were mentioned in 112 of 1,845 total reviews (6% of all reviews).

Another code connected to this theme was the medical need for birth control, which was mentioned by approximately ten percent of users across both platforms (N=143 Nurx reviews; N=50 Planned Parenthood Direct reviews). For these users, being on birth control was medically necessary to alleviate medical conditions like endometriosis, painful periods, or hormonal regulation. Not having timely access to an in-person provider combined with medical needs results in a major barrier to obtaining the reproductive healthcare a user needs. Eliminating wait times for visits and facilitating on-demand contact with a clinician is one way in which telecontraception platforms purport to break down this barrier. Additional codes under this theme of access and timeliness of apps consisted of speed/quick service, easy to use,

convenience, and shipping. Only four reviews across both platforms explicitly mentioned living in a rural area.

Clinician Interaction

Interactions with telecontraception clinicians was another major theme mentioned by approximately one in four user reviews across both platforms (N=331 Nurx reviews; N=141 Planned Parenthood Direct reviews). Users indicated that providers answered their questions and concerns and were supportive and knowledgeable:

> *I've had nothing but fantastic experiences using Nurx. It's such a contrast to the care I've received at a doctors office or clinic (judgmental, flippant, and I've had doctors flat out tell me my birth control side effects were "impossible" and all in my head... What could I possibly gain from making it up?). Nurx is completely different. Their staff and doctors treat me with respect, and they treat me like an intelligent person…When I told them I was having side effects, they took my concerns seriously and made recommendations for a different pill. (Nurx user)*
>
> *I've used this app several times and always feel listened to and helped. The doctors are extremely nice and it's easy to get help. (PP Direct user).*

Friendly, informative, and helpful clinicians were largely mentioned in the Planned Parenthood Direct reviews. Users often described their clinicians as "sweet" or "nice". User reviews of Nurx expressed more negative experiences regarding their requests than users of Planned Parenthood Direct, although the line between provider and customer service is blurred in these reviews. For example, it is impossible to discern who the user is referring to when they discuss sending a request since this could be a question to a clinician or a question to the customer service department (for example, about a billing issue). In addition, Planned Parenthood Direct conducts video visits with patients while Nurx reviews requests and fills a prescription so contact is made through messages rather than face-to-face virtual visits. The mode of interaction then may influence user experiences with a clinician, such as if they are viewing and interacting with them in real time versus messaging through an online portal. Whether a user interacts with a provider via messaging or a video visit may also reflect the

design choices of the platform itself. For example, Nurx does not require a video visit and presents this is a positive aspect of their service by stating that users can access services on their schedule (Nurx Inc. 2021). On the other hand, Planned Parenthood Direct mentions that video chats may be necessary (Planned Parenthood Direct 2020), and most Planned Parenthood Direct users who mentioned clinician interactions referred to a video visit. Telecontraception platforms may operate from different standpoints and perspectives regarding what is required to provide quality reproductive healthcare, and their design choices reflect these philosophies.

Related to this theme are the additional codes of birth control options, information and education, and discreet/privacy characteristics of telecontraception. Birth control options was a code that was specific to Nurx. One in five user reviews (N=260) mentioned different birth control options offered by Nurx, which was often related to clinician interaction and information/education about the various options. Some users expressed their need for a specific brand of birth control, which was often associated with a higher cost versus a generic version. Users were often upset about this, citing a medical need to be on a name-brand contraception. Other users expressed gratitude for "finally" finding a birth control that was right for them, and how it was the first time experiencing this despite visiting providers in-person for birth control. Information and education was related to this theme, as users expressed how they learned about birth control options through informational resources or through their provider:

> *I've had so many struggles finding the right pill for me and this app got it right on the first try. The papers with all the informations they send is so helpful and makes me feel so comfortable. (Nurx user).*

> *I ended up trying a few birth controls through this app. I once used the doctor's recommendation function, but I also found their listing of all the birth controls available to be one of the most comprehensive and easy-to-read guides on the internet. At the OBGYN, I never felt empowered to do my own research and make my own choices. In years of using birth control, I never felt like I was on the right thing until now (Nurx user).*

I got a notification from a doctor hours after submitting my request with lots of very useful information. (Planned Parenthood Direct user).

I was sent a ton of helpful information. (Planned Parenthood Direct user).

The above quotes illustrate the increased information and educational resources available to patients through telecontraception platforms. Patients can review these informational materials and ask questions. This stands in contrast to in-person visits, where a provider often selects a brand of birth control. Here, in telecontraception apps, patients can choose based on many different options. The second quote references the doctor recommendation function available in the Nurx app, which selects an option for the patient based on what the provider would recommend if the patient is unsure about making a decision. This is similar to in-person visits. However, these quotes also illustrate the potential of telecontraception to address existing barriers in the in-person healthcare system such as not having enough time to discuss options or providing a comprehensive guide to choosing contraception which would be the best fit. Finally, the last code categorized under this theme relates to the discreet and private nature of telecontraception. Some patients mentioned not wanting others to find out about their use of contraception, such as a religious parent, and appreciated the discreet packaging.

Cost and Affordability

User reviews discussing the cost or affordability of telecontraception was mentioned by approximately one in five users across both platforms (N=292 Nurx reviews; N=104 Planned Parenthood Direct reviews). Users were divided on this issue, illustrating how telecontraception has yet to alleviate barriers of cost and affordability. Just like the current in-person healthcare system, accessing and paying for care is dictated by insurance and socioeconomic status. Thus overall, the platforms largely mirror existing dynamics in in-person healthcare. On one hand, users lamented that the platform did not accept their insurance or complained that the cost was

too high. Prices seemed to vary widely. Some users mentioned paying $20, while others complained of inflated prices such as $150. Another major difference was that Nurx charged a $15 nonrefundable consultation fee, even if the user later found out that the platform did not accept their insurance. They were drawn in by the idea of the platform but were charged before finding out they could not use it. Users felt that this was a deceptive practice, since this felt to them like a "bait and switch." Lack of transparency about pricing was a common complaint among Nurx users. However, Planned Parenthood Direct provides a clear guide to how much users will pay for using its services. This reflected in its user reviews: while billing complaints were mentioned in 14% of Nurx user reviews, this issue only represented 2% of Planned Parenthood Direct reviews. Issues of cost represent the operating model and design choices of each company on its website or app, and also whether it is a for-profit or non-profit company. Providing direct, explicit information about reproductive healthcare costs was a clear focus on the Planned Parenthood Direct homepage, while this information was harder to find on the Nurx website. This might reflect the different philosophies of the two companies regarding how they view the purposes of their services, whether that is rooted in affordability and access (Planned Parenthood Direct) or financial interests and running a business to compete with in-person healthcare (Nurx).

On the other hand, users praised the platforms for being an "affordable" option. Some users even mentioned that there was no cost. Cost was also often mentioned alongside convenience:

> *I feel that they are reasonably priced for how convenient it was. (PP Direct user).*
>
> *So convenient and cheaper than seeing my own doctor! (PP Direct user).*
>
> *I pay $15 a month without my insurance but I don't mind because they've made this so easy! (Nurx user).*

Absolute easiest and most cost effective way to be in control of your reproductive health (Nurx user).

I've never had to pay anything out of pocket since my insurance covers my BC, until this year. This year, Nurx decided to charge people $15 (which I believe is for the year). Though it's annoying, it's less than the copay I would need to pay to see my doctor AND they don't charge for shipping (Nurx user).

