2019

An Evaluation of Differences in Motivations to Receive Cervical Cancer Screening and Follow-Up Care between Black and White Women

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AN EVALUATION OF DIFFERENCES IN MOTIVATIONS TO RECEIVE CERVICAL CANCER SCREENING AND FOLLOW-UP CARE BETWEEN BLACK AND WHITE WOMEN

A dissertation submitted in partial fulfillment of the requirement of the degree of Doctor of Philosophy at Virginia Commonwealth University

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Acknowledgements

There are several people who I would like to acknowledge and thank. I would like to thank my advisor and the chair of my dissertation, Dr. Eric Benotsch, for his continued mentorship, support, and expert guidance throughout this dissertation, as well as the rest of my graduate career. I am extremely grateful to have had the opportunity to work with and learn from him, and I will forever appreciate the genuine nature of his mentorship, his willingness to support my growth in the direction of my own research interests, and his confidence through my periods of self-doubt.

I would also like to express my gratitude toward my other dissertation committee members, Drs. Linda Zyzniewski, Susan Bodnar-Deren, Andrew Barnes, and Kristina Hood, for their insight and direction in the development of this project, as well as for the roles that each of them played as support systems and mentors.

Thank you to my friends, family, and everyone who falls in between. I want to extend a special thanks to my partner, who has offered unconditional support and unwavering confidence in myself and all of my pursuits. You have served as a sounding board, witnessed me at all of my highs and lows, loved me at each stage of this process, and helped me maintain my balance.

As a first-generation college student, I am overwhelmed with gratitude for my parents – everything that I am is and always will be a magnificent combination of both of you. Everything that I have been able to do already and will do in the future has been made possible through your hard work and unwavering support. I will be forever grateful for everything that you have sacrificed and provided me with to ensure that I would be able to follow my passions. Beyond that, I am appreciative of your authenticity and the innumerable lessons that you have taught me along the way. Thank you for instilling in me the resilience, confidence, and compassion that you have. My work will always be a reflection of who you are and the values that you have passed on. Words cannot begin to express how much I love you both.
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Abstract

AN EVALUATION OF DIFFERENCES IN MOTIVATIONS TO RECEIVE CERVICAL CANCER SCREENING AND FOLLOW-UP CARE BETWEEN BLACK AND WHITE WOMEN

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A dissertation submitted in partial fulfillment of the requirement of the degree of Doctor of Philosophy at Virginia Commonwealth University.

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Background: Cervical cancer among Black women is a major individual and public health concern. Despite advancements in medical technology and policy, disparities in cervical cancer diagnosis and mortality still exist between White and Black women, with Black women having higher rates of diagnosis (10.0 vs 7.1 per 100,000) and mortality (4.1 vs 2.0 per 100,000). Previous studies have focused heavily on barriers to obtaining cervical cancer screening among Black women and efforts to improve screening rates. Despite speculation by researchers that gaps in receipt of quality follow-up care may contribute to disparities, its role in disparate mortality rates between Black and White women has yet to be formally studied.

Purpose: The goals of the present research were to (1) assess differences in Pap screening rates and (2) rates of adherence to recommended follow-up care after abnormal Pap results between Black and White women, (3) evaluate how specific factors of the Health Belief Model (HBM)
influence the decision-making process for obtaining Pap screening and (4) receiving recommended follow-up Pap care, and (5) evaluate the role of ethnic centrality as a factor in health decision-making.

**Results:** Results indicated that HBM facets functioned similarly in predicting engagement in Pap screening and follow-up care, although there were differences in the influence of different facets by race. Ethnic centrality showed little applicable influence on adherence to follow-up care among Black women. An exploratory analysis revealed that doctor recommendation was the most influential factor predicting follow-up care use for both racial groups.

**Conclusion:** The present study offers support for increased education and training on provider recommendation of appropriate follow-up care, as well as effective provider communication of results and services using messaging that appeals to the values and concerns of patients.
An evaluation of differences in motivations to receive cervical cancer screening and follow-up care between Black and White women

Introduction and Background

Cervical Cancer

What is Cervical Cancer? Cervical cancer occurs when malignant cells develop in the cervix, which is a structure of tissue that attaches the lower section of the uterus to the upper section of the vaginal canal (Center for Disease Control and Prevention [CDC], 2014). The cervix serves many functions, including acting as a physical barrier preventing sexually transmitted infections (STIs) from entering the uterus, altering the consistency of mucus production to permit or prohibit conception, and dilating to allow childbirth to occur or tissue to be expelled during menstruation.

What is Human Papillomavirus? Cervical cancer most commonly results from infection by certain high-risk strains of Human Papillomavirus (HPV) that are sexually transmitted (Ramondetta, 2013; U.S. Preventive Services Task Force [USPSTF], 2018). HPV is the most commonly occurring STI in the United States, and accounts for an estimated 14.1 million of the 20 million new STI diagnoses that occur each year (CDC, 2013). It is estimated that 80% of Americans will have contracted HPV in their lifetime (American Sexual Health Association, 2019), and 79 million Americans are currently infected with at least one strain of HPV (CDC, 2016). Although HPV will largely be discussed throughout this project in terms of the potential for certain specific strains to negatively influence the cervix of cisgender women, people can become infected with HPV regardless of gender and HPV can influence many different body parts and systems.
While over 200 types of HPV exist, there are about 40 different strains that can infect the genitals (including the cervix, vagina, vulva, rectum, anus, penis, and scrotum), mouth, and throat (Planned Parenthood Federation of America [PPFA], 2018). Some of these HPV strains may cause warts to develop, while others may lead to problematic cell changes that can result in cancer over time. Of the types of cancer that can result from HPV infection, cervical cancer is the most commonly occurring (CDC, 2012). Other strains outside of these 40 types may cause warts to develop elsewhere on the body, such as on the hands and feet; however, these strains are not sexually transmitted and will not be the focus of this work. HPV 16 and 18 are the viral strains that are most often responsible for cervical cancer diagnoses, with HPV 16 accounting for 50% and HPV 18 accounting for 20% of these diagnoses (Ramondetta, 2013). Still, there are other strains of HPV that have been linked to cervical cancer, and up to 40% of individuals who receive a cervical cancer diagnosis are infected with more than one strain of HPV (Ramondetta, 2013). Most HPV infections are able to be cleared naturally by the body’s immune system over time; however, the high prevalence of HPV and likelihood of exposure to high-risk HPV strains indicate that those who have a cervix remain at risk for cervical cancer. Further, having a poorer immune system or becoming infected with more persistent strains of HPV can result in the body being unable to clear the virus(es) on its own, thus placing individuals at increased risk for developing cervical cancer.

*How prevalent is cervical cancer?* At one time, cervical cancer was the leading cause of cancer death among women in the U.S. (NIH, 1996). Though rates of diagnosis and mortality have fallen by around 75% over the past 50 years, cervical cancer is still the third most common gynecological malignancy among women in the United States (U.S. Cancer Statistics Working Group, 2015). Despite our advances, each year, around 12,000 individuals are diagnosed and
about 4,000 die from cervical cancer (CDC, 2014). In 2018, the estimated number of women in the U.S. who were living with cervical cancer was 289,696 (SEER, 2019). For 2019, the estimated number of new cases is 13,170 and the estimated number of deaths is 4,250 (National Cancer Institute [NCI], 2019). The median age at diagnosis is 50 years old; however, graphing cervical cancer diagnosis by age shows that women are most often diagnosed between the ages of 35-45 years old (NCI, 2019).

**How can cervical cancer be prevented?**

**Abstinence.** As HPV strains that affect reproductive organs are contracted through sexual contact, the easiest way to avoid HPV infection that may lead to cervical cancer is to practice abstinence. For those who are sexually active, it is suggested that barrier methods (e.g., latex condoms, dental dams) are used for protection against direct skin-to-skin contact that may result in transmission of the HPV virus (CDC, 2016).

**Vaccination.** It is also widely suggested that individuals receive the HPV vaccination, which protects against the strains of HPV that most commonly result in cervical cancer (CDC, 2012; Department of Health and Human Services [DHHS], 2013). The Gardasil 9 HPV vaccination specifically targets and protects against the two highest risk HPV strains involved in cervical cancer (HPV-16 and HPV-18), as well as five other strains that are linked with cancer (HPV-31, 33, 45, 52, and 58) and strains that cause the majority of cases of genital warts (HPV-6 and HPV-11) (Bailey et al., 2018; Kahn, Lan, & Kahn, 2007; Merck Vaccines, 2019). The HPV vaccine is given in a series of two to three doses administered across a six- to 12-month span depending on age range (Bailey et al., 2018; Merck Vaccines, 2019; National Cancer Institute [NCI], 2014).
When first approved in 2006, vaccination was recommended for adolescent girls from 11-12 years old (but could be administered beginning at the age of 9), and a similar recommendation was made for adolescent boys beginning in 2011 (NCI, 2014). Since then, recommendations have expanded even further. As of August 2019, the CDC recommends that vaccination occur before an individual reaches 15 years of age (Meites et al., 2019). This practice is recommended for two reasons: (1) HPV vaccines result in a higher immune response in those who are of preteen or young teen age, and (2) the vaccine is more effective at preventing infection if the series is completed before an individual becomes sexually active (Bailey et al., 2018). Still, recent numbers indicate that among those 11-13 years old, only 36% of girls and 14% of boys have been vaccinated (Bailey et al., 2018).

It is also recommended that catch-up doses be administered to men through age 21, as well as women and “certain special populations” (i.e., gay or bisexual men and those who have lowered immune systems) through age 26 (Bailey et al., 2018; Meites et al., 2019). The most recent update to these recommendations includes those in the 27-45 age range. Clinical trials have shown efficacy in preventing HPV infections, and the CDC now recommends that shared clinical decision-making between provider and patient be utilized to determine whether those falling within this age range would benefit from vaccination (Meites et al., 2019). For example, those who are not in a mutually monogamous sexual partnership and/or have new sexual partners are at risk for acquiring a new HPV infection and may benefit from vaccination (Meites et al., 2019). Those who receive the vaccine after age 15 will receive a schedule of three doses, with the second dose occurring 1-2 months after the first, and the third occurring 6 months following the second dose (Meites et al., 2019).
**Cervical Cancer and HPV Screening.** Medical advances have significantly reduced both cervical cancer diagnosis and mortality rates among those with a cervix, by allowing cancer to be detected at its earliest stages through Papanicolaou (Pap) smear testing (Parrish, 2016; Surveillance, Epidemiology, and End Results [SEER], 2019). During a Pap smear, a sample of cells is collected from the cervix by a medical professional and sent off to a medical lab to be evaluated for cell changes that indicate cancerous or pre-cancerous conditions. While Pap smears test for abnormal cell developments that result from HPV infection, they do not test for the HPV viruses themselves. HPV testing, on the other hand, does detect the presence of the HPV virus, which can develop into abnormal cell changes (i.e., cervical dysplasia) in the future that may ultimately result in the formation of cancerous cells.

It is currently recommended that 21-29 year olds with a cervix obtain Pap testing at 3-year intervals as long as results remain normal (USPSTF, 2018). It is suggested that those aged 30-64 years old obtain either a Pap test at 3-year intervals, receive high-risk HPV testing every 3 or 5 years, or receive both Pap testing and high-risk HPV testing every 5 years (American College of Obstetrics & Gynecology [ACOG], 2016; USPSTF, 2018). Current recommendations also state that if those aged 65 and older have had a history of normal results for the previous 10 years, they may be able to stop testing (USPSTF, 2018). However, this particular guideline has recently been called into question after research has surfaced showing significant rates of cervical cancer diagnosis after age 65 (Dilley, O’Donnell, Smith, Bae, & Huh, 2018). In this work, data from the SEER and National Cancer databases were used and showed that between 18.9-19.7% of cervical cancer diagnoses from 2000-2014 had been among women above the age of 65 (Dilley et al., 2018). For these and other reasons, screening practices and intervals should
be based on individuals’ circumstances and health history, and should be part of an ongoing plan of care between an individual and their medical provider.

Screening recommendations are different from those previously listed for those who are at a higher risk of developing cervical cancer, such as those with a history of cervical cancer; those who are HIV positive or immunosuppressed; and those with a history of exposure to DES (diethylstilbestrol) while in utero (Vegunta Files, & Wasson, 2017). [DES is a synthetic form of estrogen that was prescribed to some pregnant women between 1938-1971 with the intention of preventing miscarriages or premature deliveries; however, it was later found that DES use early on in pregnancy could cause reproductive issues in the fetus (American Cancer Society, 2015).] People who are at higher risk for cervical cancer, such as those who fall into the above groups, may require more frequent Pap testing. Current recommendations instruct these individuals to consult with their provider about their specific medical history in order to discern the appropriate timetable for Pap testing given previous Pap results and other risk factors (ACOG, 2016).

The significant reductions in cervical cancer diagnosis and mortality rates over the last five decades have been largely attributed to the development of effective Pap testing, HPV testing, and the modification of screening guidelines (Ramondetta, 2013). This is because even after an HPV virus has been contracted, it can take years or even decades for the viral infection to transition to the point of cervical dysplasia or develop into cervical cancer. There are typically no signs or symptoms of infection until years after contraction of the virus (CDC, 2016); therefore, routine Pap testing is particularly effective at catching cell changes early on and reducing the window of opportunity for the cell changes to persist unknowingly into cancer development.
Types of Abnormal Pap Results.

There are a variety of abnormal Pap results that one can receive, which reflect a range in severity of abnormal cells or cervical dysplasia.

**ASC-US.** The result that reflects the lowest level of severity is ASC-US (Atypical Squamous Cells of Undetermined Significance). This result indicates that abnormal cells have been detected on the surface of the cervix, but these cells may or may not be dangerous. ASC-US results are generally considered to be very mild, as they can also indicate other noncancerous causes, such as infections or inflammation (NCI, 2019).

**LSIL.** LSIL (Low-grade Squamous Intraepithelial Lesion) refers to finding mild dysplasia (i.e., slightly abnormal cells) on the surface of the cervix. Because LSIL is caused by strains of HPV, it is considered to be more serious than ASC-US; however, it is common for the body to clear LSIL on its own without treatment (NCI, 2019). Still, it is possible for LSIL to become cancerous and spread. CIN I stands for Cervical Squamous Intraepithelial Neoplasia 1, and is defined in the same way as a LSIL result; however, CIN results are found when a cervical biopsy is taken (NCI, 2019). Because these results mean the same thing, LSIL and CIN I results are grouped together when appropriate.

**ASC-H.** ASC-H (Atypical Squamous Cells – Cannot exclude High-Grade Lesion) results indicate the presence of abnormal squamous cells present in the tissue on the outer part of the cervix. These results may be a sign of more serious results (namely, HSIL), which may develop into cervical cancer over time if not treated. More testing may be needed to clarify diagnosis of cells when this result is received (NCI, 2019)

**HSIL.** A type of moderate or severe dysplasia that is found on the surface of the cervix is referred to as a High-Grade Squamous Intraepithelial Lesion (HSIL). Abnormal cells in this
category can range from looking somewhat to very abnormal, and if no treatment is received then these cells may become cancer and spread to nearby healthy tissue (NCI, 2019).

**CIN II.** Cervical Squamous Intraepithelial Neoplasia II (CIN II) results indicate that a cervical biopsy has been done and abnormal cells have been found on the surface tissue of the cervix. While this is not a cancer diagnosis, the result does refer to high-grade or moderate dysplasia and it may develop into cancer if treatment is not received. Appropriate treatment for this diagnosis may include cryotherapy, laser therapy, Loop Electrosurgical Excision Procedure (LEEP), or cone biopsy to remove or destroy abnormal tissue (NCI, 2019). Each of these treatment options are described in further detail in the next section.

**CIN III.** Severely abnormal cells that are found on the surface of the cervix through the completion of a cervical biopsy are referred to as Cervical Squamous Intraepithelial Neoplasia III (CIN III). This result indicates high-grade or severe dysplasia, and is also sometimes referred to as Stage 0 Cervical Carcinoma in Situ (NCI, 2019). The treatment options for this diagnosis are the same as those for CIN II.

**AGC.** A result of Atypical Glandular Cells (AGC) refers to abnormal cells found on the inner part of the cervix or the lining of the uterus. This result may be a sign of cancer, or could indicate the presence of other serious medical conditions (NCI, 2019). More testing may be needed to determine the source and significance of this result.

**AIS.** Adenocarcinoma In Situ (AIS) results refer to atypical glandular cells, as well. This result indicates a pre-cancerous condition where these abnormal cells are currently localized to surface-level cervical tissue but could lead to an invasive adenocarcinoma if left untreated (NCI, 2019).
Options after Abnormal Pap Results.

If results from a Pap screening test come back as abnormal, but do not show that the patient currently has cervical cancer, there are methods of treatment designed to prevent the progression of the abnormal or precancerous cells into cancerous cells. These methods may be used individually or in combination in order to aid the healthcare provider in diagnosing cell changes with more specificity and potentially removing the abnormal cells.

Diagnosis of Cervical Dysplasia. There are various methods that providers use to diagnose (or rule out) specific types or categorizations of cervical dysplasia. One method is a colposcopy. When colposcopies are performed, a specific microscope (i.e., colposcope) is used to examine the cervix with increased magnification so that the provider may evaluate the existence and type of cervical dysplasia based on the appearance of cells (The American College of Obstetricians and Gynecologists [ACOG], 2015). A provider may decide that in addition to the colposcopy, it would be advantageous to perform a cervical biopsy. During a cervical biopsy, a large cluster of cells that appear to be abnormal are collected from the surface of the cervix and sent to a lab to be assessed. A provider may also decide that endocervical curettage should be performed, which involves collecting clusters of abnormal cells from the inside of the cervical canal for further analysis (ACOG, 2015).

Treatment of Cervical Dysplasia. There are two types of methods used for treatment once a diagnosis of the presence of precancerous cells is made: excisional treatments and ablation treatments. Excisional treatments consist of either a LEEP (Loop Electrosurgical Excision Procedure), which is the most common treatment used and involves using electrical current running through a wire loop to remove the part of the cervix with abnormal cell growth; or conization, where a cone-shaped portion of the cervix containing abnormal cells is removed.
Ablation treatments, on the other hand, consist of either cryotherapy, where the abnormal cells are frozen and naturally detach; or laser therapy, where the tissue is destroyed using a focused beam of light (ACOG, 2016).

Often, once treatment is administered, more frequent Pap and/ or HPV testing is recommended in order to follow up more closely on any subsequent cervical changes. Conversely, some types or stages of cervical dysplasia do not require treatment, as they may consist of more minor cell changes that the body may be able to clear up on its own (e.g., results indicating ASC-US, LSIL, or CIN I). Still, more frequent Pap and/ or HPV testing is typically recommended when this is the case, to monitor any new developments and catch any additional changes early on.

**Health Disparities in Cervical Cancer Diagnosis and Mortality**

Despite the overall reduction of cervical cancer diagnoses and mortality that has been seen in recent decades, disparities still exist between White and Black women. The American Cancer Society (2016) reports that Black women experience higher rates of cervical cancer diagnosis than White women (10.0 vs 7.1 per 100,000 women), as well as double the rate of mortality (4.1 vs 2.0 per 100,000 women, respectively; American Cancer Society, 2016). However, more recent work that accounts for personal history of hysterectomy indicates the existence of even more severe disparities, and reports mortality rates of 10.1 vs 3.2 per 100,000 women among Black and White women, respectively (Beavis, Gravitt, & Rositch, 2017). Although adjusted diagnosis rates are not reported, this work suggests that disparities in mortality rates had previously been underestimated by 44%. To put these new statistics into perspective, the authors compared the adjusted cervical cancer mortality rates to global rates, and found that the mortality rate among White women mirrored that found in other developed nations.
(e.g., Europe, Australia/New Zealand, Japan) at 3.3 per 100,000 women, while rates for Black women were in-line with those of less developed nations (e.g., all of Africa and Asia, not including Japan) at 9.8 per 100,000 (Beavis et al., 2017). Although Black women are more likely than any other racial/ethnic group to die from cervical cancer in the U.S., prior work has shown that Black women remain largely unaware of their increased rates of risk (Parrish, 2016).

**Pap Screening.** Disparities in diagnosis and mortality persist even as disparities in Pap screening behavior have narrowed, with Black women now obtaining Pap screening at rates that are equal to those of White women (American Cancer Society [ACS], 2016). Still, much of the research focused on reducing racial disparities in cervical cancer diagnosis and mortality continue to be aimed at increasing Pap screening behaviors of Black women (Ackerson, 2010; Bazargan, Bazargan, Farooq, & Baker, 2004; Bellinger, Millegan, & Abdalla, 2015; Strohl et al., 2015; Weragoda et al., 2016). Both qualitative and quantitative studies have discussed various factors that result in non-adherent Pap screening behaviors among Black women, including socioeconomic status (SES; Bellinger et al., 2015; Weragoda et al., 2016), lack of adequate insurance coverage (Bellinger et al., 2015), knowledge about cervical cancer (Strohl et al., 2015), poor patient-provider communication and relationships (Ackerson, 2010; Bazargan et al., 2004), and ethnic identity (Bellinger et al., 2015).