Users mentioned convenience alongside cost to justify or rationalize paying for contraception. Getting birth control shipped directly to them or not having to go to a doctor's office or pharmacy were mentioned by many users in terms of cost and convenience. Many women who indicated that they did not have health insurance said that the services were a "lifesaver" for them. Affordable birth control may mean different things to different users. Others complained that their insurance was not accepted by the platform, despite paying nothing for birth control with their insurance if they went through their in-person provider. Having insurance did not necessarily guarantee a cost-effective, affordable experience since the platforms did not work with all types of insurance. For example, users with Medicaid insurance lamented the fact that Nurx did not accept their insurance. Planned Parenthood Direct users mentioned that even though they had insurance, the platform would not accept it but that they did not mind paying the cost because it was supporting an organization they believed in. Overall, the platforms contained mixed reviews of cost and affordability, suggesting that telecontraception platforms have not yet fully addressed barriers to affordable contraception.

Support for the Idea of Telecontraception

Another major theme across both platforms was support for the *idea* of telecontraception (N=263 Nurx reviews; N=73 Planned Parenthood Direct reviews). Many user reviews expressed gratitude directly to the platform for providing its services, indicating a long-time need for their services. Others expressed their support for the idea even if they had less than positive

experiences, indicating that these platforms are tapping into an unmet need. Reviews frequently used the words "game changer" to describe telecontraception platforms.

> *Thank you!!! This app is easy to use, well-designed, and you really can have birth control ordered in mere hours. That's absolutely incredible. (PP Direct user).*
>
> *Honestly, I love everything about Nurx. This system is a complete game changer. (Nurx user).*
>
> *I've never written an App Store review before, but this was worth the effort. This is truly a game changer for how we treat birth control. (Nurx user).*
>
> *I'm telling every girl I know about this. (Nurx user).*
>
> *I was getting increasingly frustrated with how much effort it took to obtain birth control, something that is over the counter in other countries, when I found Nurx and it changed my life. I recommend it to everyone searching for a simple solution! (Nurx user).*
>
> *I cannot stress enough how great this service is….It's just been such a huge relief and I cannot imagine going back to life without it. (Nurx user).*
>
> *I am so glad this app exists. (PP Direct user).*
>
> *This was the best invention! Love this app and the services provided to me. (Nurx user).*
>
> *PPDirect is revolutionary! (PP Direct user).*
>
> *What women and menstruating persons have needed forever. (PP Direct user).*
>
> *Love the idea of this and it should be more of a thing!!!! Thank you guys for creating something like this. (PP Direct user).*
>
> *Thank you Planned Parenthood for creating this app. It is wonderful! (PP Direct user).*

Related to this theme was that many users of Planned Parenthood Direct had a history with the organization. Ten percent of reviews for PP Direct (N=50) mentioned being a patient or supporter of Planned Parenthood. Name recognition and having a prior history with the organization seemed to influence users, as they were grateful for its services both in-person and through the platform:

> *I'm a huge supporter of Planned Parenthood and have been for 25 years. This is the first time in 20 years I have not had health insurance so I was DELIGHTED to find this app and I'm literally no time at all I had a prescription filled and at such a low cost. (PP Direct user).*

Thank you Planned Parenthood for all that you do. Have been going there for years ever since I started my birth control and will always go there. (PP Direct user).

This is where I first started getting birth control because I could get it without insurance and without my dad finding out (religious) I was 19. (PP Direct user).

I was interested when I saw an ad for another company that offered the same service but I didn't really feel comfortable with it until I saw that Planned Parenthood also offered the service. I decided to go with Planned Parenthood. (PP Direct user).

Having an established orientation to the company or platform made users feel more comfortable using telecontraception services, since they could trust it as a legitimate service based on the recognition of the company name. In contrast, many user reviews of the Nurx platform mentioned being "skeptical" ordering birth control through an app. They were not sure if it was legitimate or not. Having the history and name recognition of an established organization like Planned Parenthood seemed to eliminate any concerns about legitimacy, as no user reviews mentioned being skeptical of their telecontraception services.

Another code related to this theme of support for the telecontraception idea is state (un)availability. While the number of user reviews mentioning this was small (3 percent of reviews for Nurx and 8 percent of reviews for Planned Parenthood Direct), it is an important to mention because it illustrates the policy and legislative influences on telecontraception platform availability. These users mentioned how the platform was not available to them because they lived in a certain state, often linking their statement about the lack of access to *needing* access:

I downloaded this app getting very excited to find something like this. I cannot express how much these service(s) are needed. Then I notice that pretty much every state is on the app except Nevada. What a huge deflate I had immediately…(Nurx user).

Need this in GA and every other state they don't offer it in!!! Thanks!!! (Nurx user).

I'm assuming it's great so I'll give you a high rating for just existing as an option for women! But please expand to Maryland!!! It seems as though you're everywhere else but where I am…and quite honestly, it would be an INBELIEVABLE help to the community if you guys ever were to expand to Maryland. When young girls living in the socioeconomic nightmare that is the inner city-a pregnancy can ruin not only the life of the mother, but that of the child as well! Smart girls get stuck here! HELP!. (Nurx user).

Thus, users would express a need for obtaining contraception in this virtual sphere while simultaneously expressing their support for the idea of telecontraception. This illustrates the need for women in all states to be provided with the opportunity to access the services. Lack of access does not mean lack of interest for these users. Quite the contrary, they expressed a desire for the platform to expand services to include their state.

Platform Development

The final theme was platform development, which drew on statements coded to reflect comments about app rollout, technological complaints about the app, and customer service. This largely represented "growing pains" of a new business, such as how Nurx began as a startup company and Planned Parenthood Direct began with a select number of pilot states to test its app. It also reflected the different backgrounds and experiences the two companies have in the reproductive healthcare sphere. Planned Parenthood's wealth of historical, institutional knowledge and experience may have helped with rolling out their virtual services compared to Nurx which is a startup company and new to the healthcare services arena.

Technological complaints about the app were mentioned in over one-third of reviews for Planned Parenthood Direct and 13% of reviews for Nurx. However, Nurx had a large amount of reviews (33%) mentioning customer service, which overlapped with these codes. For example, as Nurx grew and rolled out their app to the Google Play Store, their customer service was seemingly bombarded by requests. Users mentioned how the Nurx app contained a banner expressing the long hold or wait times to speak with a representative. Users complained about slow response times, citing how they often waited on hold for over an hour on the phone to reach customer service. Some reviews also mentioned that as Nurx grew over time, this became more of an issue compared to when they had accessed its services at the beginning of its creation.

However, it is worth mentioning that some users praised the customer service department. The trajectory to establish a telecontraception app seems to be a bit rocky regardless of the company model. Both platforms experienced “bugs”, crashes, slow loading times, and problems with app functionality. However, Nurx contained many more reviews related to slow service than Planned Parenthood Direct.

DISCUSSION

This qualitative analysis of user experience of telecontraception platforms allows for an on-the-ground perspective of what users experience both in the virtual and non-virtual spheres. Findings illustrate how areas where telecontraception both alleviates and falls short of addressing barriers to obtaining contraception in the current in-person healthcare system. Specifically, the user reviews demonstrate that telecontraception platforms address important accessibility issues inherent in the current traditional healthcare system but findings are more mixed regarding affordability and equitability. This demonstrates how technological innovations often make broad claims to “solve” existing issues, yet they must still grapple with real-world, on-the-ground forces such as insurance systems. Telecontraception is no exception, though it does address many problems women face in obtaining contraception in the current in-person healthcare system.

Overall, users express how telecontraception platforms do alleviate some barriers associated with an in-person provider visit. Not having to take time off work, having a busy schedule, and waiting months to wait for an appointment with a booked in-person provider reflect the advantages of these platforms and how they can reduce geographical and time barriers associated with in-person healthcare. These findings reflect earlier research on telemedicine and convenience, particularly how patients can access health care providers and services outside of

normal business hours (Jain and Mehrotra 2020; Rodler et al. 2020). This allows patients to request what they need when they need it, rather than having to conform to a 9-to-5 clinic schedule. Users express these new telecontraception systems as "game changers" or "life savers", illustrating how these platforms are literally changing the "game" of in-person healthcare visits. Related to this is user support for the idea of telecontraception. Many users expressed effusive gratitude for this service, which suggests unmet reproductive health needs in the current in-person healthcare system.

Clinician and patient interactions in telecontraception platforms were brought up by approximately one in four women across both platforms. Users mentioned the friendliness and knowledge of their clinician and expressing how they valued that they could ask questions and were not judged. This stands in contrast to previous research illustrating how providers largely did not assess patient pregnancy intention, birth control preferences, or allow patients an opportunity to ask questions during an in-person visit for birth control (Dehlendorf et al. 2017). This study's finding illustrates that these platforms are meeting the visions of women about telecontraception, such as the ability to discuss options with a provider and provided with knowledge and information about different contraception options (Sundstrom et al. 2019). Although clinician and patient interaction is characteristic of *both* in-person and virtual reproductive healthcare services, the positive experiences of patients with their telecontraception providers illustrates that there may be other factors influencing the quality of care of these visits.

It may be that telecontraception interactions are less subject to time restrictions since patients can access providers on their schedule rather than vice versa and in a relaxed setting such as their home. Online visits also place patient concerns and needs at the forefront (Basu 2019). There may be more time to discuss options and concerns, answer questions, and build

rapport since the sole focus of the interaction is reproductive healthcare, as opposed to a well-woman visit where there are many different competing tasks to accomplish. In-person visits may have more restrictions such as short appointment time slots or competing tasks to complete during the visit which could affect the quality of the patient-provider interaction or amount of information and discussion conducted during the visit. This may explain previous research findings about in-person providers failing to assess patient pregnancy intention, birth control preferences, or allow patients an opportunity to ask questions (Dehlendorf et al. 2017). Telecontraception platforms may also provide greater information, education, and resources about different options which patients can read about and discuss with a provider in their own time. Providing educational decision tools about birth control choices and preferences are effective in patient-provider communication by allowing patient concerns and preferences to enter the discussion rather than provider choice (Holt et al. 2020).

One important finding to note was that the *mode* of interaction seemed to make a difference in a user's experience of telecontraception. Nurx and Planned Parenthood Direct contained differing perspectives of the clinician interaction. This could be due to the way patients and providers interact on these platforms. While Planned Parenthood Direct providers conduct video visits with patients, Nurx providers review requests made through the app and interact with patients through messages rather than face-to-face virtual visits. Planned Parenthood Direct users praised their clinicians, while Nurx users had more mixed reviews. The mode of interaction may influence user experiences with a provider because they are viewing and interacting with them in real time, versus back-and-forth messages. It could also be the growing pains associated with Nurx, if clinicians are bombarded with messages and not able to provide the best care because of these pressures. Yet another explanation is the philosophy and

operating model behind the telecontraception platforms. Planned Parenthood has advocated and provided reproductive healthcare for over 100 years, so they may value transferring aspects of their quality of care such as face-to-face interactions to the virtual sphere. On the other hand, Nurx is a startup company aiming to gain more users for its business so they may value messaging as a way to handle a larger volume of users. Overall, users expressed clinician interactions in a largely positive way, especially when tying it to finding the right birth control for them, obtaining information, and the discreet, private, non-judgmental manner of getting contraception.

However, this analysis also showed that telecontraception platforms fall short in addressing some barriers in obtaining contraception. The theme of cost and affordability largely reflects the current dynamics of in-person healthcare, where the ability to access affordable care is tied to existing insurance and employment patterns and state-level policy (U.S. Centers for Medicare & Medicaid Services 2020; Adamczyk 2020; Jones and Sonfield 2016), factors that limit the scope of "disruption" that platform designers can realize. Technological design and advances are inseparable from the social context in which they emerge (MacKenzie and Wajcman 1999). Telecontraception platforms must still operate within existing economic and political environments, such as insurance systems or legislative policy. This limits the ability of technological innovations to "solve" existing problems because they are still subject to and must grapple with prevailing institutional forces. Rhetoric around technology often portrays technological innovations as a "techno-utopia" where technology is portrayed as a cure-all for the current problems of the day, yet this mythology ignores the power, control, and tools that certain groups hold over others at all stages of technological innovation (Rogers 1995; Winner 1986; Wajcman 2004; boyd & Crawford 2012; Zuboff 2019). Telecontraception platforms

provide an example of this through their limits of addressing barriers tied to insurance systems and state-level policy on prescribing and dispensing authority because they still exist within these institutional contexts and constraints.

Limitations

There are limitations to using data such as user reviews from publicly available websites. It raises questions about the validity and reliability of the data, as well as who it represents (boyd & Crawford 2012). User reviews can represent sample selection bias since users are not required to write reviews (Caldeira et al. 2017) so the reviews may represent atypical experiences. They may not be representative of all telecontraception users. Another problem in mining user reviews is that is difficult to detect spam or fake reviews (Genc-Bayebi and Abran 2017). This sample is also restricted to users who have internet access. Research has demonstrated a digital divide in internet access, skills, and information, and these are patterned by existing social inequalities such as income (DiMaggio et al. 2004; Hargittai 2002). A recent study found that racial and ethnic minorities had higher odds of telehealth use during the COVID-19 pandemic and illustrates the need for continued expanded access and coverage of telehealth services (Campos-Castillo and Anthony 2021). In addition, research has documented disparities among health platform users and non-users (Carroll et al. 2017; Mesch 2016; Bidmon and Terlutter 2015; Anthony, Campos-Castillo, and Lim 2018), although studies have not yet looked at telecontraception platform users. Telecontraception platform users may differ in ways from other non-users, such as having internet access, use, skills, and knowledge to navigate the internet. However, given the dearth of data on telecontraception platforms, analyzing user reviews on a large scale serves as an exploratory first step toward uncovering more about these platforms and how users experience them. It allows for a preliminary exploration into *why* some women are

using these platforms as well as their experiences and evaluations of the platform services. This research also identifies areas for further research that can examine representative samples of women across the United States, such as the potential of telecontraception to empower women by providing more information and education about different options.

CONCLUSION

Telecontraception platforms represent a novel way to approach contraception access and availability. These apps are growing and expanding, and are particularly helpful during the current COVID-19 pandemic as many users mentioned how they do not want to visit an in-person provider to obtain birth control due to concerns about contracting the virus or they have lost insurance through losing a job. Nurx and Planned Parenthood Direct are two platforms which represent opposites in terms of size, development stage, and user orientation. Yet user reviews of the two platforms yielded similar themes, suggesting that widely experienced motivations and intentions drive use of telecontraception. However, the way telecontraception platforms deliver these services can vary depending on their characteristics, underlying philosophies, and business operating models, which can serve to either alleviate or reinforce current in-person healthcare system dynamics associated with obtaining contraception. Severing the tie between in-person visits and contraception can improve women's experiences obtaining birth control in that they are not limited to geographical and time barriers present in the in-person system (Grindlay and Grossman 2016; Jain and Mehrotra 2020; Rodler et al. 2020), and they also enjoy patient-centered interactions with their provider and increased information and education about their options and preferences, which are all important factors in improving patient-provider communication in reproductive healthcare services (Holt et al. 2020; Dehlendorf et al. 2017; Becker and Tsui 2008; Gomez and Wapman 2017). While telecontraception

platforms are “game changers” and “life savers” in many ways, this study indicates that overcoming the barriers faced by women who need reproductive healthcare is less about technological innovation, and more about disrupting entrenched social forces that shape insurance systems and policymaking.