Low SES and lack of insurance coverage result in decreased access to screening, with some women relying on free or reduced-cost screening programs or opting to delay their care (Bellinger et al., 2015). Other studies have even noted that rates of cervical cancer incidence and mortality within some low-income communities in the U.S. come close to mirroring those rates documented in developing nations (Kahn et al., 2012; Jemal et al., 2013). Lack of knowledge about the causes of cervical cancer, how it can be prevented, and the use of Pap tests to screen
for it have each been related to lower rates of screening among Black women (Bellinger et al., 2015; Strohl et al., 2015).

As previously stated, studies have also found that many Black women are unaware of their increased risks related to cervical cancer and the need to obtain screening (Bazargan et al., 2004). Patient-provider relationships have been thoroughly studied, and results have shown that receiving suggestions to receive screening and receiving health education from providers is a significant predictor of screening behavior (Johnson, Mueller, Eliason, Stuart, & Nemeth, 2016; Tracy, Schluterman, & Greenberg, 2013). Along with this, effective communication, trust, and the presence of shared decision-making between the patient and their provider have all been related to higher rates of screening (Ackerson, 2010; Bazargan et al., 2004; Bellinger et al., 2015).

Various provider interventions and culturally-focused health campaigns developed specifically to target Black women have been employed to encourage increased screening; however, mortality rates have not been significantly reduced (Parrish, 2016). These efforts may have positively influenced Pap screening rates over time, though, as it is currently reported that Black women now have equal rates of Pap screening to White women (ACS, 2016). However, it stands to reason that barriers other than those related to access to and utilization of Pap screening must remain, as Black women have been found at the time of cancer diagnosis to be older and to have a more advanced stage of cancer than White women even despite having roughly equal rates of Pap screening (Weragoda et al., 2016). The aforementioned differences in age and cancer stage at time of diagnosis have been found to be strong predictors of cervical cancer mortality in Black women (Brooks, Baguet, Gardner, Moses, & Ghosh 2000; Eggleston et al., 2006); and though it has not been formally studied, it has been suggested that these differences
likely result from receiving no follow-up care or follow-up care of poor quality after receiving abnormal Pap test results (Benard et al., 2012; Brandt et al., 2006; DeSantis, Naishadham, & Jemal, 2013; Horner et al., 2011; Weragoda et al., 2016).

Follow-Up Care as a Barrier. Some qualitative research has shown that lack of knowledge about follow-up care, the costs associated with such care, and the patient-provider relationship are all influential factors for ethnic minority women when making decisions about obtaining recommended follow-up care (Bellinger et al., 2015; Brandt et al., 2006; Coker, DeSimone, Eggleston, White, & Williams, 2009). Bellinger and colleagues (2015) noted that Black women reported little recollection about the follow-up care recommended by their provider, as well as limited access to follow-up care services that were recommended after they received their abnormal Pap results. Other research has suggested that the quality and appropriateness of treatment following abnormal Pap results may contribute to the racial disparities seen in survival rates, as ethnic minority women often do not share the same level of access to high quality health care that White women do (Hicks, Yap, Matthews, & Parham, 2006; Weragoda et al., 2016). Despite these speculations, the role of receipt of follow-up care in the disparate cervical cancer mortality rates between Black and White women has yet to be formally studied.

Disparities based on socioeconomic status. Socioeconomic status (SES) has been implicated as a root cause of health disparities in cervical cancer diagnosis and mortality rates (Weragoda et al., 2016). SES can and has been operationalized and discussed in various forms within the literature. However, in relation to healthcare systems and service use, it is most often discussed within the frame of affordability and access, not just to health care, but to high quality health care. Consideration is often given to the ability to pay for services out of pocket, the availability of social aid programs focused on provision of health care services, and access to
health insurance coverage. A particularly important aspect of access to health insurance coverage is access to high-quality health insurance coverage (i.e., the ability of individuals to not be underinsured), as access to low-quality insurance results in people having insurance coverage by title, but still not possessing the ability to afford the health care services that they need.

Prior work has shown that people are more likely to forego health care services—including preventive services—if they lack any form of health insurance coverage, which is a behavior that has been documented as subsequently resulting in poorer health outcomes (Kaiser Commission on Medicaid and the Uninsured, 2006). Literature shows that those who are of lower income and who lack health insurance coverage possess decreased access to Pap screening, with some women being forced to rely on free or reduced-cost screening programs to obtain necessary care or delaying their care altogether (Bellinger et al., 2015; Weragoda et al., 2016). A study conducted by Garfield, Licata, & Young (2014) that collected a nationally representative sample, showed that only 33 percent of individuals who were uninsured reported receiving preventive screenings, compared to 67 percent of individuals who had Medicaid coverage, and 74 percent of those who had private health insurance. Thus, health insurance coverage – and quality health insurance coverage, specifically – can serve as a significant factor when considering access to care. Unfortunately, access to any health coverage, especially access to quality health coverage, in the United States is largely dependent upon level of employment and rate of income. This means that, in some sense, quality of insurance coverage and SES are inextricably linked in this country.

**The role of the PP(ACA) in working to reduce health disparities.**

The Patient Protection and Affordable Care Act (PPACA) may represent a step in a new direction, as a chief aim of the legislation has been to equalize the quality of insurance coverage and
access to services irrespective of SES or class standing. The passage of the ACA has resulted in increased access to preventive cancer screenings, such as cervical cancer screening, for many individuals (ASPE, 2015). One major accomplishment of the ACA has been the expansion of access to health insurance coverage – through efforts like Medicaid expansion and the provision of federal subsidies – to millions of U.S. citizens who did not previously have coverage. While this change has resulted in increased access to care for a substantial number of people, the establishment of Essential Health Benefits (i.e., healthcare services that insurance providers are now required by law to cover with no additional cost-sharing responsibilities for patients) have expanded access to care even further (ASPE, 2015). Included in these Essential Health Benefits are preventive cancer screenings, such as cervical cancer screening. This means that individuals are now supposed to have access to these preventive screening services at no out-of-pocket cost to them (Kaiser Family Foundation, 2013), which has the potential to significantly reduce barriers to certain preventive care. Altogether, this legislation reflects the desire for a cultural shift away from treatment and toward prevention of health issues.

However, the ACA is not without its faults. The final draft of the ACA legislation did not include the initially proposed requirement that states expand their Medicaid coverage to those living at or below 138 percent of the federal poverty level. Instead of including a blanket requirement for all states to expand, the decision to expand, Medicaid coverage using these or other guidelines was left up to individual states, and financial incentives were offered for states that decided to expand. Although 37 states (including Washington D.C.) out of 50 have accepted Medicaid expansion (as of November 2019), 14 have yet to do so, leaving many of the poorest citizens residing within these states in a health coverage gap (Kaiser Family Foundation, 2019). Citizens residing in the coverage gap are deemed ineligible for Medicaid coverage, but are also unable to qualify for federal subsidies
to offset health insurance costs within the marketplace, since individuals must be situated between 138 and 400 percent of the federal poverty level to qualify for this assistance.

Another significant limitation is that the ACA does not specify diagnostic testing or treatments as Essential Health Benefits. Specifically considering cases of cervical cancer prevention, this means that while preventive cancer screenings may be free, any tests that are required to confirm or formally diagnose precancerous or cancerous cell changes, as well as any treatments for such abnormal cell changes or cervical cancer at any stage, are still subject to patient cost-sharing. Thus, patients may be required to pay co-pays, co-insurance rates, or deductibles in order to access these vital services which are aimed at reducing the chance that their condition would continue into advanced stages. Because such diagnostic tests and treatments can range in cost and may require the care of a specialist, lack of high quality health insurance coverage for these services has the power to severely limit access to life-saving follow-up care and treatment, and ultimately contribute to the health disparities previously noted.

The Role of Ethnic Centrality in Cervical Cancer Disparities

Qualitative work completed by Bellinger and colleagues (2015) evaluated the factors that go into deciding whether to obtain a Pap smear among Black women in the American south. A major theme that emerged in the group discussion was that of ethnic identity. Interestingly, the specific role of ethnic identity was variable between women and served as both a protective and predictive factor for cervical cancer care. Some of the women who were interviewed viewed Pap testing as a rite of passage into womanhood, and many felt that it was their cultural responsibility as Black women to promote their own health and that of their families and social networks (Bellinger et al., 2015). These women specifically discussed the need to maintain their own health so that they may be present and able to care for others, and some extended this idea to the responsibility of educating others about the
importance of screening (Bellinger et al., 2015). However, for others, cultural identity was prohibitive of receiving screening. Some women described the script of the “Strong Black Woman,” in that they were expected to sacrifice their own health and well-being for that of others around them, which resulted in personal delay or avoidance of care (Bellinger et al., 2015). Still others discussed the importance of womanhood and motherhood, and reported that fears about the potential for abnormal results to indicate the need for a hysterectomy or other fertility-compromising treatment prevented them from seeking care in the first place (Bellinger et al., 2015). The role of ethnic identity in cervical cancer prevention and care this appears to be an important one that warrants further explanation.

**Theoretical Framework: The Health Belief Model (HBM)**

The Health Belief Model (HBM) (depicted in Figure 1) is used to explain how individuals make choices regarding their health (Janz & Becker, 1984), and has been used to evaluate decision-making related to preventive service use such as cancer screening behavior (University of Twente, 2016). Additionally, this model has been used in previous work to predict cancer screening behaviors specifically among Black women (Hoyo et al., 2005; Johnson, Mues, Mayne, & Kiblawi, 2008). This model is comprised of five dimensions: (1) susceptibility, (2) severity, (3) benefits, (4) barriers, and (5) cues to action, which are outlined below and in figure 1 (National Cancer Institute [NCI], 2005).

1. Susceptibility refers to perceptions of risk related to contracting a certain condition,
2. Severity refers to beliefs about how serious an issue or condition is, or how strongly it may affect one’s health or wellness,
3. Benefits refer to perceptions about how positive engaging in a certain health action may be, or how effective the health action may be in reducing susceptibility or severity of a condition,

4. Barriers refer to beliefs about the negative aspects, outcomes, or costs (e.g., physical, psychological, etc.) of engaging in the health action, and

5. Cues to action refer to any factors that may trigger engagement in a health action or a desire to engage in the health action.

**Figure 1.** The Health Belief Model (modified slightly from Glanz, Rimer, & Lewis, 2002, p.52).

**The Health Belief Model and Prevention**

This model has been applied to various populations and a plethora of health behaviors, and has been used to address public health concerns (Conner & Norman, 1996; Chamption & Skinner, 2016), including preventive health behaviors such as cancer screening, vaccination uptake, and birth control use behaviors, as well as clinical use behaviors, such as physician visits (Joseph et al., 2014; University of Twente, 2016; Yarbrough & Braden, 2001). The dimensions
of the health belief model are substantially supported by empirical evidence as significant predictors of individuals’ engagement in various health behaviors (Janz & Becker, 1984). However, in practice, the Health Belief Model is often broken down and used to assess one or more of the above components on their own rather than testing the influence of the full model on a health behavior outcome of interest (Crepaz & Marks, 2002; Yarbrough & Braden, 2001).

Previous research evaluating ethnic disparities in cervical cancer screening and mortality have studied the influence of individual components of the HBM, such as: perceived risk of susceptibility in relation to screening behavior (Parrish, 2016), the role of cervical cancer knowledge in perceptions of susceptibility and severity (Strohl et al., 2015) and benefits and barriers to screening (Bellinger, 2014), and cues to action provided by targeted health campaigns (Wong et al., 2013; Wong, AbuBakar, & Chinna, 2014) or healthcare providers (Bazargan, 2004; Bellinger et al., 2015) on Pap screening uptake. Though these dimensions have been evaluated separately in relation to cervical cancer screening behavior, the HBM (in combination with path modeling techniques) provides a strong framework through which these dimensions can be evaluated simultaneously to determine how these factors influence one another and the outcomes of interest. In the present study, each of these HBM framework dimensions were included in analyses predicting engagement in Pap screening and the innovative study of receipt of follow-up care after receiving an abnormal Pap result. Ethnic centrality additionally served as a moderator under the dimension of ‘cue to action’ predicting receipt of recommended cervical cancer follow-up care (see Figure 5 for the full model used).

**Present Research**

The goals of the present research were to (1) assess differences in Pap screening rates between Black and White women, (2) examine rates of adherence to recommended follow-up
care following abnormal Pap results between Black and White women, (3) evaluate how specific factors of the HBM influence the decision-making process for obtaining Pap screening, (4) evaluate how these factors influence the decision-making process for receiving follow-up Pap care, and (5) evaluate the role of ethnic centrality as a moderator in health decision-making.

**Hypothesis 1a-b:** In line with prior research (American Cancer Society [ACS], 2016), it was hypothesized that (a) Black women would have rates of Pap screening and abnormal Pap results that were similar to those of White women. As an extension of previous findings, it was additionally hypothesized that (b) Black women would have lower rates of follow-up care utilization after receiving abnormal Pap test results.

**Hypothesis 2a-f:** Drawing on findings from previous research evaluating attitudes, knowledge, and experiences with Pap screening and follow-up care (Bazargan, 2004; Bellinger, 2015; Parrish, 2016), it was hypothesized that the degree to which various dimensions of the HBM influence decisions to receive or avoid Pap screening would differ between Black and White women (See Figure 2). Specifically, it was hypothesized that: (a) demographic variables for Black and White women would be similarly related to Pap screening, such that age would be negatively related to Pap screening (i.e., younger women would be more likely to obtain screening), and education and SES would be positively related to Pap screening (i.e., those who were more educated and of a higher SES would be more likely to engage in Pap screening) regardless of race; (b) insurance status would be negatively related to perceived barriers and this relationship would be stronger for Black women; (c) perceived susceptibility and (d) perceived severity would be positively related to Pap screening and show a stronger influence among Black women; (e) perceived barriers would be negatively related to receiving Pap testing and this relationship would be stronger for Black women, and (f) perceived benefits of receiving Pap
screening would be positively related to Pap screening and this relationship would be stronger for White women.

**Figure 2.** A path model using the components of the Health Belief Model of behavior to depict the hypothesized relationships between various factors and receipt of Pap screening. This model was run separately for Black and White women.

**Hypothesis 3a-g:** In building off of hypothesis 2, it was expected that the degree to which the dimensions of the HBM influence receipt of follow-up care following an abnormal Pap result would differ among Black and White women. More specifically, it was hypothesized that: (a) demographic variables for Black and White women would be similarly related to receipt of follow-up care, such that younger women, those who are less educated, and those who are of lower SES would be less likely to engage in follow-up care after an abnormal Pap result regardless of race; (b) insurance status would be negatively related to perceptions of barriers, positively related to follow-up care use, and this relationship would be stronger for Black women; for both Black and White women, higher levels of severity of an abnormal Pap result as conveyed by a medical provider would be related to increased perceptions of (c) susceptibility and (d) severity of cervical cancer; (e) perceptions of barriers would be negatively related to receiving follow-up care after an abnormal Pap result and this relationship would be stronger for Black women; (f) perceptions of benefits of receiving follow-up care would be positively related to receiving such care and this relationship would be stronger for White women. It was also hypothesized that while the directions of the effects will mirror those found for Pap screening.
(g) the influence of perceived barriers and benefits would be more strongly related to decisions to obtain follow-up care.

Figure 3. A path model using the components of the Health Belief Model of behavior to depict the hypothesized relationships between various factors and receipt of follow-up care. This model was run separately for Black and White women.

**Hypothesis 4a-c:** Based on previous qualitative work (Bellinger et al., 2015), it was hypothesized that strong ethnic centrality would serve as a significant moderator for Black women between perceptions of (a) susceptibility and (b) severity of cervical cancer and the decision to obtain follow-up care, but would not significantly influence decision-making among White women. Specifically, it was expected that for Black women, those with stronger ethnic centrality would be less likely to receive recommended follow-up care (See Figure 4).

Figure 4. Moderation model showing that the relationship between perceptions of susceptibility and severity and receiving subsequently recommended follow-up care is moderated by the salience of Black women’s ethnic centrality.

Additionally, it was expected that (c) ethnic centrality would serve as a significant moderator between perceptions of susceptibility and severity of cervical cancer and receipt of recommended follow-up care for Black women in the larger HBM model, but that ethnic centrality would not serve as a significant moderator among White women in this decision-
making process. More specifically, it was expected that all of the hypothesized relationships from H3 will be present; however, it was further hypothesized that for Black women, identifying more closely with one’s ethnicity would weaken the relationship between cervical cancer threat perceptions and the likelihood of obtaining recommended follow-up care after receiving an abnormal Pap result, thus resulting in a lower likelihood of obtaining such care (See Figure 5).

![Diagram](image.png)

**Figure 5.** A modified version of the path model used to test H3, depicting the additional pathway of ethnic identity as a moderator between perceived threat and receipt of follow-up care. This model was run separately for Black and White women.

**Method**

**Participant Recruitment**

Amazon Mechanical Turk (MTurk) is a crowdsourcing website where individuals who are referred to as “workers” complete web-based tasks (usually, but not always) in exchange for monetary compensation. In MTurk, workers complete “Human Intelligence Tasks” (HITs) set up by “requesters” (who are the employers) that can range from providing feedback on media advertisements to passage translation to handwriting transcription to product rating, and more (Azzam & Jacobson, 2013; Berinsky, Huber, & Lenz, 2012). More recently, MTurk has also gained the interest of researchers as a platform for conducting research with human subjects.

The use of MTurk has several strengths. One of the most important strengths that the platform has in relation to this study is the ability to easily reach people who are located all
across the country. A significant amount of the research evaluating disparities in Black women’s receipt of cervical cancer screening and treatment care have focused on the experiences of Black women living in the American south (Bellinger et al., 2015; Carter, 2008; Freeman & Wingrove, 2005; Prabhu Das, 2005; Weragoda et al., 2016; Zhan & Lin, 2014). While these experiences are certainly important to the conversation, a goal of the present work was to evaluate the experiences of Black women from diverse geographic locations within the U.S. Another benefit is the reduced risk of the presence of social desirability bias among respondents (Brinkerhoff, 2016).

Moreover, the platform has successfully been used for cancer disparity research. Although much cancer disparity research (including work specifically focused on racial disparities) relies on data from large population surveys such as the National Breast and Cervical Cancer Early Detection Program (NBCCEDP; Dalzell et al., 2015; Tangka et al., 2015; White & Wong, 2015), Health Information National Trends Survey (HINTS; Blake et al., 2015; Price, Koshiol, Kobrin, & Tiro, 2011; Zhao & Nan, 2016), the Behavioral Risk Factor Surveillance System (BRFSS; Chen, Kessler, Mori, & Chauhan, 2012; Gandhi et al., 2015; Herrera et al., 2012), and the National Health Interview Survey (NHIS; Forney-Gorman & Kozhimannil, 2016; Prince et al., 2011; Solomon, Breen, & McNeel, 2008; Sirovich & Welch, 2004), a substantial portion of more recent work has turned to MTurk data collection to gain more insight into individual experiences related to cancer prevention behaviors. MTurk has been used to evaluate knowledge, perception, and intention specifically related to cervical cancer screening and prevention (Porter, Amin, & Bednarczyk, 2018), online cancer information-seeking (Chae, 2015), and attitudes and well-being of cancer survivors (Arch & Carr, 2015). Additionally, the crowdsourcing site has been used to evaluate other similar research topics, such as knowledge
and attitudes related to ovarian cancer (Carter, DiFeo, Bogie, Zhang, & Sun, 2014), lung cancer (Zide et al., 2015), breast cancer screening (Yeh, Schnur, Margolies, & Montgomery, 2015), sexual behavioral factors (Beymer, Holloway, & Grov, 2018), and infertility (Farrell, Brennan, & Lanham, 2018).

In other countries, work related to cervical cancer screening has been completed using crowdsourcing sites outside of MTurk. For instance, work being conducted among populations in Britain (Marlow, Ferrer, Chorley, Haddrell, & Waller, 2018) and comparing samples in Australia and the U.S. (Schmid et al., 2017) used Qualtrics and Survey Monkey, respectively, for data collection. This may be related to the fact that the majority of MTurk workers are from the U.S. (75%) or India (16%), with only 0.7 percent of MTurk workers living in Britain, and even fewer living in Australia (Difallah, Filatova, & Ipeirotis, 2018). Still other studies surveying cancer-related perceptions and behaviors in countries such as Canada (Duffet-Leger, Letourneau, & Croll, 2008) and Korea (Kim, 2014) have relied on the collection of data from university samples.

A strength of MTurk is that it offers the ability to collect data from hundreds of participants in the span of a few hours (Litman, Robinson, & Abberbock, 2017). While previous research using MTurk has been able to collect decently sized samples of women (Carter et al., 2014; Porter et al., 2018; Yeh et al., 2015) and cancer survivors (Arch & Carr, 2015; Chae, 2015), a potential concern for the present project was the ability to collect data from self-identified Black women. The U.S. Census Bureau population estimates for 2017 show that Black citizens comprise slightly over 13 percent of the population. However, Black women make up just over seven percent of the U.S. population (U.S. Census Bureau, 2017). Since the proportion of Black women in the country is so small relative to the proportion of White women, it was
anticipated that there would be more difficulty involved in recruiting the amount of Black women needed to establish power for the study analyses.