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CONCLUSION

This research set out to investigate the current landscape of reproductive healthcare and telecontraception with an eye toward accessibility, affordability, and equitability. In the introduction, three aims were discussed. Aim #1 sought to better understand sources of reproductive healthcare access, affordability, and equity issues by providing a current picture of the in-person, traditional reproductive healthcare system. The goal of aim #2 was to investigate the state-level conditions that pattern accessibility and availability of telecontraception platforms to uncover the combinatory political, economic, or social conditions linked to availability of these platforms across the United States. Aim #3 analyzed user reviews of two telecontraception platforms to gain insight into user experiences and evaluations of these emerging platforms. These three aims used mixed methods that informed one another to examine the relationships between gender, health, and technology. Using a national survey of women, state-level data about social, economic, and political climates of states, and user reviews of telecontraception platforms all provide different lenses for looking at the accessibility, affordability, and equitability of telecontraception platforms. These different data sources and findings inform one another to provide a fuller picture of this fast-growing phenomenon. Taken together, findings illustrate both the promises and pitfalls of how technological innovations currently address reproductive health needs and disparities. The remainder of this dissertation will discuss the major themes and implications of these findings.

PROMISES OF TELECONTRACEPTION

This research uncovered many areas in which telecontraception is disrupting entrenched institutional forces and conditions. Telecontraception addresses issues of accessibility and equitability by breaking down barriers related to the time pressures of current in-person

traditional healthcare environments. User reviews in Aim #3 revealed that these platforms do alleviate many of the existing in-person barriers to obtain contraception, such as waiting months for a booked provider and having to take time off work for a visit in order to fit into the nine to five healthcare office hours. As many user reviews mentioned, birth control is a time-sensitive medical need. Telecontraception addresses the issue of time because it provides on-demand access to providers and birth control quickly. Many users expressed support and gratitude for telecontraception, illustrating that these services are tapping into unaddressed issues and needs in obtaining contraception. Furthermore, states with high proportions of women legislators in combination with other state-level conditions were linked to telecontraception platform availability. This was true regardless of the political party of the women legislators in each state. Having women in positions of power alongside other state conditions may be an important factor moving forward for advocates of reproductive rights and policy, regardless of whether a state is controlled by Democrats or Republicans.

Another area where telecontraception has the potential to improve reproductive health care for women is through how they may affect the quality of reproductive healthcare visits. Using a mixed methods approach illustrated the different aspects of this theme and how each aim informs one another. As revealed in Aim #3, telecontraception platforms provide on-demand access to knowledgeable, supportive clinicians as well as information and education about different birth control options. This aligns with previous qualitative research on rural women's perceptions of telecontraception, such as the ability to discuss options with a provider and obtain information and knowledge about different contraception options (Sundstrom et al. 2019). Aim #1 revealed that individual attitudes and interpersonal interactions were important factors in making a birth control visit, indicating that patient-provider communications and interactions are

especially salient in efforts to access birth control. It also illustrated that only half of women reported that they got information about birth control at their last visit or that their doctor spent time talking to them about future plans for having or not having children. Telecontraception may therefore be addressing an unmet need in the current traditional healthcare system which may be pressed for time and competing priorities by giving patients more time to discuss options and obtain information about birth control from on-demand providers. Since telecontraception visits are initiated by the patient, their concerns are the main focus of the visit instead of a well-woman visit where competing priorities take time and attention away from more substantial discussions about options. Online visits place patient concerns and agenda at the forefront of the visit (Basu 2019), so telecontraception visits may represent a potential channel for achieving improved quality of visits and patient-provider interactions about birth control.

This carries important implications for racial and ethnic minority women who are more likely to experience racism through healthcare provider interactions, such as through pressure, imbalanced information, lack of patient input, and exclusion (Becker and Tsui 2008; Gomez and Wapman 2017; Dehlendorf et al. 2017; Gary et al. 2015). Having more time during a visit may help alleviate some of these barriers related to racism and time pressures because patients are provided with access to supportive, knowledge providers and information about all the birth control options. The focus of the visit is also solely on contraception, so not having other competing priorities such as exams and questionnaires taking up precious time during a visit can also allow for improved discussions and interactions between patients and providers. Previous research has shown that providing educational decision tools about birth control choices and preferences are effective in patient-provider communication by allowing patient concerns and preferences to enter the discussion (Holt et al. 2020). Telecontraception platforms have the

potential to improve dialogue and interactions between patients and providers because their focus is concentrated solely on birth control and patient concerns.

Telecontraception is a rapidly growing segment of telemedicine. As the number of users and services continue to expand, it is important to identify how platforms focused on reproductive health fit within the larger landscape of telemedicine. Findings from this research illustrate that the promises of telecontraception have the potential to extend to other telehealth initiatives and health apps more broadly. Specifically, telecontraception platforms disrupt the accessibility barriers of the traditional healthcare system by providing on-demand contact with providers and information. Patients do not have to mold their lives around a schedule of nine to five appointments, booked medical providers, and rushed visits where they might not have time to discuss all their questions, concerns, and options. The online visit is driven by the concerns and agenda of the patient which has the potential to improve the quality of visits and interactions between patients and providers. This is of the utmost importance in reproductive healthcare visits, where information and choice are essential for women to make choices about their bodies and lives.

PITFALLS OF TELECONTRACEPTION

All three aims illustrate that emerging innovations shape and are shaped by existing social conditions and arrangements. Technological innovations such as telecontraception platforms do not exist outside of their social, political, and economic contexts. Although in theory this technology allows for greater access to more people, the ability of consumers to utilize the services provided by these platforms is still limited by long-standing inequalities in institutional systems. Institutional factors permeate every finding from each aim of this dissertation. Making a reproductive healthcare visit, the ability to access telecontraception

platforms in a certain state, and the experiences of telecontraception platform users are all shaped by institutional influences. The pitfalls of telecontraception are related to issues of affordability and equitability and largely mirror existing, on-the-ground systemic inequalities such as insurance and socioeconomic status.

The Mythology of Technological Determinism

Technological determinism and the mythology of a techno-utopia permeate the language and rhetoric surrounding technological innovation (Rogers 1995; Winner 1986; Wajcman 2004; Nakamura 2009; boyd & Crawford 2012; Mosco 2014; Devlin 2018; Zuboff 2019). This discourse focuses on the idea that any kind of technological advancement or innovation is beneficial for humanity, along with a noticeable absence of questioning its meaning or costs and ignorance of physical, social realities (Winner 1986; Nakamura 2009). In contrast, the social shaping of technology theoretical framework recognizes that technological design and innovation are inseparable from the contexts in which they emerge (MacKenzie and Wajcman 1999). There is nothing inherent or deterministic about technology itself, and technology can operate differently depending on time and place (Wajcman 2004). The social contexts, relationships, and hierarchies which shape and are shaped by technology are important to study because they are inextricably bound up in the concept of technological innovation; technology and society are not separate factors (Latour 1987).

All three aims illustrate the social shaping of technology, whether that is accessing the technology of contraception itself or using online platforms to access contraception. Individual, interpersonal, and institutional factors all play a role in the decision to make a visit (virtual or non-virtual) for contraception and the experience of doing so. State-level conditions influence availability of telecontraception platforms across the United States. Insurance and socioeconomic

status impact the experience of telecontraception users. In the case of telecontraception, this technological innovation *in theory* grants access to anyone with a smartphone, but *in reality* access is often limited along the lines of existing social, political, and economic inequalities. Previous research questioned whether telecontraception platforms increase accessibility to contraception for those who face barriers or whether they simply make it more convenient for those who already have access (Dorland, Fowler, and Morain 2019; Zuniga et al. 2020). This research demonstrates that these platforms do represent a novel way of addressing barriers but are still limited by entrenched institutions and forces. They must still grapple with insurance coverage and networks, as well as policy and legislation dictating their ability to prescribe and dispense medication. Uninsured women still face barriers with these new innovations, despite the finding in Aim #1 that this group shows the strongest pregnancy avoidance attitudes.

As access to the internet and apps increase, online platforms increasingly employ a rhetoric of "choice" and "empowerment" (Lupton 2016; Lupton 2018). However, the ability of users to access these services is patterned by existing inequalities such as insurance and socioeconomic status. It is critical that health app designers, stakeholders, and policymakers consider how their decisions and choices fit into existing contexts, otherwise they will fail to address barriers that they are aiming to tear down. These choices affect who these apps reach and as a result may fail to reach everyone who needs their services. Not doing so also risks perpetuating existing inequalities (O'Neil 2016). The digital and material are linked (Mosco 2014). Many times with technology, social factors only appear when something goes wrong (Latour 1987). With the rapid pace and adoption of technology and "big data", health app designers need to consider how their decisions and choices may affect and be affected by existing social forces *before* they roll out a technology.

One last important point to note about technological innovation and apps is the role of privacy in the use of personal data. Many telecontraception platform users lamented that there was no way to "delete" their profiles if they no longer wanted to use the app. Apps are an emerging area of society in which legislation is slow to catch up in the United States (Zuboff 2019; Martínez-Pérez, De La Torre-Díez, & López-Coronado 2015). The General Data Protection Regulation (GDPR) was implemented by the European Union (EU) as recently as 2018 and outlines privacy and security standards for organizations using personal data (Wolford 2021). As much as health apps such as telecontraception aim to provide access to needed services, it is also important to consider what they are taking away from users in terms of personal information and "digital breadcrumbs" which can be sold, combined, and used by other organizations (Zuboff 2019:90).

Overall, the pitfalls of telecontraception illustrate many of the same drawbacks of telemedicine and health apps more broadly. Findings from this research indicate that issues of affordability and equitability do not have the same disruptive effect on the healthcare system as the accessibility of telecontraception. User reviews revealed that cost and insurance were major influences on the experiences of telecontraception platform users and largely mirrored the frustrations of navigating insurance coverage and high prescription costs in the traditional in-person healthcare system. Furthermore, telecontraception experiences differed depending on the platform itself. While Nurx is a for-profit company, Planned Parenthood Direct is a non-profit organization. This carries implications for users because it affects their experiences of the platform and whether they can afford to use it. Platform medicine designers make decisions about who they want to reach through their business and operating models. Choices and decisions about insurance, cost, and affordability all affect the experiences of platform users and

in turn the equitability of these platforms. Although findings from this research illustrate that telecontraception does alleviate many of the existing access barriers, findings also show that users may still encounter roadblocks through affordability barriers. Breaking down the barriers related to affordability and equitability requires innovation not only through the decisions and choices of the platforms themselves, but also knowledge of how to achieve these goals within an entrenched system of insurance and payment networks.

REPRODUCTIVE HEALTHCARE COMMONALITIES AND DISPARITIES

Commonalities

While findings from this research illustrate disparities in reproductive healthcare access and affordability, it is also important to make note of the commonalities and similarities uncovered among women in terms of their shared attitudes and experiences. The majority of women in Aim #1 indicated a strong pregnancy avoidance attitude, with no statistically significant differences by race or ethnicity, socioeconomic status, or insurance status. With most women in each subgroup of this national survey expressing this shared attitude, this finding illustrates that pregnancy avoidance is largely a shared attitude among women even by subgroup. Similarly, user reviews in Aim #3 indicated support and gratitude for the idea of telecontraception. This suggests a long-standing need for these services and their goal of addressing existing barriers to obtaining contraception. While women may of course differ on their individual views or modes of contraception, both findings illustrate that pregnancy avoidance and accessible birth control are important to women. This is an important finding to note because it demonstrates the importance of creating accessible reproductive healthcare services for *all* women. It also aligns with previous research findings that women value and

support accessible contraception, such as pharmacist-provided birth control or over-the-counter birth control (Landau, Tapias, and McGhee 2006; Grindlay and Grossman 2018).

Another commonality among women are the many shared barriers they face in obtaining contraception. Many user reviews of the telecontraception platforms mentioned barriers associated with obtaining birth control in the in-person healthcare system. This mirrors findings that nearly one-third of women report difficulties obtaining prescription birth control or refills (Grindlay and Grossman 2016). Users expressed their gratitude for having a service that allowed them to access contraception without having to take time off work, waiting months for an in-person appointment with a booked provider, or losing employer-sponsored health insurance with the loss of a job. These are all features of the in-person, traditional healthcare system which creates barriers to obtaining contraception. Telecontraception platforms have the potential to address these barriers by providing convenient access to contraception and providers.

Clinician and patient interactions are also an important commonality shared by women in accessing reproductive healthcare. Many users of telecontraception platforms mentioned friendly, knowledgeable, nonjudgmental providers with whom they could ask questions. While this is a factor that could arguably be present in the in-person healthcare system too, it is possible that telecontraception platforms provide something that is missing in the in-person context such as more time to discuss options, answer questions, and build rapport. Similarly, Aim #1 found that women who went to Planned Parenthood or another family planning clinic for their last women's healthcare visit had nearly three times higher odds of making a birth control visit compared to women who went to a private doctor's office, while the opposite was true for preventative annual gynecological healthcare visits. The context of the environments that provide birth control, whether that is through increased time or a feeling of understanding, is important.

Previous research has found that teens and other groups of women may prefer to utilize Planned Parenthood for not only cost and confidentiality, but also for additional dimensions of care such as ease of getting care and medical staff treatment (Sugerman et al. 2000; Oglesby 2014). There may be other factors associated with family planning providers or telecontraception platforms that influence women's experiences of accessing contraception. Perhaps having the focus of the visit being on contraception, rather than a "well-woman visit" that aims to cover many facets of health, plays an important role in these dynamics. Previous research has found that in-person providers largely fail to assess patient birth control preferences or allow patients an opportunity to ask questions (Dehlendorf et al. 2017). Whether that it is due to time or other factors is unknown, but a virtual or non-virtual visit for birth control arguably places the focus squarely on birth control rather than other competing demands.

Women have firsthand experience with shared barriers to obtaining contraception, and having women in positions of political power could be an important factor in translating these barriers to solutions. Aim #2 demonstrated that the percentage of women legislatures in combination with other political, social, and economic state-level factors was linked to availability of telecontraception platforms across the United States. These findings did not change even when considering the political orientation of these women legislatures, indicating that gender may play a potentially important role in shaping access to these platforms. While I cannot make claims that women legislators *passed* these policies, their higher percentages are associated with the availability of these platforms in combination with other state-level factors and this finding occurred in both environments of Democrat *and* Republican state political control. This is consistent with previous research which found that states with higher proportions of women representatives propose more bills pertaining to women, children, and families

compared to men and also compared to states with lower proportions of women representatives, regardless of political party (Volden, Wiseman & Wittmer 2018; Thomas 1991; Saint-Germain 1989). Overall, this indicates a potentially optimistic avenue for women, as having women in positions of power can help introduce issues important to women regardless of the political environment in which they operate.