While the use of MTurk is unlikely to provide the same level of access as in-person study recruitment might, it does offer the ability to collect Black women from geographically diverse locations at a rate that appears to be higher than some other crowdsourcing platforms. Schmid and colleagues (2017) did not report demographic information related to race; however, Marlow and colleagues (2018) reported that 8.3 percent of their Qualtrics sample identified as Black and 73 percent identified as White. Interestingly, a study evaluating attitudes towards cervical cancer screening recommendations in the U.S. that used Qualtrics for data collection reported a far larger sample of White participants (82%), although they did not break down the participation of other racial groups beyond categorization as “Non-White” (Gerend, Shepherd, Kaltz, Davis, & Shepherd, 2017). MTurk workers fluctuate in their participation on the site; however, previous work has shown that MTurk can be used to collect samples that are more racially diverse than Qualtrics (Beymer et al., 2018), social media recruitment, and university samples (Casler, Bickel, & Hackett, 2013). Additionally, some of the previously mentioned studies have been able to recruit Black women at a rate that is higher than the U.S. Census figures for Black women in the population (Farrell et al., 2018; Yeh et al., 2015).

Because MTurk was not originally developed to meet the needs of social science researchers, a newer platform developed with the intention of serving researchers, TurkPrime, was used (Litman et al., 2017). TurkPrime links to requesters’ MTurk accounts and is designed to sample the same pool of MTurk workers; however, TurkPrime offers additional controls that allow researchers to collect data more efficiently, with less biased data, and at a lower cost. One of the benefits of this platform is the addition of a control to automatically assign qualifications.
This control allows researchers to reduce the risk of multiple survey completions by the same person, by assigning a “qualification” to workers after they complete the survey. This qualification assignment will result in workers who have previously completed the study not being able to access it again in the future.

TurkPrime also provides a control called “microbatch” which allows researchers to set small batch collections to open at pre-determined times throughout the day. Bias in participant characteristics based on the day of the week and time of day that data collection batches are released has been noted, as certain types of people in certain areas of the country are more likely to be logged onto MTurk at certain times (Litman et al., 2017). The addition of this feature aids in the reduction of bias in sampling, since batches can be set up beforehand to be released at various points throughout various days. Perhaps the most beneficial control that TurkPrime offered for this study was the ability to “restart” a batch. Work by Chilton and colleagues (2010) has shown that participation in MTurk tasks drops by 70 percent after the first 24 hours after posting. The “restart” control allows requesters to refresh their data collection batch so that it appears at the top of the HIT list again. This control has been found to substantially improve participant engagement with and completion of tasks (Litman et al., 2017).

Sample & Procedure

A national, geographically-representative convenience sample was collected via MTurk for the current study. A survey was administered through this survey platform to cisgender women across the United States who were between the ages of 21 and 65. Data were collected from January until May of 2019. A total of 4,293 surveys were submitted by workers. After reviewing each submission, data from 2,330 participants (54.27%; 1,171 White women and 1,159 Black women) were retained. The remainder of the submissions were excluded as a result
of issues such as quality assurance failures, participant errors in the form of incomplete or duplicate submissions, or multiple submissions emanating from the same IP address (See table 1 below for full exclusion data).

**Table 1.**
Reasons for participant elimination from dataset

<table>
<thead>
<tr>
<th>Reason</th>
<th>Participants excluded* n (%)**</th>
</tr>
</thead>
<tbody>
<tr>
<td>HIT submitted with fake code or no code</td>
<td>529 (26.95)</td>
</tr>
<tr>
<td>Failed at least 3 quality assurance items</td>
<td>440 (22.41)</td>
</tr>
<tr>
<td>Participant failed identity requirements (either indicated gender/race/age value that did not permit inclusion)</td>
<td>329 (16.76)</td>
</tr>
<tr>
<td>Duplicate submission by the same MTurk worker</td>
<td>231 (11.77)</td>
</tr>
<tr>
<td>IP showed location outside of the U.S.</td>
<td>230 (11.72)</td>
</tr>
<tr>
<td>Multiple attempts were shown attached to the same IP address</td>
<td>209 (10.65)</td>
</tr>
<tr>
<td>Errors and/ or incoherent free-responses appeared in survey</td>
<td>147 (7.49)</td>
</tr>
</tbody>
</table>

*Reasons listed for participant elimination from dataset are not mutually exclusive

**Percentages taken as a portion of the overall 1,963 participants removed from the dataset

An advertisement was posted on the MTurk website in the form of a HIT (Human Intelligence Task), which is a single task that MTurk workers have the option to complete. The description of the study in the advertisement indicated that survey items pertained to perceptions, experiences, and use of preventive reproductive health services. If workers were interested in completing the study then they could open the HIT, and they would be directed to the consent form for the study (see Appendix A for the full consent form). This consent form detailed the purpose of the study, included an overview of the topics included, and explained that the data collected from them would remain anonymous and confidential. Participants were also informed that the study would take roughly 30 minutes to complete, and that they would be compensated $0.75 upon successful completion, which is slightly above the average rate of compensation for this platform (Arch & Carr, 2017).
If individuals chose to participate, then they were directed via a link to the online survey in Qualtrics. Before accessing the full survey, participants completed a short pre-screening that collected part of their demographic information and determined their eligibility for participation based on the inclusion/exclusion criteria listed below. If participants did not meet the inclusion criteria for the study, then they were notified that they were not eligible to complete the full study and were directed out of the survey without compensation.

**Inclusion/exclusion criteria:** Only self-identified cisgender women were recruited for this study. Inclusion was also limited to women between the ages of 21 and 65, due to the cervical cancer screening guidelines provided by the U.S. Preventive Services Task Force that recommend routine screening for the duration of this age range (USPSTF, 2018). Only participants who self-identified primarily as Black or White were able to participate in the study. Because MTurk workers are majority White (77%; Sawyer, 2016), separate HITs were created in order to recruit an equal number of Black and White women, and to ensure that recruitment of White women was paced equally alongside the speed of recruitment of Black women. One of the HITs included a filter within their demographic pre-screening survey that excluded anyone who did not identify as a Black woman, while the other had a filter to exclude anyone who did not identify as either a Black or White woman.

**Screening and informed consent procedures:** Due to the online nature of this study, a waiver of documentation of informed consent was acquired in favor of electronic consent; therefore, participants were directed to an informed consent page that provided details of the study and their participation. Participants were required to indicate that they had read this consent form and wished to participate in the study in order to progress to the survey pre-screener. Participants were informed via the consent document that certain demographic
characteristics were required to participate in the full study, and that they would be required to respond to a brief set of demographic questions before proceeding to the actual study survey. Participants were not informed of the desired demographic characteristics (i.e., age range, gender, and race requirements) before their completion of the demographic questions.

After providing responses to the demographic survey, respondents who did not meet the inclusion criteria for participation in the study were informed of this and were not allowed to proceed, while respondents who did meet the inclusion criteria for the study were allowed to continue. The latter group was then able to participate in the rest of the study via completion of online questionnaires, which took approximately 30 minutes. Compensation was provided to participants upon successful completion of the study via the MTurk payment mechanism (automatic deposit to their account). Participants were informed via the consent document that in order to receive compensation for their participation, they must correctly respond to seven out of ten quality assurance questions (seven quantitative and 3 qualitative open response) that were placed randomly throughout the study. Successful participants were paid $0.75 upon successful completion of the study. Participants were also required to enter the same six-digit code into both the Qualtrics survey and MTurk HIT page in order to receive compensation. Once the codes were matched across online platforms and quality assurance items were checked for correctness, compensation was authorized.

Both MTurk and Qualtrics operate through secure servers, and the only identification of the participant was present in the identification value assigned to the participant by MTurk. IP addresses were collected initially as a quality control measure to ensure participants had not submitted duplicate entries, but were removed from the dataset once data quality had been evaluated, and thus were not stored with the data. Because no identifying information was stored,
participation in the study remained anonymous. All study procedures were approved by the Institution Review Board (IRB) at Virginia Commonwealth University prior to data collection.

**Power Analysis**

Although 2,330 of the 4,293 submissions were initially retained for analyses, an additional 82 participants (45 White women and 37 Black women) were removed from the dataset. These 82 participants indicated that they had undergone a hysterectomy wherein their cervix had been removed, which meant that they would not need to obtain Pap screening and thus should not be included in analyses. The final sample size included 2,248 individuals (1,125 White women and 1,123 Black women).

Post hoc power analyses were run separately for chi square and moderation analyses using G*Power software (Faul, Erdfelder, Buchner, & Land, 2009). Power analyses for chi square analyses by race showed that (1) for the outcome of ever receiving abnormal Pap results with the participants in the sample who reported ever receiving Pap screening (n=2,008), it was determined that this sample size was sufficient to detect a small effect (0.1) at 0.94 (94%), (2) for the outcome of receiving recommended follow-up care including only participants who ever reported an abnormal Pap result and had a medical provider recommend they receive follow-up care (n=624), the sample size was sufficient to detect a small effect (0.15) at 0.93 (93%), and (3) for the outcome of receiving recommended follow-up care for more severe abnormal Pap results including only participants who ever reported a more severe abnormal Pap result and had a medical provider recommend they receive follow-up care (n=116), the sample size was sufficient to detect a moderate effect (0.35) at 0.93 (93%).

In evaluating power for moderation analyses, it was determined that for analyses including only Black women (n=294), the sample size was sufficient to detect a small effect
(0.05) at 0.97 (97%). Moderation analyses including only White women (n=366) were determined to be powered to detect a small effect (0.15) at 0.99 (99%).

Because software is not available to calculate post hoc power for path models, a priori power analyses were utilized to calculate power for each of the hypothesized path models using the a priori structural equation modeling power calculator created by Soper (2017). A power analysis for the theorized H2 model predicting Pap screening behavior that included 5 latent variables and 32 observed variables, a desired power level of 0.90 (90%), an error probability level of 0.05, and an anticipated effect size of 0.10 showed that a sample size of 2,008 was needed in order to detect small effects, and that a minimum of 269 participants were needed in order to test the model structure. Thus, the sample size of 2,248 participants was determined to provide adequate power at 0.90 to test for small effects.

A power analysis for the theorized H3 model predicting utilization of follow-up care and included 6 latent variables and 37 observed variables, a desired power level of 0.90 (90%), an error probability level of 0.05, and an anticipated effect size of 0.18 showed that a sample size of 629 was needed in order to detect small-medium sized effects, and that a minimum of 227 participants were needed in order to test the model structure. Thus, the sample size of 660 participants was determined to provide adequate power at 0.90 to test for small-medium level effects.

A power analysis for the theorized H4 model predicting utilization of follow-up care and included 7 latent variables and 42 observed variables, a desired power level of 0.90 (90%), an error probability level of 0.05, and an anticipated effect size of 0.18 showed that a sample size of 660 was needed in order to detect small-medium level effects, and that a minimum of 200 participants were needed in order to test the model structure. Thus, the sample size of 660
participants was determined to provide adequate power at 0.90 to test for small-medium level effects.

**Measures**

*Demographics.* Participants provided information such as age, gender, race, ethnicity, sexual orientation, relationship status, educational attainment, employment status, household income level, number of dependents, and their state of residence (See Appendix B for full study questionnaire). Gender was asked to ensure that participants who identified as anything other than a cisgender woman were excluded from the study, and age was asked primarily to ensure that participants were between the ages of 21 and 65.

The household income level, number of dependents, and state of residence were used to calculate participants’ standing as a percentage of the federal poverty level (FPL). Percentage of the federal poverty level was calculated using the 2019 poverty guidelines provided by the US Department of Health and Human Services, where household size for each participant was multiplied by the poverty guideline for their state of residence (ASPE, 2019). If participants did not provide their state of residence, the poverty guidelines for the 48 contiguous states and the District of Columbia were used.

*Health Insurance Information.* In order to gain an understanding of participants’ insurance status, questions were posed about the consistency of their health insurance coverage during the previous year and the type of insurance plan that they have. The item assessing consistency of health insurance coverage during the previous year was a modified version of the item used by Geisler and colleagues (2006), and includes the following response options: (1) “I was not insured at all in the past year,” (2) “I was insured for 1-6 months out of the last year, (3)
“I was insured for 7-11 months out of the last year,” and (4) “I was insured for all 12 months of the last year.”

Health insurance plan type was assessed at a broad level of public versus private insurance, consistent with other studies (Culwell & Feinglass, 2007; Smith & Medalia, 2014). Private insurance plan types include the following: (a) a plan through an employer, (b) federal government insurance (for federal employees), (c) a plan through the government exchange/Marketplace, (d) coverage through a parent’s plan, or (e) coverage through a university plan. Public insurance plan types include: (a) military insurance (Tricare), (b) Medicaid/state program insurance, (c) Medicare, and (d) veteran benefits. Participants also had the option to respond “I’m not sure.”

**Perceived Barriers.** Perceived barriers were assessed using a measure of barriers specifically related to cervical cancer screening. The “barriers” subscale of the Health Belief Model Scale for Cervical Cancer and Pap Smear Test developed by Guvenc and colleagues (2010) was used. This subscale included 14 items measured using a 6-point Likert scale ranging from “strongly disagree” to “strongly agree,” and assessed perceptions of various types of barriers (e.g., tangible financial- and resource-based barriers, emotional barriers) related to obtaining cervical cancer screening. For the overall sample, the reliability of this subscale was $\alpha = .85$ (see Table 2 for reliability values by race). An example item for this scale is “I have other problems more important than having a Pap smear test in my life.” A 13-item modified version of this scale was used to assess perceptions of barriers related to obtaining cervical cancer follow-up care following an abnormal Pap result, and the same 6-point Likert scale was used. Reliability for this measure was $\alpha = .83$ (see Table 2 for reliability values by race). For this scale, the item “I am too old to have a Pap smear test regularly” that was present in the perceived
barriers measure for Pap screening was removed, rather than re-worded to reflect follow-up care. An example item for this scale is “I am afraid to have follow-up diagnostic tests done for fear of a bad result.”

**Perceived Benefits.** Perceived benefits were assessed using a measure of benefits specifically related to cervical cancer screening derived from another subscale of the Health Belief Model Scale for Cervical Cancer and Pap Smear Test (Guvenc, Akyuz, & Han Acikel, 2010). The “benefits” subscale included 5 items and was measured using a 6-point Likert scale ranging from “strongly disagree” to “strongly agree.” The reliability of this scale was $\alpha = .73$ (see Table 2 for reliability values by race). An example item for this scale is “Having regular Pap smear tests will decrease my chances of dying from cervical cancer.” A 4-item modified version of this scale was used to assess perceptions of benefits related to obtaining cervical cancer follow-up care following an abnormal Pap result. Reliability for this measure was $\alpha = .79$ (see Table 2 for reliability values by race). An example item from this measure is “I think that having diagnostic tests done after abnormal Pap results is a good way for cervical cancer to be diagnosed early.”

**Perceived Susceptibility.** Another subscale established by Guvenc and colleagues (2010) that included 3 items assessing perceptions of susceptibility related to developing cervical cancer was used within models for both Pap screening behavior and receipt of follow-up care following receipt of an abnormal Pap result. This scale used the same 6-point Likert scale as above. For this sample, the reliability of this measure was $\alpha = .92$ (see Table 2 for reliability values by race). An example item for this scale is “I feel I will get cervical cancer sometime during my life.”

**Perceived Severity.** To evaluate perceptions of how strongly a cervical cancer diagnosis might influence their health, the “seriousness” subscale of the Health Belief Model Scale for
Cervical Cancer and Pap Smear Test developed by Guvenc and colleagues (2010) was used. Participants responded to 7 items using the same 6-point Likert scale as above. The reliability of this scale was $\alpha = .80$ (see Table 2 for reliability values by race). An example item for this scale is “Problems I would experience with cervical cancer would last a long time.”

**Ethnic Centrality.** Ethnic centrality was measured using a subscale that was adapted from the Multidimensional Inventory of Black Identity (Sellers et al., 1997). This 5-item ethnic centrality subscale is designed to assess the extent to which individuals’ ethnic label is central to how they define themselves. This subscale has been used across a range of ethnic groups of adolescent age, and has a good overall internal consistency (Fuligni, Witkow, & Garcia, 2005). For this sample, the reliability of this scale was $\alpha = .89$ (see Table 2 for reliability values by race). Participants responded to items asking about their identification with their ethnic group and background using a 5-point Likert scale that ranged from “1-Strongly Disagree” to “5-Strongly Agree.” An example item from this scale is “Being a part of my ethnic group is an important reflection of who I am.”
Table 2.
Means, standard deviations, and Cronbach’s alpha coefficients for model predictors by group

<table>
<thead>
<tr>
<th></th>
<th>Perceived Susceptibility to Cervical Cancer (3 items)</th>
<th>Perceived Severity of Cervical Cancer (7 items)</th>
<th>Perceived Barriers to Pap Screening (14 items)</th>
<th>Perceived Benefits of Pap Screening (4 items)</th>
<th>Perceived Barriers to Follow-Up Care (13 items)</th>
<th>Perceived Benefits of Follow-Up Care (4 items)</th>
<th>Ethnic Centrality (5 items)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean (SD)</td>
<td>3.42 (3.21)</td>
<td>19.72 (6.99)</td>
<td>16.97 (10.96)</td>
<td>14.18 (3.50)</td>
<td>18.51 (11.29)</td>
<td>14.25 (3.66)</td>
<td>10.75 (5.19)</td>
</tr>
<tr>
<td>α Reliability</td>
<td>.916</td>
<td>.798</td>
<td>.852</td>
<td>.728</td>
<td>.866</td>
<td>.792</td>
<td>.890</td>
</tr>
<tr>
<td>Racial Group</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>White</td>
<td>3.99 (3.24)</td>
<td>20.05 (6.28)</td>
<td>17.12 (10.96)</td>
<td>14.19 (3.18)</td>
<td>18.44 (11.27)</td>
<td>14.26 (3.35)</td>
<td>8.26 (4.62)</td>
</tr>
<tr>
<td></td>
<td>.919</td>
<td>.777</td>
<td>.855</td>
<td>.760</td>
<td>.866</td>
<td>.768</td>
<td>.892</td>
</tr>
<tr>
<td>Black</td>
<td>2.85 (3.08)</td>
<td>19.39 (7.62)</td>
<td>16.81 (10.96)</td>
<td>14.18 (3.796)</td>
<td>19.63 (11.65)</td>
<td>14.23 (3.95)</td>
<td>13.25 (4.47)</td>
</tr>
<tr>
<td></td>
<td>.908</td>
<td>.815</td>
<td>.849</td>
<td>.745</td>
<td>.872</td>
<td>.813</td>
<td>.821</td>
</tr>
</tbody>
</table>
Severity of Abnormal Pap Test Results as Relayed by a Medical Provider. To evaluate the severity of participants’ abnormal Pap results, items were developed from concepts present in the Consumer Assessment of Healthcare Providers and Systems (CAHPS) survey, as well as some of the research literature (Bellinger et al., 2013; Nolan et al., 2014). Participants responded to 5 items with response options of “Yes,” “No,” and “I don’t know.” An example item for this scale was “Did the doctor state that the results were potentially harmful to your health?” Response options were re-coded so that “Yes” received a score of 1, while “No” and “I don’t know” received a score of 0. A total score was then developed by adding the scores from each of the 5 items, so participant scores ranged from 0-5.

Cervical Care Health Behaviors and Results. Participants were asked to self-report their medical history related to cervical cancer services and related diagnoses. Individuals were asked to provide information about Pap screening behavior including whether they had ever had a Pap smear during their lifetime, if they had received a Pap smear during the previous 3 years, and how long ago they had received their last Pap smear.

Participants were also asked to report whether they had received an abnormal result on their most recent Pap screening. For participants who indicated that they had not received an abnormal result on their most recent Pap, the question was broadened to ask whether they had ever received an abnormal Pap result. If participants had received an abnormal Pap result in either of these cases, they were asked to indicate what the official diagnoses for their abnormal Pap results were. Responses to these items were used to develop a variable describing experiences of lifetime abnormal Pap results and included data from 660 individuals who had experienced abnormal results.
If participants indicated that they had ever received an abnormal Pap result, they were asked to answer additional questions about whether a medical provider recommended they obtain additional follow-up diagnostic tests or treatment after receiving the abnormal Pap, which specific follow-up tests or treatments had been recommended, and whether they obtained the follow-up care recommended by their medical provider (See Appendix B for full questionnaire).

**Additional Medical History.** Participants were asked to respond to various items evaluating their medical history outside of cervical cancer prevention care. Respondents were asked about previous HIV diagnosis and diagnosis of autoimmune disorders, exposure to DES while in utero, and previous cervical cancer diagnosis. Medical history including any of these would be likely to result in a doctor’s recommendation to receive more frequent Pap screening, and was helpful to factor in when determining the frequency at which participants should be screened (i.e., if more frequent than every 3 years would be likely).

Additionally, because Pap smear testing requires the presence of a cervix, participants were asked whether they had a hysterectomy performed and whether their cervix was removed during this procedure. Thus, participants who reported having a hysterectomy where the cervix was removed (n=82) were removed from further analyses.

**Quality Assurance.** In order to reduce random response rates and promote greater data quality, ten questions were placed throughout the survey as quality assurance items. Seven of these items were multiple response or true/false items, and three were open-ended response items. Participants were notified in the informed consent document that if they failed to correctly answer seven out of ten of these items then they would not receive compensation. Participant data was removed for all individuals who failed seven out of ten of the quality assurance items.
Results

Demographic Information

Sample demographic information is shown in Table 3. The ages of participants ranged from 21-64 years old, and the average age of participants was 35 years (SD = 10.16). An independent t test showed that there was a significant difference in age by racial group, though the means differed by less than two years. The sample also largely consisted of those who had received their Bachelor’s degree (35.7%) and who were employed full time (55.8%), with no significant differences based on racial group. There were, however, significant differences in insurance status during the previous year, with Black women being more likely to have not had insurance at all or to only have had insurance for 1-6 months out of the year, while White women were more likely to have had insurance for all 12 months out of the year.

When compared to the 2015 state population estimates published by the U.S. Census Bureau, the current sample was geographically representative at $r = 0.933$, $p<.001$. There were significant differences in U.S. region of residence by racial group, with Black women being more likely to live in the South and White women being more likely to live in the Midwest or West; however, there were no significant racial differences among those living in the Northeast.

Table 3.
Sample demographic characteristics

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Black Women (n=1,123)</th>
<th>White Women (n=1,125)</th>
<th>t/Mann-Whitney z / $\chi^2$ test values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (Years)</td>
<td>34.15 (9.84)</td>
<td>35.79 (10.41)</td>
<td>t (2246) = 3.832***</td>
</tr>
<tr>
<td>Income</td>
<td>54,428.65 (54,322.521)</td>
<td>65,912.25 (56,977.19)</td>
<td>$Z = -7.036$***</td>
</tr>
</tbody>
</table>
Correlations were used to determine the extent to which ethnic centrality was related to age, education, and income level. Pearson correlations revealed that scores on ethnic centrality were not significantly related to age ($r = -0.033, p=0.120$), and were positively related to education ($r=0.066, p<0.01$). Spearman’s rho indicated that ethnic centrality was negatively related to level of income during the previous year ($r_s=-0.077, p<0.001$).
Hypothesis 1a-b.

Pap screening. Chi square analyses were conducted to determine whether rates of Pap screening differed based on racial group (Table 4). There was a significant difference in lifetime Pap screening, with White women being more likely to have ever received a Pap screening in their lifetime. However, among women who had reported at least one lifetime screening, Black women were more likely than White women to have received screening within the previous three years, as well as the previous five years.

| Table 4. Differences in Pap screening based on racial group |
|----------------------------------|-----------------|-----------------|----------|
| Black Women n (%)                | White Women n (%) | $X^2$   |
| Pap Screening, lifetime $^a$     | 982 (87.4)       | 1026 (91.2)     | 8.312**  |

**Of those who had ever had a Pap screening**

| Pap Screening, last 3 years $^b$ | 833 (84.8) | 821 (80.0) | 7.986**  |
| Pap Screening, last 5 years $^b$ | 911 (92.8) | 917 (89.4) | 7.081**  |

$^a$ Analysis included all participants (n=2,248)

$^b$ Analysis included those who reported ever having received a Pap smear (n=2,008)

Abnormal Pap results. A chi square analysis was also conducted to determine whether rates of abnormal Pap results differed based on racial group (Table 5). The analysis showed that there was a significant difference in receipt of abnormal results overall, with 29.9 percent of Black women and 35.7 percent of White women reporting receiving any abnormal result across their lifetime. Specific Pap results reported by participants are present in the table, as well, and show that the most commonly endorsed options across both racial groups were ASC-US (Atypical Squamous Cells of Undetermined Significance) and abnormal results where specific results of Pap screening were unknown. Black women were significantly more likely to report receiving an abnormal result of ASC-US, while White women were significantly more likely to report an abnormal result of HSIL (High-Grade Squamous Intraepithelial Lesion).
Interestingly, Black women were significantly more likely to report that they never received their Pap results from their provider, and White women were significantly more likely to report that their Pap screening had returned an abnormal result before, but that they were not able to recall what the specific abnormal result was.

Table 5.

<table>
<thead>
<tr>
<th>Differences in abnormal Pap results based on racial group</th>
<th>Totals n (%)</th>
<th>Black Women n (%)</th>
<th>White Women n (%)</th>
<th>X²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any abnormal Pap result c</td>
<td>660 (32.9)</td>
<td>294 (29.9)</td>
<td>366 (35.7)</td>
<td>7.476**</td>
</tr>
<tr>
<td>Differences in abnormal results by race d</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ASC-US</td>
<td>291 (44.0)</td>
<td>153 (52.0)</td>
<td>138 (37.5)</td>
<td>21.279**</td>
</tr>
<tr>
<td>Abnormal, but unsure of result</td>
<td>231 (34.9)</td>
<td>87 (29.6)</td>
<td>144 (39.1)</td>
<td></td>
</tr>
<tr>
<td>LSIL</td>
<td>78 (11.8)</td>
<td>34 (11.6)</td>
<td>44 (12.0)</td>
<td></td>
</tr>
<tr>
<td>ASC-H</td>
<td>21 (3.2)</td>
<td>11 (3.7)</td>
<td>10 (2.7)</td>
<td></td>
</tr>
<tr>
<td>HSIL</td>
<td>17 (2.6)</td>
<td>3 (1.0)</td>
<td>14 (3.8)</td>
<td></td>
</tr>
<tr>
<td>ACG</td>
<td>24 (3.6)</td>
<td>6 (2.0)</td>
<td>18 (4.9)</td>
<td></td>
</tr>
<tr>
<td>Result of LSIL or more severe d</td>
<td>140 (21.2)</td>
<td>54 (4.8)</td>
<td>86 (7.6)</td>
<td>7.739**</td>
</tr>
<tr>
<td>Never received Pap result c</td>
<td>53 (2.6)</td>
<td>33 (3.4)</td>
<td>20 (1.9)</td>
<td>3.888*</td>
</tr>
</tbody>
</table>

*p<.05, **p<.01
For analyses comparing multiple categories, columns with different superscripts (a,b) differ significantly (Bonferroni corrected)

Analysis included those who reported ever having a Pap smear (n=2,008)
Analysis included those who reported abnormal results (n=660)

Follow-up care. Further chi square analyses were used to evaluate differences in receipt of care following abnormal Pap results (Table 6). When taking into account all abnormal results of any severity level (i.e., lowest to highest severity included), White women were significantly more likely than Black women to report that their providers had recommended that they obtain some form of follow-up care after receiving their abnormal Pap results. However, if follow-up care had been recommended by a provider, Black and White women were equally likely to report obtaining at least some of the follow-up care that was recommended to them.
The same pattern emerged when the abnormal results with the lowest level of severity (i.e., ASC-US and abnormal but unsure of specific results) were removed, leaving only the more severe abnormal results (i.e., LSIL or above) to be analyzed. In fact, even more disparate rates of doctor recommendation were shown between the racial groups. Still, there were no significant differences based on racial group in rates of receipt of follow-up care when higher-level diagnostic testing (i.e., colposcopy, biopsy, LEEP, conization, cryotherapy, laser therapy, or follow-up with a specialist) that would be appropriate for these results had been recommended by providers.

<table>
<thead>
<tr>
<th>Table 6.</th>
<th>Doctor recommendation of follow-up care and patient engagement after an abnormal Pap result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Totals</td>
<td>Black Women n (%)</td>
</tr>
<tr>
<td>Of those who received any abnormal Pap result (n=660)</td>
<td>624 (94.5)</td>
</tr>
<tr>
<td>Doctor recommended follow-up care</td>
<td></td>
</tr>
<tr>
<td>Of those who had a doctor recommend follow-up care (n=624)</td>
<td>554 (88.8)</td>
</tr>
<tr>
<td>Individual received at least some doctor recommended follow-up care</td>
<td></td>
</tr>
<tr>
<td>Of those who reported a result of LSIL or more severe result (n=140)</td>
<td>116 (82.9)</td>
</tr>
<tr>
<td>Doctor recommended follow-up care</td>
<td></td>
</tr>
<tr>
<td>Of those who had a doctor recommend follow-up care (n=116)</td>
<td>105 (90.5)</td>
</tr>
<tr>
<td>Individual received at least some doctor recommended follow-up care</td>
<td></td>
</tr>
</tbody>
</table>

**p<.01

Hypotheses 2a-f.

H2a-f were tested using path models that were designed using dimensions of the Health Belief Model to explain Pap screening behaviors. In the figure shown (figure 6), ovals indicate the unobservable “latent” variables, which included perceived susceptibility, perceived severity, perceived benefits, and perceived barriers. These variables were measured using multiple observed items, as indicated in the above section detailing measures used. Rectangles indicate the observed
variables, which were measured directly, and consist of demographic information and receipt of Pap screening.

**Figure 6.** Theorized version of the Health Belief Model for H2a-f.

The baseline model was first run with the entire sample included and without considering race as a factor, in order to determine good model fit for the sample as a whole. To ensure that the model was also a good fit for each racial group individually, two separate but equivalent baseline models were then run. When the full proposed HBM model predicting Pap screening during the previous three years was run, model fit was acceptable, with a chi square=7.888 (df=1, p=0.005), RMSEA (Root Mean Square Error of Approximation) =0.056, and a CFI (Comparative Fit Index) =0.995. However, while this model showed good fit for White women ($\chi^2(1)=2.037$, $p=0.154$; RMSEA=0.031; CFI=0.999), it showed only acceptable model fit for Black women ($\chi^2(1)=6.692$, $p=0.010$; RMSEA=0.072; CFI=0.991). The baseline model was re-run without nonsignificant paths emanating from demographic characteristic predictors and showed improved overall model fit ($\chi^2(12)=17.562$, $p=0.130$; RMSEA=0.014; CFI=0.996), as well as
good fit for the groups of both White ($x^2(12)=10.127$, $p=0.605$; RMSEA=0.000; CFI=1.000) and Black ($x^2(12)=15.252$, $p=0.228$; RMSEA=0.016; CFI=0.995) women individually.

Once the model was determined to be a good fit for both groups individually, the configural model was run including both groups in order to establish a statistical baseline model for invariance analyses. This model maintained good fit across both groups ($x^2(24)=25.375$, $p=0.386$; RMSEA=0.007; CFI=0.999), and still reflected a somewhat better fit for White women compared to Black women (individual chi square contributions: 9.515 and 15.862, respectively).

The fully constrained model was then run with all remaining model paths constrained to be equal to test for invariance between groups. Model fit was reduced, but remained acceptable ($x^2(42)=110.773$, $p=0.000$; RMSEA=0.038; CFI=0.948), and reflected worsened fit for both groups, although fit remained worse for Black women than White women (chi square contributions 62.628 vs 48.144, respectively). Further, the chi square difference test comparing the constrained model to the configural model was significant, reflecting that model invariance was not achieved ($x^2(18)=85.397$, $p=0.000$).

Modification indices for the constrained model were used to remove path constraints from the model, and indicated that paths from perceived barrier and benefit factors predicting Pap screening, as well as covariance paths between the factors of perceived benefits and perceived barriers, perceived susceptibility and perceived severity, perceived severity and perceived benefits, and perceived susceptibility and perceived barriers should be relaxed and able to vary between groups. These modifications were made and the invariance analysis was then repeated. This model showed improved fit overall ($x^2(36)=42.335$, $p=0.216$; RMSEA=0.013; CFI=0.995), as well as for each individual group ($x^2$ for White women=17.618,
$x^2$ for Black women=24.716). Model invariance was also achieved with this model ($x^2(12)=16.959, p=0.151$).

However, in an effort to further improve model fit among Black women, the initial baseline model for each group was consulted to determine where other significant group differences might lie. Paths that were nonsignificant for either White or Black women in this baseline model were relaxed so that they were able to vary between groups, and the model was re-run. Nonsignificant paths only among White women included the ones between insurance status and perceived severity, as well as perceived susceptibility and Pap screening; while the nonsignificant paths among only Black women included those between education predicting perceived susceptibility, as well as age, federal poverty level (FPL) standing, and perceived benefits predicting engagement in Pap screening.

Model invariance remained in this final model ($x^2(6)=4.059, p=0.669$), and model fit was further improved overall ($x^2(30)=29.435, p=0.495$; RMSEA=0.000; CFI=1.000), and for each group individually ($x^2$ for White women=11.663, $x^2$ for Black women=17.772). The r-square values showed that this final model explained 25.6% and 20.4% of the variance in Pap screening behavior during the previous three years for White and Black women, respectively. As depicted in figures 7.1-7.3, the model further showed that while paths from insurance status, perceived barriers, and perceived susceptibility predicting Pap screening, along with paths from age and insurance status predicting perceived barriers, and insurance status predicting perceived benefits were significant and able to be constrained to be equal across groups, many others varied.

Paths from age, FPL standing, and perceived benefits predicting Pap screening were not significant for Black women, but had influence for White women. A similar pattern emerged for the path between education predicting perceptions of susceptibility to cervical cancer.
Conversely, the path from perceived susceptibility predicting Pap screening was not significant for White women, but had influence for Black women. The same pattern emerged for the path between insurance status predicting perceived severity of cervical cancer, and although the path between age predicting perceived severity was significant among White women, it remained more influential for Black women.

**Hypothesis Outcomes.** Partial support was found for this collection of hypotheses. H2a found minimal support. For White women, age was negatively related to Pap screening, meaning that as age increased engagement in Pap screening decreased, and SES was positively related to Pap screening, such that as SES increased engagement in Pap screening increased, as well. However, age and education were not significant predictors of Pap screening receipt among Black women, and education was not a significant predictor of screening for either racial group, resulting in a lack of full support for this hypothesis.

H2b was supported, as insurance status was negatively related to perceptions of barriers to obtaining Pap screening, and this relationship was more influential among Black women. For both groups, this result indicates that as duration of insurance coverage during the previous year increased, the perception of barriers to obtaining screening decreased.

H2c was partially supported, with perceptions of susceptibility to cervical cancer being positively related to Pap screening, but only among Black women. Perceptions of cervical cancer severity were positively related to Pap screening behavior among both racial groups and reflected a stronger influence among Black women, which provided complete support for H2d.

Partial support was also attained for H2e. Perceptions of barriers to screening were negatively related to engagement in Pap screening. Although present results indicated a slightly stronger relationship value for Black women, the influence of this path was closer to being equal
across the racial groups. H2f was supported, though, as perceptions of benefits to Pap screening positively predicted engagement in Pap screening, and this relationship was only significant among White women.
Figure 7.1. Path model showing the final invariant model for H2a-f. Line arrows represent significant constrained paths that did not show moderation by race. Dashed arrows represent paths that were relaxed/ moderated by race.

*p < .05, **p < .01, ***p < .001, ns = not significant
Figure 7.2. Path model showing model paths that were significant for White women. Line arrows represent significant constrained paths that did not show moderation by race. Dashed arrows represent paths that were relaxed/moderated by race.

\*p<.05, \**p<.01, \***p<.001
Figure 7.3. Path model showing model paths that were significant for Black women. Line arrows represent significant constrained paths that did not show moderation by race. Dashed arrows represent paths that were relaxed/ moderated by race.

*p<.05, **p<.01, ***p<.001
Hypotheses 3a-g.

H3a-g were tested using path models that were designed using dimensions of the Health Belief Model to explain follow-up service use behaviors following receipt of an abnormal Pap result. This model is an extension of the path model used to evaluate H2a-f, and includes the addition of the variable of severity of an abnormal Pap result as conveyed by a medical provider. In the figure shown (figure 8), ovals indicate the unobservable “latent” variables, which consist of the severity of abnormal Pap results as relayed by a medical provider, perceived susceptibility, perceived severity, perceived benefits, and perceived barriers. These variables were measured using multiple observed items, as indicated in the above section detailing measures used. The rectangles indicate the observed variables, which were measured directly, and consist of demographic information and receipt of recommended follow-up care.

![Diagram](image)

**Figure 8.** Theorized version of the Health Belief Model for H3a-g.

The theorized baseline model was first run with the entire sample of those who had reported ever receiving an abnormal Pap result included (n=660) and without considering race as a factor, in
order to determine good model fit for the sample as a whole. To ensure that the model was also a
good fit for each racial group individually, two separate but equivalent baseline models were then
run. When the full proposed HBM model predicting engagement in follow-up care was run, model fit
was acceptable ($x^2(3)=14.283, p=0.003; \text{RMSEA}=0.076; \text{CFI}=0.955$). While this model showed a
good fit for Black women ($x^2(3)=4.142, p=0.247; \text{RMSEA}=0.036; \text{CFI}=0.988$), it showed very
poor fit for White women ($x^2(3)=13.874, p=0.003; \text{RMSEA}=0.100; \text{CFI}=0.933$).

The baseline model was re-run without paths that were nonsignificant among both groups
(i.e., paths from insurance status predicting perceived susceptibility, perceived severity, and
perceived benefits; and paths from FPL predicting perceived susceptibility, severity, benefits,
barriers, and the receipt of follow-up care) and showed improved overall model fit
($x^2(6)=15.053, p=0.020; \text{RMSEA}=0.048; \text{CFI}=0.961$), as well as good fit among both Black
($x^2(6)=7.828, p=0.251; \text{RMSEA}=0.032; \text{CFI}=0.978$) and White ($x^2(6)=13.402, p=0.371;
\text{RMSEA}=0.058; \text{CFI}=0.951$) women.

After this model was determined to show good fit among both groups individually, the
configural model was run including both groups to establish a statistical baseline model for
invariance analyses. This model maintained good fit across both groups ($x^2(12)=21.352,
p=0.455; \text{RMSEA}=0.049; \text{CFI}=0.961$), although it did reflect better fit for Black women
compared to White women (individual chi square contributions: 7.678 vs 13.674, respectively).

The fully constrained model was then run with all remaining model paths constrained to
be equal in order to test for invariance between groups. Model fit was slightly reduced, but
remained acceptable ($x^2(36)=58.800, p=0.010; \text{RMSEA}=0.043; \text{CFI}=0.906$), and reflected
worsened fit that was roughly equal across both groups ($x^2$ for Black women=29.244; $x^2$ for
White women=29.256). Further, the chi square difference test comparing the constrained model
to the configural model was significant, reflecting that model invariance was not achieved \( (\chi^2(24)=37.148, p=0.042) \).

Modification indices for the constrained model were used to determine that the addition of paths using severity of the result as relayed by a doctor to predict perceived benefits and barriers to follow-up care would improve model fit for White women. These paths were added to the model, were relaxed, and the invariance analysis was repeated. This model showed improved fit overall \( (\chi^2(32)=44.708, p=0.067; \text{RMSEA}=0.035; \text{CFI}=0.947) \), and did show improved fit for White women \( (\chi^2=18.341) \), although fit was not drastically improved for Black women \( (\chi^2=26.367) \). Model invariance was achieved through these changes \( (\chi^2(20)=23.356, p=0.272) \).

In an effort to improve model fit for Black women, the initial baseline and constrained models were consulted to determine where other significant group differences might lie. Paths that were nonsignificant for either White or Black women (but not among both groups) were relaxed (i.e., paths from age predicting perceived susceptibility to cervical cancer and receipt of follow-up care; paths from education predicting perceived susceptibility, severity, and benefits, as well as receipt of follow-up care; a path from insurance status predicting perceived barriers to follow-up care; paths from perceived susceptibility to cervical cancer and benefits of follow-up care predicting receipt of follow-up care; and a path from severity of abnormal results as conveyed by a medical provider predicting perceptions of severity of cervical cancer).

Not only was overall model fit improved \( (\chi^2(23)=21.269, p=0.565; \text{RMSEA}=0.000; \text{CFI}=1.000) \), but model fit was stronger than in the original configural model, and showed improved fit for each group individually \( (\chi^2 \text{ for Black women}=12.674; \chi^2 \text{ for White women}=8.595) \). The r-square values showed that that this final model explained 17.2% and 20.2% of the variance in follow-up service use after receiving an abnormal Pap result for Black
and White women, respectively. As depicted in figures 9.1-9.3, only 10 of the 24 originally hypothesized paths remained in the final model. Six of these paths were able to be constrained to be equal across groups (i.e., paths from age predicting perceptions of severity of cervical cancer; insurance status predicting perceived barriers to follow-up care; insurance status and perceived barriers to follow-up care predicting receipt of follow-up care; and severity of results as conveyed by a medical provider predicting perceived susceptibility to cervical cancer.

The model additionally required that the four remaining paths be relaxed and able to vary between groups, and that two additional paths be added to the model. The final invariant model thus had 10 significant paths. The negative path from education level predicting perceived susceptibility to cervical cancer, as well as the positive path from perceived benefits predicting receipt of follow-up care were significant for White women but not for Black women. The added paths from severity of an abnormal Pap result as conveyed by a medical provider positively predicting perceived barriers and negatively predicting perceived benefits of follow-up care were also significant for White women but not among Black women. Conversely, positive paths from severity of an abnormal Pap result as conveyed by a medical provider predicting perceptions of severity of cervical cancer and from perceived susceptibility to cervical cancer predicting receipt of follow-up care were only significant for Black women.