Disparities

Findings from this research also illustrate reproductive healthcare disparities among women that largely reflect long-standing inequalities in institutional systems. Insurance is a main driver behind access and affordability of reproductive healthcare both in in-person and virtual environments, as demonstrated by both Aim #1 and Aim #3. Uninsured women had lower odds of making a birth control visit compared to privately-insured women, despite having the highest pregnancy avoidance attitudes compared to women with other types of insurance. Institutional variables such as insurance status and facility type were associated with making a birth control visit and making an annual gynecological preventive visit.

User evaluations of telecontraception platforms uncovered major cost differences depending on insurance status and coverage. This illustrates that regardless of the mode of delivery, existing social institutions such as insurance still play a major role in influencing access to healthcare. Over ten percent of women in the U.S. are uninsured, and there are still significant racial and ethnic disparities in insurance coverage despite passage of the Affordable Care Act (Kaiser Family Foundation 2021; Shane and Ayyagari 2014; Breslau et al. 2018; Smith and Medalia 2014; O'Hara and Brault 2013). This was reflected in the Aim #1 findings that black and Hispanic women had higher percentages of being uninsured compared to white women.

Taken together, these findings illustrate that factors such as insurance intersect with race and ethnicity to produce disparities rooted in access and affordability.

Where a woman lives dictates her access to telecontraception platforms. The mixed methods approach used in this research yields findings that inform one another, especially regarding this issue. Findings from Aim #2 showed that political, social, and economic state-level factors all combine to pattern availability of these platforms across the United States. But as Aim #3 shows, the availability of these platforms is not based upon demand or desire for the platforms within these states. Many user reviews mentioning that the telecontraception platform was unavailable in their state also pleaded to expand the services to their state. However, it is important to note that the number of states serviced by a platform rapidly changed even during the course of conducting this research. Since user reviews dated back to 2017, many of these pleas have been answered as telecontraception platforms expand access to a greater number of states. This illustrates the importance of making sure technological innovations such as telecontraception are accessible, affordable, and equitable. Telecontraception platforms arose out of a specific social, political, and economic context. They are clearly meeting an unaddressed need for women across the United States. However, without considering how they affect and are affected by existing institutions they will fail to address all of the barriers women currently face in the traditional in-person healthcare system.

Conclusion

As platform medicine continues to emerge and innovate, what are telecontraception platforms adding to the landscape of reproductive healthcare services? What problems are they solving and where do they fall short? This research identified key research questions which informed one another to uncover both the promises and pitfalls of current systems of accessing

contraception. Overall, the findings illuminated areas for improvement in both the virtual and traditional healthcare spaces. Results show that telecontraception addresses many of the accessibility barriers associated with obtaining contraception in the United States. User reviews expressed support and gratitude for telecontraception, indicating a need for these services that is not being adequately addressed by the traditional healthcare system. However, existing social forces such as insurance and legislation limit the affordability and equitability of telecontraception. This carries important implications because this research also found that most women across the United States expressed strong pregnancy avoidance attitudes, regardless of subgroup. While telecontraception platforms disrupt issues of accessibility in the traditional healthcare system, affordability and equitability still have room for improvement which carries implications for who can use these platforms and their experiences of doing so. Harnessing the potential of these apps, as well as health apps and telemedicine in general, requires knowledge about the material, on-the-ground conditions and circumstances women operate in as they access these platforms. Knowing more about these factors in both the traditional and virtual environments can help tailor better approaches to ensure that all women across the United States have equitable, affordable access to the care they request and deserve to make decisions about their own bodies and lives.

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APPENDICES

Appendix A: Supplementary Analyses for Aim #1

Table 1a. Logistic Regression Comparing Estimation Sample, Sample without Pregnant Women, and Imputed Data

	Birth Control Visit Estimation Sample	Birth Control Visit Dropped Pregnant Women	Birth Control Visit Imputed Data	Annual Gynecological Visit Estimation Sample	Annual Gynecological Visit Dropped Pregnant Women	Annual Gynecological Visit Imputed Data
	OR	OR	OR	OR	OR	OR
Individual Attitudes, Knowledge, & Contraception Use						
Pregnancy avoidance attitude						
2	2.46	2.52	2.25	1.00	.94	.97
3	3.04**	3.10**	2.88**	1.06	1.04	1.05
4	2.59**	2.65**	2.39*	.84	.83	.82
5	3.27**	3.38**	2.87**	.64	.64	.66
6 Very important to avoid pregnancy	4.39***	4.49***	3.98***	.56	.57	.56
Currently pregnant	.26**		.26**	.31**		.29***
Knowledge of birth control methods	1.08	1.09	1.08	1.01	1.05	.99
Past use of the pill	5.89***	5.75***	5.65***	1.25	1.20	1.26
LARC at last wave	.82	.75	.88	1.82	1.73	1.69
Interpersonal Variables						
Visit: Doctor or nurse talked about future plans for children	.71	.68	.70	1.45	1.29	1.46*
Visit: Got info about birth control and pregnancy prevention	3.79**	3.61***	3.90***	.84	.81	.83
Relationship status						
Broken up but back together	1.59	1.55	1.48	1.17	1.20	1.20
Not together for six months or longer	.54	.53	.56	1.39	1.35	1.38
Not dating anyone	.38**	.37**	.40**	.78	.75	.81
Institutional Policy Factors						
Visit: Facility type						
Planned Parenthood or other family planning clinic	2.71*	2.92*	2.67*	.29***	.25***	.30***
Public health dept. or community health clinic	1.85	1.88	1.77	.56	.51	.56
Student health clinic or some other type of h.c. facility	1.03	.94	1.03	.44*	.38*	.43*
Visit: Payment						
Insurance paid	1.10	1.24	1.10	1.01	1.07	.97
Reduced fee or free services	1.36	1.39	1.36	.80	.82	.79
Has a regular place to go for medical care	.69	.72	.65	1.00	1.01	1.06
Lives in a state that expanded Medicaid under ACA	.89	.88	.88	.98	1.01	.998
Key Subgroups						
Race and ethnicity						
Black	.88	.84	.81	2.44*	2.13*	2.65**

Other	1.05	1.14	.98	1.46	1.90	1.56
Hispanic	1.41	1.39	1.35	1.06	.98	1.07
Multiracial	.50	.52	.50	.81	.91	.81
Socioeconomic status						
100-199%	.88	.96	.87	.92	1.05	.96
200%+	.65	.70	.65	.88	.91	.95
Insurance status						
Medicaid	.61	.67	.62	1.23	.98	1.23
Uninsured	.32**	.36*	.31**	.93	1.01	.93
Marketplace	.81	.91	.82	2.43*	2.84*	2.31*
Control Variables						
Marital status						
Never married	1.35	1.34	1.29	1.53	1.48	1.46
Living with partner	1.22	1.22	1.20	1.46	1.57	1.41
Divorced or separated	.97	1.01	.95	1.66	1.56	1.63
Employment status						
Part-time	1.64	1.53	1.70	.69	.73	.70
Full-time	1.35	1.35	1.35	1.29	1.35	1.28
Educational attainment						
High school	.60	.60	.58	2.10	2.10	1.97
Some college, no degree	.85	.85	.86	1.37	1.30	1.34
Associate's degree	.65	.65	.66	1.35	1.26	1.25
Bachelor's degree	.57	.54	.58	1.87	1.76	1.73
Master's, professional, or doctorate degree	.51	.50	.52	1.94	2.05	1.84
Age						
18-26	3.01**	3.05**	2.95**	.23**	.24**	.29**
27-30	2.17*	2.04*	2.12*	.23**	.25**	.28**
31-36	1.79	1.83	1.79	.40*	.46	.48
Foreign-born	.57	.55	.61	1.97	1.92	1.96
Constant	.10**	.09**	.12*	6.50*	5.40	5.93*
Observations	982	889	1,008	982	889	1,008

Note. *** p<.001, ** p<.01, * p<.05. Reference categories are respectively: White; Less than 100% FPL; Private insurance; Married; Unemployed; Less than High School; Age 37-39; Not foreign-born; Pregnancy avoidance attitude of 1; No past use of the pill; No LARC at last wave; Doctor didn't talk about future plans for children; Didn't get information about birth control; Together for six months or longer; Private doctor's office; Respondent paid; No regular place for medical care; Lives in a state that did not expand Medicaid under ACA.