**Hypothesis Outcomes.** Partial support was found for this collection of hypotheses, as well. H3a was not supported, as age, education, and SES were not significantly related to obtaining follow-up care for either racial group. However, age was found to significantly predict perceptions of cervical cancer severity and benefits of follow-up care for both racial groups, such that perceptions of cervical cancer severity and benefits to obtaining follow-up care decreased as
age increased. It was further found that education significantly predicted perceptions of cervical cancer susceptibility for White women, with perceptions decreasing as education level increased.

H3b was partially supported, as insurance status was found to be negatively related to perceptions of barriers to follow-up care, and positively related to engagement in follow-up care after an abnormal Pap result. These results showed that as duration of insurance status during the previous year increased, perceptions of barriers to follow-up care decreased, and engagement in follow-up care increased. However, the influences of these relationships were roughly equal between racial groups.

Full support was found for H3c, with severity of an abnormal Pap result as conveyed by a medical provider positively predicting perceptions of susceptibility to cervical cancer for both racial groups. Results reflected a positive relationship, such that as the conveyed severity of abnormal Pap results increased, perceptions of susceptibility to cervical cancer increased, as well. Conversely, severity as conveyed by a medical provider only positively predicted perceptions of cervical cancer severity among Black women, resulting in a lack of full support for H3d.

Partial support was found for H3e. Perceptions of barriers to receiving follow-up care was negatively related to obtaining follow-up care for both racial groups. However, this relationship was not found to be more influential among Black women, as this path was constrained to be roughly equal across racial groups. H3f received support, with perceptions of benefits to receiving follow-up care after an abnormal Pap result being significantly, positively related to obtaining follow-up care among White – but not Black – women.

Finally, only partial support was found for H3g. The influence of perceived benefits of follow-up care predicting follow-up care utilization (which was only significant for White
women) was stronger than that of the prediction of perceived benefits on Pap screening utilization in H2 ($\beta=.287$ vs $\beta=.144$, respectively), thus providing support for the hypothesis. However, although perception of barriers to follow-up care significantly, negatively predicted follow-up care utilization for both racial groups, the influence of perceived barriers predicting Pap screening utilization (H2) was much stronger for both groups, reflecting a $\beta=0.160$ decrease between the models for White women and a $\beta=0.187$ decrease for Black women between the two models.

Additionally, although not originally part of the hypothesized model, modification indices suggested that two paths be added to improve the model. These newly added paths from severity of an abnormal Pap result as conveyed by a medical provider positively predicting perceived barriers and negatively predicting perceived benefits to obtaining follow-up care were significant for White women but not among Black women.
Figure 9.1. Path model showing the final invariant model for H3a-g. Line arrows represent significant constrained paths that did not show moderation by race. Dashed arrows represent paths that were part of the original theoretical model and were relaxed/ moderated by race. Bolded dashed arrows represent paths that were later added to the theoretical model and relaxed/ moderated by race.

*p<.05, **p<.01, ***p<.001, ns = not significant
**Figure 9.2.** Path model showing model paths that were significant for White women. Line arrows represent significant constrained paths that did not show moderation by race. Dashed arrows represent paths that were part of the original theoretical model and were relaxed/moderated by race. Bolded dashed arrows represent paths that were later added to the theoretical model and relaxed/moderated by race.

*p*.05, **p*.01, ***p*.001
Figure 9.3. Path model showing model paths that were significant for Black women. Line arrows represent significant constrained paths that did not show moderation by race. Dashed arrows represent paths that were relaxed/ moderated by race. 

*\( p < .05 \), **\( p < .01 \), ***\( p < .001 \)
Hypotheses 4a-b.

To test hypotheses 4a-b, four moderation analyses were run. Product terms were created from the independent and moderator variables for each analysis. The first two analyses for H4a evaluated the hypothesized influence of ethnic centrality on the relation between perceived susceptibility to cervical cancer and receipt of recommended follow-up care. For both Black and White women, perceived susceptibility was not significantly related to receipt of follow-up care ($\beta=0.153, p=0.164$ vs. $\beta=-0.184, p=0.084$, respectively). Further, ethnic centrality was neither a significant moderator for this relationship ($\beta=0.232, p=0.067$ vs. $\beta=0.033, p=0.732$), nor a significant predictor for receipt of follow-up care ($\beta=0.138, p=0.229$ vs. $\beta=-0.097, p=0.383$) for either racial group.

The second set of analyses for H4b evaluated the hypothesized influence of ethnic centrality on the relation between perceived severity of cervical cancer and receipt of recommended follow-up care. The same pattern emerged. Again, for both Black and White women, perceived severity was not significantly related to receipt of follow-up care ($\beta=0.119, p=0.517$ vs. $\beta=0.084, p=0.674$, respectively). Ethnic centrality was also not a significant moderator between the variables ($\beta=0.132, p=0.283$ vs. $\beta=-0.267, p=0.087$), and it was not a significant predictor of receipt of follow-up care on its own ($\beta=0.124, p=0.545$ vs. $\beta=0.366, p=0.134$).

Although the moderations were not significant for either group, interesting findings did emerge. Results from these analyses indicated that ethnic centrality was significantly related to perceived susceptibility ($\beta_{\text{Black}}=-0.616, p<0.001$ and $\beta_{\text{White}}=-0.735, p<0.001$) and perceived severity ($\beta_{\text{Black}}=-0.908, p<0.001$ and $\beta_{\text{White}}=-0.927, p<0.001$) for both groups.
Hypothesis 4c.

Hypothesis 4c was tested using path models that were an extension of those used to test H3a-g. The paths from the final invariant model used in H3a-g were used as a baseline to construct the model tested in H4c. Although the moderations in H4a-b were not significant in predicting follow-up service use behaviors, ethnic centrality was shown to be significantly related to perceptions of both cervical cancer susceptibility and severity. As a result of this finding, ethnic centrality was not added into the final model as a moderator, and was instead entered as a predictor of both perceived susceptibility and perceived severity. The final model is shown in figure 10, where ovals indicate the unobservable “latent” variables, including the severity of abnormal Pap results as relayed by a medical provider, perceived susceptibility, perceived severity, perceived threat, perceived benefits, perceived barriers, and ethnic centrality. These variables were measured using multiple observed items, as indicated in the above section detailing measures used. Similar to the previously tested models, the rectangles indicate the observed variables, which were measured directly, and consist of demographic information and receipt of recommended follow-up care.
As in previous analyses, the theorized baseline model from figure 10 was first run with the entire sample of those who had reported ever receiving an abnormal Pap result included (n=660) and without considering race as a factor, in order to determine good model fit for the sample as a whole. To ensure that the model was also a good fit for each racial group individually, two separate but equivalent baseline models were then run. When the full proposed HBM model predicting engagement in recommended follow-up care was run, model fit was good ($\chi^2(6)=10.469$, $p=0.106$; RMSEA=0.034; CFI=0.981). This model showed acceptable fit for Black women ($\chi^2(6)=12.571$, $p=0.050$; RMSEA=0.061; CFI=0.927), and showed good fit for White women ($\chi^2(6)=6.945$, $p=0.326$; RMSEA=0.021; CFI=0.994). The configural model was then run including both groups to establish a baseline model for invariance analyses. This model maintained good fit across both groups ($\chi^2(12)=19.503$, $p=0.077$; RMSEA=0.043; CFI=0.969), although it reflected better fit for White women compared to Black women (individual chi square contributions: 6.836 and 12.667, respectively).
The fully constrained model was then run with all model paths constrained to be equal in order to test for invariance between groups. Model fit was slightly reduced, but remained good ($\chi^2(41) = 61.370$, $p = 0.021$; RMSEA = 0.039; CFI = 0.917), and reflected worsened fit for both groups, although fit remained worse for Black women ($\chi^2$ for White women = 24.226; $\chi^2$ for Black women = 37.144). Further, the chi square difference test comparing the constrained model to the configural model was significant, reflecting that model invariance was not achieved with the fully constrained model ($\chi^2(29) = 41.867$, $p = 0.048$).

The constrained model showed no significant modification indices through which the model could be improved. Therefore, in an effort to improve model fit for both racial groups, and among Black women in particular, the initial baseline and constrained models were consulted to determine where other significant group differences might lie. Paths that were nonsignificant for either White or Black were relaxed (i.e., paths from: age predicting perceived benefits to follow-up care; education predicting perceived susceptibility to cervical cancer; severity of the abnormal Pap result as conveyed by a medical provider predicting both perceived severity of cervical cancer and benefits of follow-up care; perceived susceptibility to cervical cancer and benefits of follow-up care predicting use of follow-up care; and ethnic centrality predicting perceived severity of cervical cancer).

Model invariance was achieved in this model ($\chi^2(20) = 14.705$, $p = 0.793$). Model fit was improved overall ($\chi^2(32) = 34.208$, $p = 0.362$; RMSEA = 0.014; CFI = 0.991), and was improved for each group individually ($\chi^2$ for Black women = 21.139; $\chi^2$ for White women = 13.069). However, in an effort to further improve model fit for Black women, one additional modification was made to the model. While modification indices and baseline models did not provide any additional insight into potential improvements to the model, after consulting previous literature and theory, a path
from ethnic centrality predicting perceived benefits of follow-up care was added and relaxed to vary across groups. This addition was based on literature showing that some Black women felt that cervical care could preserve their personal health and allow them to care for others, while others delayed care as a result of the “Strong Black Woman” schema, suggesting that they were expected to sacrifice their own well-being to care for others around them (Bellinger et al., 2015). These findings thus suggested that ethnic centrality may have an influence on the perception of potential benefits to obtaining follow-up cervical care services.

This final model showed improved overall model fit ($\chi^2(32)=23.637, p=0.857$; RMSEA=0.000; CFI=1.000), as well as improved model fit for each group ($\chi^2$ for Black women=13.512; $\chi^2$ for White women=10.125). The r-square values showed that that this final model explained 17.7% and 20.1% of the variance in follow-up service use after receiving an abnormal Pap result for Black and White women, respectively.

As depicted in figures 11.1-11.3, 14 of the 23 hypothesized paths remained in the final model. Seven of these paths were able to be constrained to be equal across groups, and seven of the paths had to be relaxed and allowed to vary between groups. An additional path was later added to the model and was constrained to be equal, resulting in 15 significant paths in the final invariant model.

Five of the constrained paths were the same as those present in the final invariant model for H3 (i.e., negatively related paths from age predicting perceptions of cervical cancer severity, insurance status predicting perceptions of barriers to follow-up care; and perceived barriers negatively predicting receipt of follow-up care; as well as positively related paths from insurance status predicting receipt of follow-up care; and the added path that was not present in the originally hypothesized model from severity of abnormal Pap results as conveyed by a medical
provider predicting perceptions of susceptibility to cervical cancer). In the present model, a previously relaxed path emanating from severity of abnormal Pap results as conveyed by a medical provider positively predicting perceptions of barriers to follow-up care was able to be constrained to be equal across groups. Additionally, two new positively related paths from age predicting engagement in follow-up care and ethnic centrality predicting perception of benefits to follow-up care were added to the model and able to be constrained to be equal across racial groups.

Five of the seven relaxed paths reflected the same paths seen in the final invariant model for H3. Three of these paths (i.e., two negatively related paths from education predicting perceptions of susceptibility to cervical cancer, and severity of abnormal Pap results as conveyed by a medical provider predicting perceived benefits to follow-up care; as well as one positively related path from perceived benefits predicting receipt of follow-up care) were significant for White women, while they were not significant for Black women. The other two paths (i.e., positively related paths from severity of abnormal Pap results as conveyed by a medical provider predicting perceptions of cervical cancer severity, and perceptions of susceptibility to cervical cancer predicting engagement in follow-up care) were significant among Black, but not White, women.

The two remaining relaxed paths differed from the final invariant model present in H3. A path from age predicting perceptions of benefits to follow-up care that had previously been constrained to be equal in the final invariant model for H3 was relaxed in the current model, and represented a significant negative relationship only among White women. Additionally, the theorized path from ethnic centrality predicting perceptions of cervical cancer severity was unique to hypothesis 4, and showed a significant positive relationship among Black women only.
Hypothesis Outcomes. H4a and b were not supported, as all moderation analyses were nonsignificant. However, although ethnic centrality did not directly predict attainment of follow-up care or moderate the relationships between perceived cervical cancer susceptibility or severity and attainment of follow-up care, this variable did emerge as a significant predictor of both perceived susceptibility and perceived severity. Thus, ethnic centrality was added into later path models as a predictor of both of these variables.

Using the reconceptualized model that positioned ethnic centrality as a predictor rather than a moderator, H4c received little support. Although ethnic centrality did not significantly predict perceptions of susceptibility to cervical cancer for either racial group in the full model, it did predict perceptions of cervical cancer severity among Black women. However, this relationship showed that as feelings of ethnic centrality increased, perceptions of the severity of cervical cancer increased, rather than decreased.

An additional finding that was not originally hypothesized was that of ethnic centrality positively predicting the perception of benefits to obtaining follow-up care for both racial groups. Although this relationship was more influential among Black women, higher levels of ethnic centrality were related to increased perceptions of benefits to obtaining follow-up care for both racial groups.
Figure 11.1. Solid line arrows represent significant constrained paths that did not show moderation by race. Dashed arrows represent paths that were part of the original theoretical model and were relaxed/moderated by race. Bolded line arrows represent constrained paths that were later added to the theoretical model and did not show moderation by race. Bolded dashed arrows represent paths that were later added to the theoretical model and relaxed/moderated by race.

*p < .05, **p < .01, ***p < .001, ns = not significant
Figure 11.2. Path model showing model paths that were significant for White women. Line arrows represent significant constrained paths that did not show moderation by race. Dashed arrows represent paths that were part of the original theoretical model and were relaxed/ moderated by race. Bolded line arrows represent significant constrained paths that were not moderated by race. Bolded dashed arrows represent paths that were later added to the theoretical model and relaxed/ moderated by race. *p<.05, **p<.01, ***p<.001
Figure 11.3. Path model showing model paths that were significant for Black women. Line arrows represent significant constrained paths that did not show moderation by race. Dashed arrows represent paths that were relaxed/ moderated by race. Bolded line arrows represent constrained paths that were later added to the theoretical model and did not show moderation by race.

*p < .05, **p < .01, ***p < .001
Exploratory Analyses.

Exploratory analyses conducted as part of hypothesis 1 revealed that: (1) there were significant racial disparities in the reported rates of doctor recommendation to obtain follow-up care after receiving an abnormal Pap result, with White women being significantly more likely than Black women to report that their provider recommended follow-up care, and (2) the significant racial disparity found in rates of receipt of follow-up care were eliminated once receiving a doctor’s recommendation to obtain follow-up care was accounted for in analyses. As a result, another set of exploratory analyses were used to evaluate the role of provider recommendation to obtain follow-up care, if any, when added to the model tested in hypothesis 4c. The theoretical model tested is shown in figure 12, where ovals indicate the unobservable “latent” variables, and rectangles indicate directly measured “observable” variables, as in previous hypotheses.

**Figure 12.** Theorized version of the Health Belief Model for exploratory analyses. This model reflects the model theorized for H4c, with the addition of doctor recommendation to obtain follow-up care.
As in the previous models, the theorized baseline model from figure 12 was first run with the entire sample of those who had reported ever receiving an abnormal Pap result included (n=660) and without considering race as a factor, in order to determine good model fit for the sample as a whole. To ensure that the model was also a good fit for each racial group individually, two separate but equivalent baseline models were then run. When the full proposed HBM model predicting engagement in recommended follow-up care was run, model fit was good ($\chi^2(5)=6.701, p=0.244$; RMSEA=0.023; CFI=0.995). This model showed good fit for both Black ($\chi^2(5)=5.221, p=0.390$; RMSEA=0.012; CFI=0.998) and White ($\chi^2(5)=3.863, p=0.569$; RMSEA=0.000; CFI=1.000) women individually, as well.

The configural model was then run including both groups to establish a baseline model for invariance analyses. This model maintained good fit across both groups ($\chi^2(10)=9.066, p=0.526$; RMSEA=0.000; CFI=1.000), and reflected only slightly better fit for White women compared to Black women (individual chi square contributions: 3.805 and 5.262, respectively).

Next, the fully constrained model was run with all model paths constrained to be equal, in order to test for invariance between groups. Model fit was reduced, but remained good ($\chi^2(45)=76.160, p=0.003$; RMSEA=0.046; CFI=0.904), and reflected worsened fit for both groups ($\chi^2$ for White women=35.203; $\chi^2$ for Black women=40.957). Further, the chi square difference test comparing the constrained model to the configural model was significant, reflecting that model invariance was not achieved with the configural model ($\chi^2(35)=67.094, p=0.001$).

Modification indices from the constrained model suggested that the path from doctor recommendation predicting perceived benefits be relaxed. This path, as well as some others that were shown in the initial baseline and constrained models to be nonsignificant for either White
or Black women, but not for both groups, (i.e., paths from age predicting perceived susceptibility to cervical cancer and benefits of follow-up care; education predicting perceived benefits; severity of abnormal Pap results as conveyed by a medical provider and ethnic centrality predicting perceived severity of cervical cancer and benefits of follow-up care; doctor recommendation to obtain follow-up care predicting perceived barriers to follow-up care; and perceived susceptibility to cervical cancer predicting receipt of follow-up care) were relaxed, and the model was re-run.

Model invariance was achieved in this model ($\chi^2(24)=19.855, p=0.705$). Model fit was improved overall ($\chi^2(34)=28.921, p=0.715$; RMSEA=0.000; CFI=1.000), and showed improvement for each group individually ($\chi^2$ for Black women=16.554; $\chi^2$ for White women=12.368). R-square values showed that that this final model explained 47.4% and 36.0% of the variance in follow-up service use after receiving an abnormal Pap result for Black and White women, respectively.

As depicted in figures 13.1-13.3, 17 of the 29 originally hypothesized paths remained in the final model. Eight of these paths were able to remain constrained to be equal across groups, and nine of the paths had to be relaxed and able to vary between groups. Constrained paths for the current invariant model include seven of the same constrained paths present in the final invariant model for H4c (i.e., three negatively related paths from age predicting perceptions of cervical cancer severity; insurance status predicting perceived barriers to obtaining follow-up care; and perceived barriers predicting receipt of follow-up care; as well as four positively related paths from insurance status predicting receipt of follow-up care; severity of abnormal Pap results as conveyed by a medical provider predicting perceptions of susceptibility to cervical cancer and barriers to follow-up care; and ethnic centrality predicting perceived benefits of
obtaining follow-up care). The theorized path from doctor recommendation positively predicting receipt of follow-up care was unique to this exploratory analysis, and was additionally able to be constrained as equal across both racial groups.

Relaxed paths for the current model included seven paths that were present in the final invariant model for H4c, as well. Four of these paths (i.e., three negatively related paths from age predicting perceptions of benefits to follow-up care; education predicting perceptions of susceptibility to cervical cancer, and severity of abnormal Pap results as conveyed by a medical provider predicting perceived benefits to follow-up care, as well as one positive path from perceived benefits predicting receipt of follow-up care) remained significant only among White women, while three of these paths (i.e., positively related paths from severity of abnormal Pap results as conveyed by a medical provider and ethnic centrality predicting perceptions of severity of cervical cancer; and perceptions of susceptibility to cervical cancer predicting receipt of follow-up care) remained significant only among Black women.

For the present analysis, two new paths from doctor recommendation to obtain follow-up care positively predicting perception of benefits and negatively predicting perception of barriers to obtaining follow-up care were added to the model. These paths were relaxed, and were found only to be significant among White women.

**Exploratory Outcomes.** Although doctor recommendation to obtain follow-up care after receiving an abnormal Pap result was not initially included as a variable in the hypotheses for this project, analyses conducted early on in the project indicated that it was an important variable to consider in attempting to model follow-up care decision-making processes for both groups of women. For White women, doctor recommendation was related to increased perceptions of benefits to obtaining follow-up care and decreased perceptions of barriers to obtaining follow-up
care. Although the influence was stronger among Black women, doctor recommendation was also related to an increased likelihood of obtaining follow-up care after an abnormal Pap result was received for both groups. This path additionally represented the strongest variable relationship in the model across both racial groups. The inclusion of these three variable paths into the model improved the overall amount of variance accounted for in receipt of follow-up care by 29.7 and 15.9 percentage points for Black and White women, respectively.
Figure 13.1. Path model showing the final invariant model for the exploratory hypothesis. Solid line arrows represent significant constrained paths that did not show moderation by race. Dashed arrows represent paths that were relaxed/ moderated by race. *p<.05, **p<.01, ***p<.001, ns = not significant
Figure 13.2. Path model showing model paths that were significant for White women. Line arrows represent significant constrained paths that did not show moderation by race. Dashed arrows represent paths that were relaxed/ moderated by race.

*p<.05, **p<.01, ***p<.001
Figure 13.3. Path model showing model paths that were significant for Black women. Line arrows represent significant constrained paths that did not show moderation by race. Dashed arrows represent paths that were relaxed/ moderated by race.