Appendix B: Supplementary Analyses for Aim #2

Table 1b. Sensitivity Analyses Conducted with Alternate Coding Schemes for Outcome and Condition Variables

	Coding Used in Original Analysis	Coding Used in Sensitivity Analyses	Result of Sensitivity Analysis	Final Decision
Outcome Variable				
Number of telecontraception platform services Range: 2, 3, 4, or 5 or more services	High availability = 3 or more services Low availability = 2 services	High availability = 4 or more services Low availability = 2 or 3 services	Lower consistency scores Lower coverage scores Solution coverage dropped in half (.33); solution consistency was similar	Retained the original coding scheme for greater information about patterns to the outcome, and greater consistency and coverage.
Condition Variables				
State political control Democrat, Republican, or split	Groups together state legislature (D, R, or split) & state governor (D or R)	Separated out state legislature and state governor into two separate variables	Similar consistency and coverage scores Similar combinations of conditions	Retained the original combined variable of legislature plus governor for easier interpretation.
Proportion of women legislators Range: 14% – 52%	Four-value fuzzy set: 33% or higher = 1 (fully in) 26% to 32% = 0.67 (more in than out) 20-25% = 0.33 (more out than in) Less than 20% = 0 (fully out)	Crisp set: 30% or higher = 1 (fully in) Less than 30% = 0 (fully out)	Lower coverage scores	Retained the original coding scheme because it provided greater coverage and thus more information about the pathways.
Uninsured women Range: 3% - 24%	Four-value fuzzy set: 10% or higher = 1 (fully in) 8% to 9% = 0.67 (more in than out)	Crisp set: 10% or higher = 1 (fully in) Less than 10% = 0 (fully out)	Similar findings Slightly lower coverage scores	Retained the original coding scheme because it provided greater coverage.

	7% = 0.33 (more out than in) 6% or less = 0 (fully out)			
Rural population Range: 1% to 69%	Three-value fuzzy set: 27% or higher = 1 (fully in) 20% - 26% = 0.5 (neither fully in nor fully out) Less than 20% = 0 (fully out)	Crisp set: 40% or higher = 1 (fully in) Less than 40% = 0 (fully out)	Lower solution coverage Fewer pathways (2 pathways) with large groupings of states in each pathway	Retained the original coding scheme because it provided greater solution coverage and diverse information about the pathways.
Final robustness check using all recalibrated variables from each sensitivity analysis listed above	---	---	Very low coverage scores Lower solution coverage and consistency scores	Retained original coding decisions because this provided greater coverage and preserved the rich variation and information about the different pathways.
Robustness check using consistency cutoff value of 0.75	---	---	Lower consistency scores Fewer pathways with large groupings of states in each pathway	Retained original cutoff value of 0.80 to preserve the diversity of information present in these pathways.
Robustness check using a variable representing the percentage of women legislators who are Democrat Range: 24% to 93%	---	Crisp set: 51% or higher = 1 (fully in) Less than 51% = 0 (fully out)	Similar findings One of the pathways had low raw and unique coverage scores (.16 and .05, respectively).	Retained original women legislators variable due to higher consistency and coverage scores.

Appendix C: Supplementary Coding Information for Aim #3

Table 1c. Descriptions of Codes and their Frequency in Nurx User Reviews

Themes and Codes	Number of Reviews	Percentage of Total Reviews (N=1,323)	Code Description
Access and Timeliness of Apps			
Speed/quick service	207	16%	Fast process to order birth control
Easy to use	235	18%	App itself is easy to use (functionality), ordering process is easy
Convenience	108	8%	Mentions that the service is convenient, doesn't have to leave home or go to doctor or pharmacy
Medical need	143	11%	Requires contraception to deal with medical side effects and symptoms, need for specific brands, existing medical conditions
Shipping	143	11%	Shipping orders out – fast or slow, never received or shipped
In-person visit problems or barriers	243	18%	References to any barriers associated with in-person visits: long appointment wait times, scheduling, time, cost, exams
Clinician Interaction			
Provider	331	25%	Answering questions, medical consultation, team, messaging
Birth control options	260	20%	Requests for a specific brands, different options offered for birth control
Information/education	45	3%	Provided information and education about birth control options, educational resources, choice tailored to individual and their preferences
Discreet/privacy	24	2%	Mentions how the service is discreet, private, confidential; not wanting others to find out, discreet packaging
Cost and Affordability			
Cost/affordability	292	22%	Explicit dollar amounts patients pay, thoughts about the cost-effectiveness and price of these services
Insurance	339	26%	Having or not having insurance and whether it is accepted by the app, whether certain insurance plans cover costs
Billing complaints	183	14%	Problems with incorrect amounts or charges, need a reversal
Support for the Idea of Telecontraception			
Supports telecontraception idea	263	20%	References to support or love the idea of this service, company, believes in expanding women's health access
State (un)availability	46	3%	Mentions services not available in a certain state; need the services there
Platform Development			
Technology complaints about app	167	13%	Technological issues with app functionality, bugs, loading times, notifications, crashes, cannot add insurance, signs out
App rollout	12	1%	Conversion from the website to an app; experiences using the newly added app to the Google Play Store
Customer service	437	33%	Mentions customer service department, contact with them, resolving issues related to orders

Note: Percentage of total reviews do not add up to 100% since user reviews can contain multiple, overlapping codes.

Table 2c. Descriptions of Codes and their Frequency in Planned Parenthood Direct User Reviews

Themes and Codes	Number of Reviews	Percentage of Total Reviews (N=522)	Code Description
Access and Timeliness of Apps			
Speed/quick service	158	30%	Fast process to order birth control
Easy to use	129	25%	App itself is easy to use (functionality), ordering process is easy
Convenience	80	15%	Mentions that the service is convenient, doesn't have to leave home or go to doctor or pharmacy
Medical need	50	10%	Requires contraception to deal with medical side effects and symptoms, need for specific brands, existing medical conditions
In-person visit problems or barriers	101	19%	References to any barriers associated with in-person visits: long appointment wait times, scheduling, time, cost, exams
Clinician Interaction			
Provider	141	27%	Answering questions, medical consultation, video consultation, video chat, demeanor of physician, speak to a physician
Information/education	15	3%	Provided information and education about different birth control options, educational resources, choice is tailored to the individual and their preferences
Discreet/privacy	14	3%	Mentions how the service is discreet, private, confidential; not wanting others to find out, discreet packaging
Cost and Affordability			
Cost/affordability	104	20%	Explicit dollar amounts patients pay, thoughts about the cost-effectiveness and price of these services
Insurance	56	11%	Having or not having insurance and whether it is accepted by the app, whether certain insurance plans cover costs
Billing complaints	10	2%	Problems with incorrect amounts or charges, need a reversal
Support for the Idea of Telecontraception			
Supports telecontraception idea	73	14%	References to support or love the idea of this service, company, believes in expanding women's health access
State (un)availability	44	8%	Mentions services not available in a certain state; need the services there
Planned Parenthood patient/history	50	10%	Planned Parenthood supporter, in-person patient, grateful for the organization
Platform Development			
Technology complaints about app	178	34%	Technological issues with app functionality, bugs, loading times, notifications, crashes, cannot add insurance, signs out

Note: Percentage of total reviews do not add up to 100% since user reviews can contain multiple, overlapping codes.