*p<.05, **p<.01, ***p<.001
Discussion

The primary goal of the present research was to address significant gaps in the literature regarding disparities in cervical cancer diagnosis and mortality among Black women. Because Pap screening behavior has been extensively assessed without major improvements in disparate rates of diagnosis and mortality among Black women, this project pivots the research frame of interest to receipt of follow-up care after receiving an abnormal Pap result. Although decision-making and healthcare-seeking behaviors related to Pap screening among Black women have been studied and prior work has determined that Black women are less likely than other racial groups to receive follow-up care (Fleming et al., 2014; Sharma et al., 2012), specific factors influencing decisions to receive cervical cancer follow-up care among this population had not been formally studied.

This is the first study to use path modeling and model invariance analyses to provide a thorough evaluation of how various factors may be associated with Black women’s decision-making processes related to obtaining cervical cancer screening and necessary follow-up care after an abnormal result. This method of analysis provides the ability to thoroughly examine 1) how various factors as defined by previous literature and operationalized through the HBM may be associated with Pap screening behavior, as well as receipt of recommended follow-up care following receipt of abnormal Pap results, 2) whether the aspects of care serving as significant factors in the path model assessing associations with Pap screening behavior for each racial group are similarly associated with receipt of recommended follow-up care, 3) whether the factors significantly influencing the decision-making processes for receipt of both types of cervical cancer care differ between Black and White women, and 4) whether ethnic centrality influences the overall cervical cancer follow-up care decision-making process for Black women.
Hypotheses 1a-b.

Hypotheses 1a and b examined differences in health service use related to cervical cancer prevention and treatment based on racial group. Across racial groups, the majority of participants reported having ever received a Pap smear, as well as receiving a Pap smear within the last 3 years. Findings from hypothesis 1a show that White women were more likely to report ever having received Pap screening in their lifetime. However, results also showed that among those who reported having ever received a Pap screening, Black women were more likely to have received screening within the last 3 to 5 years, as is currently recommended by medical guidelines. These findings do not provide direct support for existing statistics showing that Black women are obtaining Pap screening at equal rates to those of White women (ACS, 2016). Instead, these findings may suggest that Black women are still experiencing disparities in cervical cancer screening initiation, and further suggest that once Black women do begin screening, they are more likely to continue receiving this preventive care at medically recommended intervals.

These findings may provide support for the various programs and media campaigns that have been aimed at increasing rates of Pap screening among Black women, as it is possible that these programs have contributed to the rates of continued care that are seen here. Results also suggest that these program efforts would be particularly beneficial when aimed toward increasing initiation of Pap screening among Black women. In line with previous literature (Johnson et al., 2016; Tracy et al., 2013), Black women of all ages may additionally benefit from their medical providers engaging in ongoing conversations and education about cervical cancer health and the importance of initiating and continuing preventive screening.
While initial analyses for hypothesis 1b revealed racial disparities in follow-up care service use after receiving an abnormal Pap result, with White women being more likely to obtain care, further examination revealed more nuanced relationships. Additional analyses run to compare instances of doctor recommendation of follow-up diagnostic testing or treatment services between racial groups showed that White women were more likely than Black women to report that their provider had recommended obtaining follow-up services. This result was found among those who had received an abnormal Pap result of any severity level (96.7% of White women vs. 91.8% of Black women), and was even further exaggerated when evaluating only those who had received an abnormal Pap result of higher severity (i.e., where those reporting ASC-US and unknown abnormal results were excluded from analysis; 90.7% of White women vs. 70.4% of Black women). Interestingly, when looking only at those women who reported receiving doctor recommendations for follow-up care, Black and White women were equally likely to have obtained the care that their provider recommended.

These results suggest that doctor recommendation is particularly influential when evaluating racial disparities in follow-up care receipt. Results may indicate that some medical providers are not appropriately recommending follow-up care, or that they are not effectively communicating information about abnormal Pap results and appropriate next steps with their Black patients. The latter possibility is supported in prior work that has shown confusion about or trouble remembering providers’ statements about their abnormal Pap results and necessary follow-up care (Bellinger et al., 2015). This supports previous work showing that Black women are less likely to have access to high quality care, which is likely to subsequently influence the quality and appropriateness of treatment following the receipt of abnormal Pap results (Hicks et al., 2006; Weragoda et al., 2016).
These findings may also reflect underlying racial differences in where health services are being obtained, as other work has reported that Black women are more likely to seek their cervical cancer care from primary care providers or emergency departments, while White women are more likely to seek care from gynecologists (Waknine, 2005). It is probable that providers who are reproductive health specialists, such as gynecologists, will be more familiar with medical guidelines and recommendations following abnormal Pap results than providers who are primarily focused in general medicine. If providers are not following medical guidelines for handling abnormal Pap results and follow-up care, additional training for providers that educates about these medical guidelines and provides a focus on effective communication of screening results and suggested follow-up tests or treatment could be beneficial for both medical providers and patients in improving health outcomes.

**Hypotheses 2a-f.**

The second group of hypotheses examined the utility of the HBM in predicting Pap screening behavior for Black and White women. Previous work has studied some of the factors of the HBM individually to determine how they relate to cervical cancer disparities and screening behavior (Bellinger et al., 2015; Parrish, 2016; Strohl et al., 2015; Wong et al., 2013; Wong et al., 2014). The present study sought to evaluate how each of the HBM factors related to Pap screening behavior, and to determine whether different facets of the model were differentially influential for Black versus White women (i.e., whether the HBM factors that were most influential in decision-making were different for Black women versus White women). Present findings indicate some similarities between Black and White women on the impact of HBM factors, as well as some important differences.
Similarities found between the groups include education not being significantly related to Pap screening, as well as insurance status being positively and the perception of barrier to screening being negatively related to screening behavior. In addition to being significant across both racial groups, the relationship between perceived barriers predicting engagement in Pap screening was also the strongest relationship present in the model for both groups, while the relationship between insurance status and perceived barriers was the second strongest.

These findings support existing research showing that lack of insurance coverage, inadequate insurance coverage, and the presence of other barriers (e.g., being able to take time off from work, securing childcare in order to go to a doctor) are related to lower rates of preventive service use among women, regardless of racial group (Bellinger et al., 2015; Kaiser Family Foundation [KFF], 2013). Similarly, a nationally representative study not limited to women showed that only 33% of uninsured individuals – versus 67% of those with Medicaid and 74% of those privately insured – received preventive screenings (Garfield et al., 2014). Because women are more likely to experience gaps in health insurance coverage due to their increased likelihood of being employed part-time, being covered as a dependent on a partner’s plan, and being of lower SES (KFF, 2013), insurance coverage is a particularly influential factor in preventive screening behavior. Considering that Kaiser Family Foundation (2013) has found that 53% of uninsured women resided below 138% of the FPL, these findings will maintain their importance as some states continue in their refusal to expand Medicaid coverage.

Differences in HBM structure between Black and White women include the following: perceptions of personal susceptibility to cervical cancer were only influential in predicting Pap screening for Black women; perceptions of benefits to receiving Pap screening were only significant in predicting screening for White women; and while perceptions of cervical cancer
severity significantly predicted screening behavior for those in both racial groups, this relationship was more influential for Black women. Previous work has highlighted lack of knowledge among Black women related to cervical cancer, their increased risk for mortality from cervical cancer, and how to prevent it (Parrish, 2016). Present findings that perceptions of susceptibility to cervical cancer and severity are influential for Black women, while benefits of screening are not, may add a degree of nuance to this work, as well as to research and community programming focused on promoting such education among Black women in efforts to increase screening (Strohl et al., 2015).

**Hypotheses 3a-g.**

The third set of hypotheses built upon the HBM constructed in hypotheses 2a-f to analyze the role of these same factors in predicting engagement in follow-up care after receiving an abnormal Pap result. This model included the addition of a factor representing the severity of the abnormal Pap result received as conveyed by a medical provider. Although it had yet to be formally researched, prior work suggested that disparities in cervical cancer diagnosis and mortality rates between Black and White women were likely due to disparities in follow-up care attainment and/ or quality between the groups (Bernard et al., 2012; Brandt et al., 2006; DeSantis et al., 2013; Horner et al., 2011; Weragoda et al., 2016). Additional work has also shown that Black women obtain follow-up care at the lowest rates of any racial group (Fleming et al., 2014; Sharma et al., 2012). Because prior work showed that certain experiences and motivations related to Pap screening behaviors are different for Black versus White women, it was hypothesized that the decision-making process for obtaining follow-up care after receiving an abnormal Pap result would also differ by racial group. Due to previous work indicating that doctor recommendation and effective communication between providers and patients (Ackerson,
2010; Bazargan et al., 2004) are important influences in obtaining Pap care (Johnson et al., 2016; Tracy et al., 2013), it was additionally hypothesized that the severity of Pap results as conveyed by a medical provider would be an influential factor in this decision-making process, in that it would increase perceptions of cervical cancer susceptibility and severity.

Partial support was found for this collection of hypotheses, and present results noted many similarities and differences between racial groups. For both groups, perceptions of cervical cancer severity and benefits to obtaining follow-up care decreased as age increased. This result may be related to previous work that has found that some women do not feel they need follow-up care because they believe that if something were wrong with their cervix then they would notice or feel it (Ackerson, 2010; Bellinger et al., 2015). This feeling of knowing what is normal or abnormal for one’s body and reproductive system are likely to increase with age and life experience. Regardless of the reasoning, though, these results may point to increased need for campaigns aimed at educating older women about the influences of cervical cancer and the benefits of obtaining follow-up care.

Another similarity between the groups was the finding that increases in duration of health insurance coverage for the previous year were related to decreased perceptions of barriers to follow-up care, as well as an increased likelihood of obtaining follow-up care after receiving an abnormal Pap result. These findings support previous literature outlined in the discussion of H1 outcomes showing lack of health insurance as a barrier to receiving various types of needed healthcare services (KFF, 2013), and echo prior work noting the importance of access to quality health insurance to cover medical costs (Garfield et al., 2014; Sung, Alema-Mensah, & Blumenthal, 2002).
Perceptions of barriers to follow-up testing were equally influential across racial groups, as well, and showed that as perceptions of barriers increased, the likelihood of obtaining follow-up care decreased. Prior work supports this finding, and has noted various types of barriers to obtaining Pap care services, ranging from tangible resources (e.g., distance to a provider, transportation and childcare needs, difficulties in taking time off work; KFF, 2018; Ladoceour, 2010; Nolan, et al., 2014) to emotional barriers (e.g., fear of harmful results, fear of pain, embarrassment, feeling unable to prevent cervical cancer from continuing to develop; Bellinger et al., 2015). Present results support more recent initiatives to reduce tangible barriers for those seeking care, such as the presence of daycare in doctor’s offices (Massachusetts General Hospital, 2019; Providence Health & Services, 2019) and Medicaid programs providing transportation to and from doctor’s appointments as a benefit of coverage (Centers for Medicare & Medicaid Services [CMS], 2016).

Based on review of the items comprising the perceived barriers measure, and the inclusion of emotion-related barriers, present results may support the need for additional focus on evaluating emotional barriers and their role in influencing this decision-making process. Because of this emotional focus, support is also provided by present results for initiatives aimed at improving patient-provider communication of results and engagement in shared decision-making with patients about their care (Ackerson, 2010; Bazargan et al., 2004; Bellinger et al., 2015). Future work in this area should include the investigation of this relationship more closely so that education and training of providers can include direction on how best to approach conversations of abnormal results so that patients’ perceived barriers are addressed.

While the influence of perceived barriers to follow-up was significant for both groups, this influence was more strongly related to obtaining Pap screening than it was to receiving
follow-up care after an abnormal Pap, which was counter to hypotheses. This could be due to a number of factors; however, common threads may be patient-provider communication and professional connection to resources. The reduced influence of perceived barriers to follow-up may, in part, be due to the existence of programs intended to cover costs related to diagnostic and treatment care after receiving abnormal Pap results, such as Every Woman’s Life (EWL). EWL covers reproductive cancer screenings for women aged 40-64 who meet financial and residential qualifications, and will additionally cover follow-up care for women who are 18 or older, have received an abnormal Pap test, and meet qualifications (Every Woman’s Life, 2019).

Unlike experiences with scheduling Pap screening tests, patients are contacted directly by providers about the need to schedule follow-up care. This contact offers an opportunity to provide insight that is usually missing when seeking Pap screening, such as financial resources that may exist, specialist provider options, what to expect from follow-up testing or treatment, and likely chain of events subsequent to follow-up care. If this information is provided, it may serve to reduce the influence of barriers in follow-up decision-making.

The final similarity noted across groups was that of increased severity of an abnormal Pap result as conveyed by a medical provider being related to an increase in perceptions of susceptibility to cervical cancer. Although not explicitly studied in previous literature, it is reasonable that a doctor’s statement about the severity of abnormal cells found through one’s Pap screening would increase their feelings of susceptibility to developing cervical cancer from those cells in the future. This may be particularly important for providers to be aware of when communicating results with patients who are Black women, as perceived susceptibility to cervical cancer was only influential in predicting engagement in follow-up care for this group, and served as the most influential factor in the model for Black women. Even with a lack of
research evaluating engagement in cervical cancer follow-up care, these findings bear resemblance to previous work focused on Pap screening behavior that has noted a relationship between perceived susceptibilities predicting engagement in Pap screening (Parrish, 2016; Strohl et al., 2015). Thus, tapping into perceived susceptibility when discussing Pap results may serve as a unique motivating factor for receiving follow-up care among Black women.

There were a few other paths that differed between racial groups, as well. Severity of abnormal Pap results as conveyed by a medical provider only predicted perceptions of cervical cancer severity among Black women. Interestingly, though, perceived severity did not significantly predict receipt of follow-up care for either racial group. These results indicate that although emphasizing the severity of one’s abnormal Pap results may increase perceptions of cervical cancer severity, this may not be beneficial, as perceptions of cervical cancer severity are not predictive of follow-up service use. Thus, these findings support limiting emphasis on severity in working toward the goal of improving engagement in follow-up care.

Conversely, perceptions of benefits to follow-up care predicted receipt of follow-up care only among White women. This may be related to previous literature which has evaluated Black women’s perceptions of abnormal Pap results, and shown common discussions around fear that follow-up testing will show unwanted results that may require treatment that could reduce or eliminate fertility, or the belief that they would know if something were wrong with their bodies (i.e., they would be experiencing noticeable symptoms; Ackerson, 2010; Bellinger et al., 2015). The relationship of perceived benefits was also more influential for predicting receipt of follow-up care for White women than it was in predicting Pap screening behavior. This may make sense in that Pap smears are commonly regarded as routine care where one expects to receive a null result confirming that there are no problems, while any follow-up care for an abnormal Pap result
is used to search for a false positive in the initial Pap result or to determine how severe cervical dysplasia is and what treatment will be necessary moving forward. Ergo, follow-up care may be seen as more beneficial in ruling out the presence of abnormal cells or preventing cervical cancer development.

Although not part of the originally hypothesized model, analyses suggested adding paths from severity of an abnormal Pap result as conveyed by a medical provider predicting perceived benefits and barriers to follow-up care. These paths were found only to be significant for White women, and showed that as the doctor’s communication of Pap results portrayed increased severity, perceptions of benefits to follow-up care decreased and perceptions of barriers to follow-up care increased. Taken in sum with the rest of the model results, this may suggest that medical providers’ communication of the severity of abnormal results may result in substantial amounts of fear of cervical cancer diagnoses. Fear, related to physical and emotional experiences, has been discussed in some previous literature as a barrier to continued cervical cancer testing and care (Ackerson, 2010; Bellinger et al., 2015). It is possible that some patients interpret their abnormal results as being equivalent to a cervical cancer diagnosis during these communications, rather than being abnormal growth that is likely able to be controlled and eliminated with early intervention.

If so, this may provide an explanation for why provider communication of severity of abnormal Pap results and perceptions of cervical cancer severity do not function as expected within the model. For instance, the introduction of fear of imminent cervical cancer diagnosis could explain why perceptions of cervical cancer severity are not predictive of engagement in follow-up care for either racial group, as well as why provider communication of Pap results is related to increased perceptions of cervical cancer susceptibility for both groups. Combined with
racial differences, this may additionally provide rationale as to why provider communication of Pap results is related to increased perception of cervical cancer severity for Black women, as well as increased perception of barriers and decreased perception of benefits for White women.

**Hypotheses 4a-c.**

The goal of the final set of hypotheses was to determine the role, if any, of ethnic centrality in decisions to obtain follow-up care after receiving an abnormal Pap result. Previous work evaluating decisions among Black women to obtain Pap screening indicated that the salience of one’s ethnic identity was influential (Bellinger et al., 2015). However, in their work, the salience of ethnic identity was found to serve as both a protective and predictive factor of Pap screening among different women. Some Black women reported apprehension in receiving care for fear of receiving abnormal results that would require fertility-compromising treatment to correct, while others evoked the Strong Black Woman schema to explain their felt need to put the health and needs of others before themselves. Still others related the Strong Black Woman schema to their feelings that their identity was tied to a need to take care of themselves so that they may care for others, as well as a responsibility to educate others about testing (Bellinger et al., 2015).

Present results provided no support for the first parts of hypothesis 4, which evaluated the role of ethnic centrality as a moderator in the relationships between (a) perceived susceptibility and (b) severity of cervical cancer and obtaining follow-up care. However, the analyses did indicate that ethnic centrality was significantly related to both perceived susceptibility and severity for both racial groups. As a result, ethnic centrality was entered into the overall HBM model and tested as a predictor of both perceived susceptibility and severity, rather than as a moderator.
In the overall model, ethnic centrality did not predict perceptions of susceptibility to cervical cancer for either group, and predicted perceptions of cervical cancer severity among Black – but not White – women. This latter relationship showed that as feelings of ethnic centrality increased, perceptions of the severity of cervical cancer increased. However, as indicated above, perceived severity of cervical cancer was not significantly related to receipt of follow-up care for either racial group. Further, although not originally hypothesized, modification indices suggested that a path be added between ethnic centrality and perceived benefits of follow-up care. Interestingly, although it was more influential for Black women, this path was significant for both racial groups, and indicated that higher levels of ethnic centrality were related to increased perceptions of benefits to obtaining follow-up care.

Taken together, these findings suggest that the salience of Black women’s ethnic identity plays a role in increasing perceptions of the severity of cervical cancer and the benefits provided by obtaining follow-up care after an abnormal Pap result; but that, ultimately, because neither perceived severity nor benefits represent a significant influence in Black women’s decision to receive follow-up care, a significant influence of ethnic centrality in this decision-making process was not found. Thus, although ethnic centrality was included in this model in an attempt to account for a portion of the decision-making process for Black women, it did not provide any additional insight in its current form. However, reflecting upon the findings of Bellinger and colleagues (2015), participants’ experiences of their ethnic identity may be interpreted as being heavily intertwined with their feminine identity, as they frequently discuss fears related to potential loss of fertility and the importance of being able to one day enter into or maintain their current role(s) as a mother, caretaker, or otherwise matriarchal presence. Thus, it may be beneficial for future work to incorporate salience of feminine identity or womanhood and
fertility into this decision-making process along with salience of ethnic identity in order to glean insight into how identification with specific identities may influence the emotional factors at play in the process of deciding to receive follow-up care.

Additional differences between the final invariant model for H3 and the present model included relaxing the path from age predicting perceived benefits of follow-up care and constraining the path from severity of abnormal Pap results as conveyed by a medical provider predicting perceived barriers to follow-up care. For the first change, model indices suggested that the model would be stronger if this path were relaxed, and resulted in this path between age negatively predicting the perception of benefits to follow-up care only being significant among White women. The latter change resulted from model values indicating similarities between groups, and showed that increased severity of abnormal Pap results as conveyed by a medical provider was related to increased perception of barriers to follow-up care across racial groups. As discussed previously, this finding may indicate that when discussing abnormal Pap results with patients, a heavy focus on the severity of the abnormal Pap results may result in the opposite of the intended effect – where patients come to perceive even more barriers to receiving follow-up care, and may experience an increase in emotional barriers as they feel more fear around having additional testing done or learning the results of diagnostic testing. Thus, current results indicate that to improve engagement in follow-up care, it may be beneficial for providers to reduce the conversational focus on result severity, while placing more focus on assessing patient perception of barriers to receiving necessary follow-up care and assisting patients in the removal of these barriers.
Exploratory Analyses.

Due to previous work indicating that cues to action from medical providers have been found to increase rates of Pap screening (Bazargan, 2004; Bellinger et al., 2015), an exploratory chi square was conducted as part of hypothesis 1 to determine whether doctor recommendation influenced the disparities seen in rate of follow-up care attainment between racial groups. Because this analysis showed that accounting for doctor recommendation to receive follow-up care made rates of follow-up care receipt equal across Black and White women, it appeared to be an important factor to be included in the overall model to aid in the explanation of this decision-making process for both racial groups.

The final invariant model for H4c was used to build the baseline model for these analyses, and was modified to include the factor of doctor recommendation to receive follow-up care. In the final invariant model for this exploratory analysis, three paths with doctor recommendation as the predictor were significant. Altogether, the inclusion of doctor recommendation as a factor in the path model accounted for an additional 30 and 16 percent of the variance in follow-up care decision-making among Black and White women, respectively. Doctor recommendation was a significant direct predictor of follow-up care receipt among both racial groups, and this path served as the most influential path in the model for each group.

The other two paths emanating from doctor recommendation were only significant among White women, and indicated that receiving a recommendation from a medical provider to obtain follow-up care was associated with increased perceptions of benefits and decreased perceptions of barriers to follow-up care. These results are promising, as they suggest that when doctors make recommendations for White women to obtain follow-up care, they may be discussing some of the benefits of these services and be addressing barriers that come up for
patients. When taking the entire model into consideration this becomes even more influential, as higher perception of benefits and lower perception of barriers to follow-up care are predictive of engagement in follow-up care among White women. Thus, doctor recommendation to receive follow-up care seems to be operating effectively through these channels to improve uptake of follow-up services among White women.

Conversely, doctor recommendation to receive follow-up care did not operate through any of the HBM facets in Black women’s decision-making processes. One possible explanation for this could be that doctor recommendations for care are operating through factors not represented in the HBM. Prior work has discussed the role of health locus of control in screening behavior among Black women, and has found that those who believe that healthcare professionals are responsible for their health are more likely to be up-to-date in their Pap screening (Bazargan et al., 2004). Decisions to obtain follow-up care may operate similarly, with those having an external locus of control being more likely to follow their doctor’s recommendations to receive care.

Another possibility is that the types of messaging used by providers is too inconsistent to form relationships between the HBM variables that are present. While it may be reasonable to theorize that doctor recommendation could operate through factors such as perceived susceptibility, severity, benefits, and barriers, some providers may emphasize the benefits of receiving follow-up care more during conversations with patients, while others focus more on susceptibility to cervical cancer, and still others focus more on reducing barriers to continued care. Without consistency across providers in the types and focus(es) of messages used to recommend follow-up care, it is unreasonable to expect that significant associations between these factors would form. As previously noted, literature has shown that while White women are
likely to receive their primary care services from physician’s offices, Black women are more likely to receive care from clinics, hospital emergency departments, or outpatient facilities (Waknine, 2005). Because sources of care for Black women are more variable than they are for White women, it is likely that the types and focuses of messages their providers use when conveying screening results and recommendations for follow-up care are more varied, as well.

**Limitations and Future Directions**

Despite overall support for some hypotheses, several limitations must be considered. One limitation was the use of a cross-sectional correlational design, which prevents drawing any causal inferences. This study also utilized a relatively small sample size of those who did not receive follow-up care (i.e., 106 out of 660 who had abnormal results), thus only a very small subset of Black and White women included in these analyses reported not receiving follow-up care (60 and 46, respectively).

Relying on self-reports of health behaviors and service receipt, which are likely to contain some measurement error, is also a limitation of the present study. Participants may not be able to accurately recall the frequency or timing of participation in health services, may not be able to recall titles of diagnoses and treatments accurately, and/or may feel pressure to report receiving recommended preventive cervical health services (Bhandari & Wagner, 2006).

This sample was also more highly educated, with 68.95% having received education beyond high school. However, this sample also had insured rates of 89.49%, which mirrored current U.S. health insurance coverage rates (91.5% of citizens covered in 2018; U.S. Census Bureau, 2019a), and the $50,000 median income of the sample is lower than that reported by the census ($61,937; U.S. Census Bureau, 2019b). Still, generalizability of the sample may somewhat be limited. This demographic distribution is likely a byproduct of internet sampling,
another limitation of this study. Samples collected through online platforms are characterized by possessing more privilege in terms of access to the internet and other types of resources. Thus, the results of the present study likely represent the upper bounds of negative outcomes that may have much lower bounds for those with less privilege.

Although Amazon Mechanical Turk has the ability to recruit a nationally representative sample, individuals are still in control of which studies they self-select into. Therefore, it is possible that those who decided to self-select into a study about women’s health services differ from the general population.

This study also did not assess sources of care, continuity of care, effectiveness of provider communication, the role of feminine identity/ womanhood and fertility, or health locus of control. Previous research has indicated that these factors may play an important role in decisions to engage in certain health services (Bazargan et al., 2004; Bellinger et al., 2015). Future studies should incorporate these variables alongside the others present in this study, as understanding the potential influence of each of these can serve to further inform beneficial focuses and methods for community and provider interventions.

Of particular importance moving forward is understanding the influence of emotional barriers to follow-up care (e.g., fear of what follow-up results may show). Additional investigation should focus on the weight of emotional barriers to follow-up compared to more traditionally discussed barriers related to tangible resources (e.g., lack of access to providers, cost, lack of time). Understanding which aspects of perceived barriers are more influential is likely to offer further insight into how providers can tailor their messages to more effectively target specific concerns that function as barriers to continued care.
General Implications

While using self-report data is a limitation of this study, online surveying resulted in a geographically representative national sample of cisgender women, allowed for the recruitment of a large number of Black women, and provided insight into some of the factors that predict engagement in Pap screening and follow-up care for Black and White women after receiving an abnormal Pap result. A particularly important implication of the present study is that expanding knowledge and training among medical providers would likely be beneficial in increasing the rates at which providers recommend appropriate follow-up care for their Black patients, thereby increasing the utilization of follow-up care among Black women, generally.

Although the indicator of doctor recommendation to seek follow-up care is based on participants’ perceptions and understanding, Black women as a group were still less likely to report having received a recommendation to get follow-up care. This finding may reflect that providers are less likely to recommend follow-up care to Black women. Alternatively, findings may the result of failed communication between providers and their patients, where the provider did recommend follow-up care but the message was not received by the patient. Previous qualitative literature evaluating follow-up service use among Black women has noted the presence of miscommunication between providers and patients, and the resulting delay or discounting of follow-up service use (Bellinger et al., 2015). Taken together with previous work, current findings provide support for an increase in funding and resources to educate providers about current relevant medical standards and guidelines for cervical care, as well as the disparities existing in provider recommendations for follow-up between racial groups.

However, the present research also suggests that one standardized method of communicating abnormal Pap results and the need for follow-up diagnostic tests or treatment
may not be equally effective for Black and White women. Instead, the focus of patient-provider communications about abnormal Pap results and recommended follow-up care should be tailored to include information indicated to be more influential for Black or White women, as appropriate. Present results support limiting discussion of points that serve to increase perceptions of cervical cancer severity, and to include a larger focus on reducing perceptions of barriers, for both racial groups. For patients who are White women, it may be more beneficial for providers to also focus the conversation around the benefits of receiving follow-up testing, while for Black women it may be more beneficial to focus a larger portion of the conversation around points that increase understanding of their personal susceptibility to cervical cancer. Thus, these findings support the provision of additional provider training related to effective communication with patients and the need for diverse messaging that speaks to different patients’ values and concerns.

Results from the present study additionally indicate that messaging techniques that incorporate ethnic identity may serve to increase perceptions of the severity of cervical cancer, but may not be particularly beneficial in persuading Black women to engage in follow-up care. Conversely, specific doctor recommendation to obtain follow-up care is likely to be the most beneficial factor influencing engagement in continued care. Therefore, present findings support direct, specific communication from medical providers about which follow-up services should be obtained, what each test or treatment is designed to do, and a clear rationale for why this care is important.

Finally, current results show that access to health insurance remains a significant predictor of engagement in Pap screening and follow-up care. Thus, this study provides support for continued policy efforts aimed at increasing access to high quality health coverage, as well as
efforts to improve coverage for follow-up diagnostic testing and treatment of cervical cell abnormalities. These results also lend support for continued development and funding of programs that improve access to care, such as those that provide financial resources outside of health insurance coverage for those in need of follow-up care. Such efforts have the potential to improve access follow-up diagnostic tests and treatments for those in need through the reduction of systemic barriers.
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APPENDIX A:

RESEARCH SUBJECT INFORMATION AND CONSENT FORM

TITLE: Experiences with Women’s Health Services

VCU IRB NO.: HM20014743

PURPOSE OF THE STUDY
The purpose of this research study is to examine the relationships between women’s perceptions, experiences, and the use of preventive reproductive health services.

DESCRIPTION OF THE STUDY AND YOUR INVOLVEMENT
If you decide to be in this research study, you will first be asked to respond to brief demographic items to ensure that you are eligible to participate. If you do not qualify for this study, you will be informed at this time.

If you do qualify for this study, you will then be asked to complete several online survey measures asking you about your knowledge and beliefs pertaining to reproductive health care, your reproductive medical history, and health service use during the previous year.

This study should take no longer than 30 minutes. All of your responses will remain confidential, so the answers that you provide will not be released to anyone.

RISKS AND DISCOMFORTS
Sometimes discussing personal health issues and behaviors can cause people to become embarrassed or upset. These questions should not elicit more discomfort than what you might experience in normal daily interactions. You may stop participating in the research at any time. If you become upset, you may contact the research team using the information at the end of this form.

There is also a risk of a loss of confidentiality. However, to minimize this risk, we do not ask for any identifying information, nor will your user ID be linked to your data.

BENEFITS TO YOU AND OTHERS
You may not get any direct benefit from this study, but the information we learn from people in this study may help us better understand how people understand and utilize health services in the United States.

COSTS
There are no costs for participating in this study other than the time you will spend filling out the questionnaires.
COMPENSATION
You will be compensated $0.75 for your participation in this research study. In order to receive compensation, you must correctly answer 5 out of 7 quality assurance questions that are randomly placed throughout the questionnaire.

CONFIDENTIALITY
Data are being collected only for research purposes. MTurk automatically collects participants’ IP addresses; however, we will not retain your IP address in our saved records or link your survey responses to your IP addresses in any saved databases, publications, presentations, or any other format.

Information from the study and your consent to participate may be looked at or copied for research or legal purposes by Virginia Commonwealth University. What we find from this study may be presented at conferences or published in scholarly papers, but your name will not ever be used in these presentations or papers. Your answers will remain confidential, as we will discard your IP addresses before data is stored and we are not collecting your name or other identifiable information.

COMPUTER USE
If possible, please take this survey on your personal computer.

VOLUNTARY PARTICIPATION AND WITHDRAWAL
Your participation in this study is voluntary. You may decide to not participate in this study. Choosing not to participate will result in no penalty or loss of benefit to which you are otherwise entitled. If you do participate, you may withdraw from the study at any time without penalty.

QUESTIONS
In the future, you may have questions about your participation in this study. If you have any questions, complaints, or concerns about the research, contact:

Dr. Eric Benotsch
808 W. Franklin St., #208
Richmond, VA 23284
E-mail: ebenotsch@vcu.edu
Phone: 804-828-0133

The researcher/study staff named above is the best person(s) to call for questions about your participation in this study.

If you have any general questions about your rights as a participant in this study, you may contact:

Office for Research
Virginia Commonwealth University
800 East Leigh Street, Suite 3000
P.O. Box 980568
Richmond, VA 23298
Telephone: 804-827-2157
Contact this number to ask general questions, to obtain information or offer input, and to express concerns or complaints about research. You may also call this number if you cannot reach the research team or if you wish to talk with someone else. General information about participation in research studies can also be found at http://www.research.vcu.edu/human_research/volunteers.htm.

CONSENT
I have been given the chance to read this consent form. I understand the information about this study. Questions that I wanted to ask about the study have been answered. By clicking “I agree” below, I am indicating that I understand this consent form and agree to participate. I also verify that I am 21 years of age or older and live in the United States.

☐ I choose to participate in this study.
☐ I choose to not participate in this study.
APPENDIX B:

STUDY QUESTIONNAIRE

Instructions: Please answer the following questions to the best of your ability:

[Demographic questions that will be used to determine eligibility for participation in the study]
[Page 1]
1. What state do you currently live in? _____

2. What is your age? ___
   [If under the age of 18 or over the age of 65, the respondent will be filtered out of the survey]

[Page 2]
3. Are you of Hispanic, Latino/a, or Spanish origin? (select all that apply):
   a. Mexican, Mexican American, Chicano/a
   b. Puerto Rican
   c. Cuban
   d. Another Hispanic, Latino/a, or Spanish origin
   e. None

4. Which race best describes you:
   • White American
   • Black American
   • Asian
   • American Indian or Alaskan Native
   • Native Hawaiian or Other Pacific Islander
   • Other ______________
   [If response is not ‘Black American’, the respondent will be filtered out of the survey]

[Page 3]
5. Which of the following best describes your sexual orientation?
   • Heterosexual/ Straight
   • Homosexual/ Gay/ Lesbian
   • Down-low
   • Same gender loving
   • Bisexual/ Bi
   • Omnisexual/ Pansexual
   • Demisexual
   • Asexual
   • Queer/ Questioning
   • Other ______________
6. Which of the following best describes your gender? [Note: cisgender means identifying with the sex assigned to you at birth, while transgender means not identifying with the sex assigned to you at birth]:
   - Cisgender Male
   - Cisgender Female
   - Transgender Male
   - Transgender Female
   - Non-Binary/ Gender Non-Conforming
   - Agender
   - Other ____________

   [If response is not ‘Cisgender Female’, the respondent will be filtered out of the survey]

7. Thinking about the past year, which option best describes the amount of time that you had health insurance coverage?
   - I was not insured at all in the past year
   - I was insured for 1-6 months out of the last year
   - I was insured for 7-11 months out of the last year
   - I was insured for all 12 months of the last year

IF ANY INSURANCE IN PAST YEAR, BRANCH TO:

8. What type(s) of health insurance plan(s) have you had in the past year?
   - Private Insurance
     - (Includes: Plans through employers, federal employee plans, plans from the Marketplace, plans through parents, plans through universities)
   - Public Insurance
     - (Includes: Military insurance (Tricare), Medicaid, Medicare, veterans benefits)

Cervical Cancer Screening History

9. Have you ever had a Pap test/ Pap smear done?  No      Yes      I don’t know

   IF YES OR I DON’T KNOW, BRANCH TO:
   a. When was the last time that you received a Pap test?
      [Even if you are unsure of the exact date, please provide your best estimate.] ___

   IF NO, BRANCH TO:
   b. Why haven’t you ever had a Pap smear done?

10. Have you had a Pap test in the last 3 years?    No      Yes      I don’t know

    IF YES, BRANCH TO:
    a. How many times have you had a Pap test in the last 3 years?
       [Even if you don’t know the exact number, please provide your best estimate] ___

    IF NO OR I DON’T KNOW, BRANCH TO:
    a. Have you had a Pap test in the last 5 years?    No      Yes      I don’t know

    IF YES, BRANCH TO:
    a. How many times have you had a Pap test in the last 5 years?
       [Even if you don’t know the exact number, please provide your best estimate] ___

    IF NO, BRANCH TO THE END OF THE BLOCK
**HPV Screening History**

11. Have you ever had an HPV test?  
   - No  
   - Yes  
   - I don’t know  
   
   **IF YES OR I DON’T KNOW, BRANCH TO:**
   
   c. When was the last time that you received an HPV test?  
      
      [Even if you are unsure of the exact date, please provide your best estimate.] ___  
      
      **IF NO, BRANCH TO THE END OF THE BLOCK**

12. Have you had an HPV test in the last 3 years?  
   - No  
   - Yes  
   - I don’t know  
   
   **IF YES, BRANCH TO:**
   
   a. How many times have you had an HPV test in the last 3 years?  
      [Even if you don’t know the exact number, please provide your best estimate]___  
      
      **IF NO OR I DON’T KNOW, BRANCH TO:**

13. Have you had an HPV test in the last 5 years?  
   - No  
   - Yes  
   - I don’t know  
   
   **IF YES, BRANCH TO:**
   
   a. How many times have you had an HPV test in the last 5 years?  
      [Even if you don’t know the exact number, please provide your best estimate]___  
      
      **IF NO, BRANCH TO THE END OF THE BLOCK**

**HPV Vaccination History**

14. Have you received at least one dose of the HPV vaccine?  
   - No  
   - Yes  
   - I don’t know  
   
   **IF YES, BRANCH TO**  
   
   a. How many doses have you received? Please enter a number. ______  
   
   b. How old were you when you received the HPV vaccine? Even if you are unsure, please enter a numerical age that is your best guess. _____  
   
   c. When was your last dose? Even if you are unsure, please enter a numerical date that is your best guess. __  
   
   d. Was the decision to receive the HPV vaccine yours or did a parent decide to have you vaccinated when you were an adolescent?  
      
      ___I decided ___A parent decided ___I decided with my parent(s) ___I don’t know  
   
   15. Has a doctor ever offered the HPV vaccine to you?  
      
      - No  
      - Yes  
      - I don’t know  
   
   16. Has a doctor ever suggested that you receive the HPV vaccine?  
      
      - No  
      - Yes  
      - I don’t know  
   
   **IF YES, BRANCH TO**  
   
   1. How old were you when a doctor suggested that you receive the HPV vaccine?  

**HBM Dimensions for Pap Screening**

Subscales from The Health Belief Model Scale for Cervical Cancer and the Pap Smear Test.  


**Perceived Susceptibility**

<table>
<thead>
<tr>
<th>Question</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Slightly Disagree</th>
<th>Slightly Agree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>17. It is likely that I will get cervical cancer in the future</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18. My chances of getting cervical cancer in the next few years are high</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
19. I feel I will get cervical cancer sometime during my life

<table>
<thead>
<tr>
<th>Perceived Seriousness/ Severity</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Slightly Disagree</th>
<th>Slightly Agree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
</table>
20. The thought of cervical cancer scares me
21. When I think about cervical cancer, my heart beats faster
22. I am afraid to think about cervical cancer

23. **Please select ‘Agree’ for this item (QA)**
24. Problems I would experience with cervical cancer would last a long time
25. Cervical cancer would threaten a relationship with my partner or spouse
26. If I had cervical cancer my whole life would change
27. If I developed cervical cancer, I would not live longer than 5 years

<table>
<thead>
<tr>
<th>Perceived Barriers</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Slightly Disagree</th>
<th>Slightly Agree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
</table>
28. I am afraid to have a Pap smear test for fear of a bad result
29. I am afraid to have a Pap smear test because I don’t know what will happen
30. I don’t know where to go for a Pap smear test
31. I would be ashamed to lie on a gynecologic examination table and show my private parts to have a Pap smear test
32. Having a Pap smear test takes too much time
33. Having a Pap smear test is too painful
34. Health professionals doing Pap smear tests are rude to women
35. I neglect or cannot remember to have a Pap smear test regularly
36. I have other problems more important than having a Pap smear test in my life
37. I am too old to have a Pap smear test regularly
38. There is no health center close to my house to have a Pap smear test
39. If there is cervical cancer in my destiny, having a Pap smear test cannot prevent it
40. I prefer a female doctor to conduct a Pap smear test
41. I will never have a Pap smear test if I have to pay for it
## Perceived Benefits

<table>
<thead>
<tr>
<th></th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Slightly Disagree</th>
<th>Slightly Agree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>42. If I have a Pap smear test regularly and the result is good, I don’t need to worry too much about cervical cancer</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>43. Having regular Pap smear tests will help to find changes to the cervix before they turn into cancer</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>44. If cervical cancer was found at a regular Pap smear test, its treatment would not be so bad</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>45. I think that having a regular Pap smear test is the best way for cervical cancer to be diagnosed early</td>
<td></td>
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<tr>
<td>46. Having regular Pap smear tests will decrease my chances of dying from cervical cancer</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

## HBM Dimensions Modified for Follow-Up Care

Modified subscales from the Health Belief Model Scale for Cervical Cancer & the Pap Smear Test.

## Perceived Barriers

<table>
<thead>
<tr>
<th></th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Slightly Disagree</th>
<th>Slightly Agree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>47. I am afraid to have follow-up diagnostic tests done for fear of a bad result</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>48. I am afraid to have follow-up diagnostic tests done because I don’t know what will happen</td>
<td></td>
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</tr>
<tr>
<td>49. I don’t know where to go for follow-up diagnostic tests</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>50. Please select strongly disagree for this item. (QA)</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>51. I would be ashamed to lie on a gynecologic examination table and show my private parts to have follow-up diagnostic tests</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>52. Having follow-up diagnostic tests takes too much time</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>53. Having follow-up diagnostic tests is too painful</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>54. Health professionals doing follow-up diagnostic tests are rude to women</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>55. I neglected or could not remember to have follow-up diagnostic tests done</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>56. I have other problems in my life that are more important than having follow-up diagnostic tests</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
There is no health center close to my house to have a Pap smear test.
If there is cervical cancer in my destiny, having follow-up diagnostic tests cannot prevent it.
I prefer a female doctor to conduct follow-up diagnostic tests.
I will never have follow-up diagnostic tests if I have to pay for it.

Perceived Benefits

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Slightly Disagree</th>
<th>Slightly Agree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>61. Having treatment done after getting abnormal Pap results will help eliminate dangerous cells in the cervix before they turn into cancer</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>62. If cervical cancer was found during follow-up tests after a Pap smear, its treatment would not be so bad</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>63. I think that having diagnostic tests done after abnormal Pap results is a good way for cervical cancer to be diagnosed early</td>
<td></td>
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</tr>
<tr>
<td>64. Having treatment done after getting abnormal Pap results will decrease my chances of dying from cervical cancer</td>
<td></td>
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</tr>
</tbody>
</table>

Ethnic Centrality


65. Please fill in: In terms of ethnic group, I consider myself to be: _______________________

Instructions: The next set of questions asks you about your ethnicity. Looking at the items below, please tell me how much you agree or disagree with each statement, thinking about how you felt during the past year.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neither Agree or Disagree</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>66. Overall, being a member of my ethnic group has very little to do with how I feel about myself.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>67. In general, being a member of my ethnic group is an important part of my self-image.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>68. Being a part of my ethnic group is an important reflection of who I am.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>69. Being a part of my ethnic group is important for my social relationships.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>70. All of my friends say that I would make an excellent rhinoceros.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
71. Being a part of my ethnic group is important to my sense of what kind of person I am.