Appendix D: Institutional Review Board Approval Letter

UNIVERSITY of WISCONSIN
UWMILWAUKEE
Department of University Safety & Assurances

Melody Harries
IRB Administrator
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Engelmann 270
P. O. Box 413
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New Study - Notice of IRB Exempt Status

Date: May 19, 2020

To: Noelle Chesley
Dept: Letters & Science

CC: Jenna Nitkowski

IRB #: 20.339
Title: Accessibility, Affordability, and Equitability of Women's Health Care Access to Telecontraception

After review of your research protocol by the University of Wisconsin – Milwaukee Institutional Review Board, your protocol has been granted Exempt Status under Category 4 as governed by 45 CFR 46.104(d).

This protocol has been approved as exempt for three years and IRB approval will expire on May 18, 2023. Before the expiration date, you will receive an email explaining how to either keep the study open or close it. If the study is completed before the expiration date, you may notify the IRB by sending an email to irbinfo@uwm.edu with the study number and the status.

Any proposed changes to the protocol must be reviewed by the IRB before implementation, unless the change is specifically necessary to eliminate apparent immediate hazards to the subjects. You are responsible for adhering to the policies and guidelines set forth by the UWM IRB, maintaining proper documentation of study records and promptly reporting to the IRB any adverse events which require reporting. You are also responsible for ensuring that all study staff receive appropriate training in the ethical guidelines of conducting human subjects research.

You must also adhere to UWM and UW System Policies, and any applicable state and federal laws governing activities which are independent of IRB review/approval (e.g., FERPA, Radiation Safety, UWM Data Security, UW System policy on Prizes, Awards and Gifts, state gambling laws, etc.). When conducting research at institutions outside of UWM, be sure to obtain permission and/or approval as required by their policies.

Contact the IRB office if you have any further questions. Thank you for your cooperation, and best wishes for a successful project.

Respectfully,
Melody Harries
Melody Harries
IRB Administrator

CURRICULUM VITAE

JENNA C. NITKOWSKI

EDUCATION

2021	Ph.D., Sociology, University of Wisconsin-Milwaukee
2017	M.A., Sociology, University of Wisconsin-Milwaukee
2008	B.A., Sociology and English, University of Wisconsin-Madison

EMPLOYMENT HISTORY

2020-Present	Teaching Assistant, Department of Sociology, University of Wisconsin-Milwaukee
2020-2021	Research Assistant, Department of Sociology, University of Wisconsin-Milwaukee
2017-2020	Research Assistant, Institute for Child and Family Well-Being, Helen Bader School of Social Welfare, University of Wisconsin-Milwaukee
2015-2017	Teaching Assistant, Department of Sociology, University of Wisconsin- Milwaukee
2016-2016	Lab Instructor, Department of Sociology, University of Wisconsin-Milwaukee
2015-2015	Associate Research Specialist, Institute for Research on Poverty, University of Wisconsin-Madison
2011-2015	Trust Operations Specialist II, Bank of Montreal Global Asset Management
2009-2011	Personal Banker I, Marshall & Ilsley Support Services Corporation
2007-2008	Research Assistant, Department of Sociology, University of Wisconsin-Madison
2005-2008	Technical Services Assistant, Memorial Library, University of Wisconsin- Madison

RESEARCH INTERESTS

Medical sociology, health disparities, gender, technology, microsociology

AWARDS

2019	Best Graduate Student Paper Award ($500 University of Wisconsin-Milwaukee Sociology Department)
2017	Chancellor's Award ($3,000 University of Wisconsin-Milwaukee)
2015	Chancellor's Award ($3,000 University of Wisconsin-Milwaukee)
2007	Dean's List (Fall 2007, University of Wisconsin-Madison)

ACKNOWLEDGEMENTS

2010	Recognized in Cameron Macdonald's book Shadow Mothers: Nannies, Au Pairs, and the Micropolitics of Mothering for contribution as a research assistant.

CONFERENCE PRESENTATIONS

2021	Janczewski, Colleen and **Jenna Nitkowski.** "Parental Mental Health and Substance-Related Services Among CPS-Involved Families." Presented at the Society for Social Work and Research 25th Annual Conference – Social Work Science for Social Change.
2020	**Nitkowski, Jenna.** "Our Bodies, Our Tests: Navigating Power Relationships in Women's Exams." Presented at the Annual University of Wisconsin-Madison Women and Gender Studies Consortium. Madison, Wisconsin (Cancelled due to COVID-19).
2018	**Nitkowski, Jenna** and Colleen Janczewski. "Easier Said Than Done: Can Differential Response Really Improve Access to Early Services?" Presented at the 25th Annual American Professional Society on the Abuse of Children Colloquium. New Orleans, Louisiana.
2017	**Nitkowski Jenna.** "Physical Environmental Condition and Crime in Milwaukee." Presented at the 2017 Annual Midwest Sociological Society Meeting. Milwaukee, Wisconsin.

PUBLICATIONS

2018	Mersky, Joshua, Colleen Janczewski, and **Jenna Nitkowski**. 2018. "Poor Mental Health Among Low-Income Women in the U.S.: Exploring the Role of Adverse Childhood and Adult Experiences." *Social Science & Medicine, 206*:14-21.

TEACHING ASSISTANTSHIPS

Spring 2021	Sociology 224: Race & Ethnicity in the United States (online)
2020-2021	Sociology 361: Research Methods in Sociology (online)
2016-2017	Sociology 361: Research Methods in Sociology (in-person and online)
2015-2016	Sociology 241: Criminology (online)

RESEARCH ASSISTANTSHIPS

2020-2021	Research Assistant, Department of Sociology, University of Wisconsin-Milwaukee. Content analysis of judicial opinions coded into a quantitative dataset for Professor Tim O'Brien's National Science Foundation grant "The Social, Political, and Legal Filtering of Expert Witnesses into Court"
2017-2020	Research Assistant, Institute for Child and Family Well-Being, Helen Bader School of Social Welfare, University of Wisconsin-Milwaukee

SERVICE

2020	Reviewer, *Information, Communication and Society*
2019	T-SBIRT Training Video, MCWP and UWM
2018	Member, UWM Graduate Student Sociology Association
2017	Student Worker, Midwest Sociological Society 2017 Annual Meeting
2015	Volunteer, UWM Graduate School Open House, Department of Sociology

RESEARCH GRANTS

2020	**Nitkowski, Jenna.** Principal Investigator. "Accessibility, Affordability, and Equitability of Women's Health Care Access to Telecontraception." Agency for Health Care Research and Quality. (Reviewed with scoring and feedback but not funded).
2018	Miner, Michael and **Jenna Nitkowski.** Co-Investigator. "School Districts, Communities, and Unequal Discipline." Russell Sage Foundation. (Not funded).