72. My ethnicity is
   (1) Asian or Asian American, including Chinese, Japanese, and others
   (2) Black or African American
   (3) Hispanic or Latino, including Mexican American, Central American, and others
   (4) White, Caucasian, Anglo, European American; not Hispanic
   (5) American Indian/Native American
   (6) Mixed; Parents are from two different groups
   (7) Other (write in): _____________________________________

73. My father’s ethnicity is:
   (1) Asian or Asian American, including Chinese, Japanese, and others
   (2) Black or African American
   (3) Hispanic or Latino, including Mexican American, Central American, and others
   (4) White, Caucasian, Anglo, European American; not Hispanic
   (5) American Indian/Native American
   (6) Mixed; Parents are from two different groups
   (7) Other (write in): _____________________________________

74. My mother’s ethnicity is:
   (1) Asian or Asian American, including Chinese, Japanese, and others
   (2) Black or African American
   (3) Hispanic or Latino, including Mexican American, Central American, and others
   (4) White, Caucasian, Anglo, European American; not Hispanic
   (5) American Indian/Native American
   (6) Mixed; Parents are from two different groups
   (7) Other (write in): _____________________________________

**Personal Health History - Abnormal Pap Test Results – Last Pap**

**Instructions:** Consider the last Pap test you had:

75. Were the results of the Pap smear normal or abnormal?
   Normal  Abnormal  I don’t know

76. More specifically, were your results:

<table>
<thead>
<tr>
<th>Result</th>
<th>Result Full Name</th>
<th>Result Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Normal</td>
<td></td>
<td>No abnormal cells present</td>
</tr>
<tr>
<td>2. ASC-US</td>
<td>Atypical Squamous Cells of Undetermined Significance</td>
<td>Abnormal cells have been found, but they may or may not be dangerous</td>
</tr>
<tr>
<td>3. LSIL</td>
<td>Low-Grade Squamous Intraepithelial Lesion</td>
<td>Mildly abnormal cells</td>
</tr>
<tr>
<td>4. ASC-H</td>
<td>Atypical Squamous Cells, cannot exclude HSIL</td>
<td>Changes have been found that raise concern for the presence of HSIL</td>
</tr>
<tr>
<td>5. HSIL</td>
<td>High-Grade Squamous Intraepithelial Lesion</td>
<td>Abnormal cells that are more serious</td>
</tr>
<tr>
<td>6. AGC</td>
<td>Atypical Glandular Cells</td>
<td>Changes have been found in glandular cells raise concern for the presence of precancer or cancer</td>
</tr>
</tbody>
</table>

7. My Pap smear test was abnormal, but I don’t know what the result was

8. I never got my Pap smear test results
IF NO ABNORMAL RESULT OR NEVER GOT PAP RESULTS, BRANCH TO ALL PAP TEST HISTORY (Personal Health History - Abnormal Pap Test Results – All Pap History):

IF ABNORMAL PAP RESULT RECEIVED (B-G), BRANCH TO:

77. When your doctor told you about your abnormal Pap results:

<table>
<thead>
<tr>
<th>Did the doctor state:</th>
<th>No</th>
<th>Yes</th>
<th>I don’t know</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. That the results were potentially harmful to your health?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. That you should receive follow-up care?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. That you needed to receive follow-up care?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>d. That they wanted you to have another Pap test done?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>e. That they wanted you to have tests other than another Pap test done?</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Did you feel:</th>
<th>No</th>
<th>Yes</th>
<th>I don’t know</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. That the results were potentially harmful to your health?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. That you should receive follow-up care?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. That you needed to receive follow-up care?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>d. That you should have another Pap test done?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>e. That you should have tests other than another Pap test done?</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

78. What care did your doctor recommend after your abnormal Pap result? Please select all that apply.

- None
- Receive Pap AND HPV testing in 5 years
- Receive a Pap test again in 3 years
- Receive a Pap test again in 12 months
- Colposcopy (uses microscope to look for abnormal cells)
- Biopsy (removing tissue/ cells to rest for abnormalities)
- LEEP procedure (uses a wire loop carrying electric current to remove abnormal cells)
- Conization (cuts a cone-shaped piece of tissue out to remove abnormal cells)
- Cryotherapy (uses liquid gas to freeze abnormal cells)
- Laser therapy (uses laser to remove abnormal cells)
- I don’t know

79. What care did you receive after your abnormal Pap result? Please select all that apply.

- None
- Receive Pap AND HPV testing in 5 years
- Receive a Pap test again in 3 years
- Receive a Pap test again in 12 months
- Colposcopy (uses microscope to look for abnormal cells)
- Biopsy (removing tissue/ cells to rest for abnormalities)
- LEEP procedure (uses a wire loop carrying electric current to remove abnormal cells)
- Conization (cuts a cone-shaped piece of tissue out to remove abnormal cells)
- Cryotherapy (uses liquid gas to freeze abnormal cells)
- Laser therapy (uses laser to remove abnormal cells)
- I don’t know

IF ‘NONE’ SELECTED (OPTION A), BRANCH TO:

80. Why did/ didn’t you decide to receive follow-up care?_______________
**IF RECEIVED ANY CARE FOLLOWING ABNORMAL RESULT (B-K), BRANCH TO:**
81. Later the doctor told you about your abnormal Pap results, about how long did it take for you to schedule an appointment to get follow-up care?
   a. I scheduled an appointment that same day
   b. A few days
   c. A few weeks
   d. A few months
   e. More than a few months

82. After the doctor told you about your abnormal Pap results, about how long did it take for you to receive follow-up care?
   a. I received follow-up care that same day
   b. A few days
   c. A few weeks
   d. A few months
   e. More than a few months
   f. I did not receive follow-up care

**IF ‘I DID NOT RECEIVE FOLLOW-UP CARE’ IS SELECTED (F), BRANCH TO:**
83. Why did/ didn’t you decide to receive follow-up care?

**IF RECEIVED ANY CARE FOLLOWING ABNORMAL RESULT (A-E), BRANCH TO:**
84. What results did you receive from this care?

<table>
<thead>
<tr>
<th>Result</th>
<th>Result Full Name</th>
<th>Result Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Normal</td>
<td>Normal</td>
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</tr>
<tr>
<td>b. ASC-US</td>
<td>Atypical Squamous Cells of Undetermined Significance</td>
<td>Abnormal cells have been found, but they may or may not be dangerous</td>
</tr>
<tr>
<td>c. LSIL/ CIN I</td>
<td>Low-Grade Squamous Intraepithelial Lesion</td>
<td>Mildly abnormal cells</td>
</tr>
<tr>
<td>d. ASC-H</td>
<td>Atypical Squamous Cells, cannot exclude HSIL</td>
<td>Changes have been found that raise concern for the presence of HSIL</td>
</tr>
<tr>
<td>e. HSIL</td>
<td>High-Grade Squamous Intraepithelial Lesion</td>
<td>Abnormal cells that are more serious</td>
</tr>
<tr>
<td>f. CIN II</td>
<td>Moderate abnormal cells</td>
<td></td>
</tr>
<tr>
<td>g. CIN III</td>
<td>Severe abnormal cells or carcinoma in situ</td>
<td></td>
</tr>
<tr>
<td>h. AGC</td>
<td>Atypical Glandular Cells</td>
<td>Changes have been found in glandular cells raise concern for the presence of precancer or cancer</td>
</tr>
<tr>
<td>i. AIS</td>
<td>Adenocarcinoma in Situ</td>
<td>Cancer cells found in glandular tissue of the endocervix</td>
</tr>
<tr>
<td>j. My follow-up test was abnormal, but I don’t know what the result was</td>
<td></td>
<td></td>
</tr>
<tr>
<td>k. I never got my follow-up test results</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

85. What care did your doctor recommend to you after you received this result? Please select all that apply. [checkbox options]
   a. None
   b. Receive Pap AND HPV testing in 5 years
   c. Receive a Pap test again in 3 years
   d. Receive a Pap test again in 12 months
   e. Colposcopy (uses microscope to look for abnormal cells)
   f. Biopsy (removing tissue/ cells to rest for abnormalities)
   g. LEEP procedure (uses a wire loop carrying electric current to remove abnormal cells)
h. Conization (cuts a cone-shaped piece of tissue out to remove abnormal cells)
i. Cryotherapy (uses liquid gas to freeze abnormal cells)
j. Laser therapy (uses laser to remove abnormal cells)
k. Follow up with a specialist
l. I don’t know

86. Why did/ didn’t you decide to receive follow-up care? ________________

IF NO ABNORMAL PAP RESULT RECEIVED ON LAST PAP, BRANCH TO:

**Personal Health History - Abnormal Pap Test Results – All Pap History**

**Instructions:** Consider all of the Pap tests you have ever had:

87. Have you ever had abnormal results?  
   - No  
   - Yes  
   - I don’t know

88. Please indicate all of the following results you have ever received:

<table>
<thead>
<tr>
<th>Result</th>
<th>Result Full Name</th>
<th>Result Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Normal</td>
<td>No abnormal cells present</td>
<td></td>
</tr>
<tr>
<td>2. ASC-US</td>
<td>Atypical Squamous Cells of Undetermined Significance</td>
<td>Abnormal cells have been found, but they may or may not be dangerous</td>
</tr>
<tr>
<td>3. LSIL</td>
<td>Low-Grade Squamous Intraepithelial Lesion</td>
<td>Mildly abnormal cells</td>
</tr>
<tr>
<td>4. ASC-H</td>
<td>Atypical Squamous Cells, cannot exclude HSIL</td>
<td>Changes have been found that raise concern for the presence of HSIL</td>
</tr>
<tr>
<td>5. HSIL</td>
<td>High-Grade Squamous Intraepithelial Lesion</td>
<td>Abnormal cells that are more serious</td>
</tr>
<tr>
<td>6. AGC</td>
<td>Atypical Glandular Cells</td>
<td>Changes have been found in glandular cells raise concern for the presence of precancer or cancer</td>
</tr>
<tr>
<td>7. My Pap smear test was abnormal, but I don’t know what the result was</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. I never got my Pap smear test results</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

IF NORMAL, BRANCH TO END OF BLOCK

IF ‘I NEVER GOT MY PAP SMEAR TEST RESULTS,’ BRANCH TO END OF BLOCK

IF ABNORMAL PAP RESULT RECEIVED (B-G), BRANCH TO:

89. When your doctor told you about your abnormal Pap results:

<table>
<thead>
<tr>
<th>Did the doctor state:</th>
<th>No</th>
<th>Yes</th>
<th>I don’t know</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. That the results were potentially harmful to your health?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. That you <em>should</em> receive follow-up care?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>c. That you <em>needed to</em> receive follow-up care?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>d. That they wanted you to have another Pap test done?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>e. That they wanted you to have tests other than another Pap test done?</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Did you feel:</th>
<th>No</th>
<th>Yes</th>
<th>I don’t know</th>
</tr>
</thead>
<tbody>
<tr>
<td>f. That the results were potentially harmful to your health?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>g. That you <em>should</em> receive follow-up care?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>h. That you <em>needed to</em> receive follow-up care?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>i. That you should have another Pap test done?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>j. That you should have tests other than another Pap test done?</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
90. What care did your doctor recommend after your abnormal Pap result? Please select all that apply.
   [checkbox options]
   a. None
   b. Receive Pap AND HPV testing in 5 years
   c. Receive a Pap test again in 3 years
   d. Receive a Pap test again in 12 months
   e. Colposcopy (uses microscope to look for abnormal cells)
   f. Biopsy (removing tissue/cells to rest for abnormalities)
   g. LEEP procedure (uses a wire loop carrying electric current to remove abnormal cells)
   h. Conization (cuts a cone-shaped piece of tissue out to remove abnormal cells)
   i. Cryotherapy (uses liquid gas to freeze abnormal cells)
   j. Laser therapy (uses laser to remove abnormal cells)
   k. I don’t know

91. What care did you receive after your abnormal Pap result? Please select all that apply.
   [checkbox options]
   a. None
   b. Receive Pap AND HPV testing in 5 years
   c. Receive a Pap test again in 3 years
   d. Receive a Pap test again in 12 months
   e. Colposcopy (uses microscope to look for abnormal cells)
   f. Biopsy (removing tissue/cells to rest for abnormalities)
   g. LEEP procedure (uses a wire loop carrying electric current to remove abnormal cells)
   h. Conization (cuts a cone-shaped piece of tissue out to remove abnormal cells)
   i. Cryotherapy (uses liquid gas to freeze abnormal cells)
   j. Laser therapy (uses laser to remove abnormal cells)
   k. I don’t know

IF ‘NONE’ SELECTED (OPTION A), BRANCH TO:
92. Why did/ didn’t you decide to receive follow-up care?__________________

IF RECEIVED ANY CARE FOLLOWING ABNORMAL RESULT (B-K), BRANCH TO:
93. After the doctor told you about your abnormal Pap results, about how long did it take for you to schedule an appointment to get follow-up care?
   a. I scheduled an appointment that same day
   b. A few days
   c. A few weeks
   d. A few months
   e. More than a few months

94. After the doctor told you about your abnormal Pap results, about how long did it take for you to receive follow-up care?
   a. I received follow-up care that same day
   b. A few days
   c. A few weeks
   d. A few months
   e. More than a few months
   f. I did not receive follow-up care

IF ‘I DID NOT RECEIVE FOLLOW-UP CARE’ IS SELECTED (F), BRANCH TO:
95. Why did/ didn’t you decide to receive follow-up care?__________________
**IF RECEIVED ANY CARE FOLLOWING ABNORMAL RESULT (A-E), BRANCH TO:**

96. What results did you receive from this follow-up care?

<table>
<thead>
<tr>
<th>Result</th>
<th>Result Full Name</th>
<th>Result Description</th>
</tr>
</thead>
<tbody>
<tr>
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<td></td>
</tr>
<tr>
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</tr>
<tr>
<td>k. I never got my follow-up test results</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

97. What care did your doctor recommend to you after you received this result? Please select all that apply. [checkbox options]

a. Receive Pap AND HPV testing in 5 years  
b. Receive a Pap test again in 3 years  
c. Receive a Pap test again in 12 months  
d. Colposcopy (uses microscope to look for abnormal cells)  
e. Biopsy (removing tissue/cells to rest for abnormalities)  
f. LEEP procedure (uses a wire loop carrying electric current to remove abnormal cells)  
g. Conization (cuts a cone-shaped piece of tissue out to remove abnormal cells)  
h. Cryotherapy (uses liquid gas to freeze abnormal cells)  
i. Laser therapy (uses laser to remove abnormal cells)  
j. Follow up with a specialist  
k. None  
l. I don’t know

98. Why did/didn’t you decide to receive follow-up care?__________________

**Personal Medical History**

<table>
<thead>
<tr>
<th>Question</th>
<th>No</th>
<th>Yes</th>
</tr>
</thead>
<tbody>
<tr>
<td>99. Do you have a chronic health condition?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>100. Do you have an auto-immune disorder?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>101. Do you have a reproductive health issue?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>102. Have you ever been diagnosed with cervical cancer?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>103. Have you ever been diagnosed with breast cancer?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>104. Have you ever been diagnosed with ovarian cancer?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>105. Have you ever been diagnosed with any other form of cancer?</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

106. Have you ever been treated for cervical cancer? | No | Yes
IF YES, BRANCH TO:
a. What type of treatment(s) did you receive for cervical cancer? [checkbox options]
   a. Surgery
   b. Radiation
   c. Chemotherapy
   d. Targeted therapy
   e. Immunotherapy
   f. I don’t know

107. Have you had a hysterectomy? ___No ___Yes ___I don’t know
   IF YES, BRANCH TO:
   a. Did you have your cervix removed during your hysterectomy?___No ___Yes ___I don’t know

108. Were you exposed to DES while your mother was pregnant? No ___Yes ___I don’t know

109. Have you been diagnosed with HIV? ___No ___Yes

Family Medical History

<table>
<thead>
<tr>
<th>Have any of your immediate family members (i.e., siblings, parents, aunts, grandparents) been diagnosed with:</th>
<th>No</th>
<th>Yes</th>
<th>I don’t know</th>
</tr>
</thead>
<tbody>
<tr>
<td>110. Cervical cancer?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>111. Breast cancer?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>112. Ovarian cancer?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>113. Any other form of cancer?</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

[Other demographic questions]

114. How many people live in your household? ______

115. How many of the people living in your household are dependent children? ______

116. Please report the amount that best describes your household yearly income BEFORE taxes (Note: this amount should include all income, including veterans’ payments, child support, alimony, and assistance from outside of the household; however, it should exclude food stamps and housing subsidies): ______

117. Highest level of education completed:
   • Middle school
   • High school
   • GED
   • Vocational school
   • Associates Degree
   • Bachelor Degree
   • Graduate Degree (Masters, Doctorate, etc.)

118. Of the following, please choose the option that best describes your highest level of employment (e.g., if you have both a part-time and a full-time job, choose “full time”):
   • Not employed
   • Student
• Employed part-time
• Employed full-time
• Retired

119. Relationship Status:
• Not currently dating or in a relationship
• In a newer relationship with 1 person (less than 12 months)
• In a long-term relationship with 1 person (12 months or longer)
• Married
• Dating/ in a relationship with more than 1 person

120. Which of the following best describes your gender? [Note: cisgender means identifying with the sex assigned to you at birth, while transgender means not identifying with the sex assigned to you at birth]:
• Cisgender Male
• Cisgender Female
• Transgender Male
• Transgender Female
• Non-Binary/ Gender Non-Conforming
• Agender
• Other ____________

121. Which race best describes you:
• White American
• Black American
• Asian
• American Indian or Alaskan Native
• Native Hawaiian or Other Pacific Islander
• Biracial or Multiracial
• Other ______________

122. What do you think this survey is about? (QA) __________________

123. Random code assignment. “Please type the code you see displayed here.” ________
**Appx C:**

U.S. Census Bureau State Region Designations

### REGION 1: NORTHEAST

<table>
<thead>
<tr>
<th>Division 1: New England</th>
<th>Division 2: Middle Atlantic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connecticut (07)</td>
<td>New Jersey (31)</td>
</tr>
<tr>
<td>Maine (20)</td>
<td>New York (33)</td>
</tr>
<tr>
<td>Massachusetts (22)</td>
<td>Pennsylvania (39)</td>
</tr>
<tr>
<td>New Hampshire (30)</td>
<td></td>
</tr>
<tr>
<td>Rhode Island (40)</td>
<td></td>
</tr>
<tr>
<td>Vermont (46)</td>
<td></td>
</tr>
</tbody>
</table>

### REGION 2: MIDWEST

<table>
<thead>
<tr>
<th>Division 3: East North Central</th>
<th>Division 4: West North Central</th>
</tr>
</thead>
<tbody>
<tr>
<td>Illinois (14)</td>
<td>Iowa (16)</td>
</tr>
<tr>
<td>Indiana (15)</td>
<td>Kansas (17)</td>
</tr>
<tr>
<td>Michigan (23)</td>
<td>Minnesota (24)</td>
</tr>
<tr>
<td>Ohio (36)</td>
<td>Missouri (26)</td>
</tr>
<tr>
<td>Wisconsin (50)</td>
<td>Nebraska (28)</td>
</tr>
<tr>
<td></td>
<td>North Dakota (35)</td>
</tr>
<tr>
<td></td>
<td>South Dakota (42)</td>
</tr>
</tbody>
</table>

### REGION 3: SOUTH

<table>
<thead>
<tr>
<th>Division 5: South Atlantic</th>
<th>Division 6: East South Central</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delaware (08)</td>
<td>Alabama (01)</td>
</tr>
<tr>
<td>District of Columbia (09)</td>
<td>Kentucky (18)</td>
</tr>
<tr>
<td>Florida (10)</td>
<td>Mississippi (25)</td>
</tr>
<tr>
<td>Georgia (11)</td>
<td>Tennessee (43)</td>
</tr>
<tr>
<td>Maryland (21)</td>
<td></td>
</tr>
<tr>
<td>North Carolina (34)</td>
<td></td>
</tr>
<tr>
<td>South Carolina (41)</td>
<td></td>
</tr>
<tr>
<td>Virginia (47)</td>
<td></td>
</tr>
<tr>
<td>West Virginia (49)</td>
<td></td>
</tr>
</tbody>
</table>

### Division 7: West South Central

| Arkansas (04)               |
| Louisiana (19)             |
| Oklahoma (37)              |
| Texas (44)                 |
### REGION 4: WEST

**Division 8: Mountain**
- Arizona (03)
- Colorado (06)
- Idaho (13)
- Montana (27)
- Nevada (29)
- New Mexico (32)
- Utah (45)
- Wyoming (51)

**Division 9: Pacific**
- Alaska (02)
- California (05)
- Hawaii (12)
- Oregon (38)
- Washington (48)

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