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Cancer Screening Disparities Among Women with Disabilities in the United States

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This is to certify that the doctoral study by

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has been found to be complete and satisfactory in all respects,
and that any and all revisions required by
the review committee have been made.

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Walden University
2025

Abstract

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MSW, Walla Walla University, 2013

BS, Black Hills State University, 2010

Doctoral Study Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Public Health

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Abstract

Breast and cervical cancer screening reduces mortality; however, women with disabilities and mental health challenges experience persistent disparities in access to preventive services. The purpose of this quantitative study was to examine the relationships between self-reported serious difficulty hearing, serious difficulty seeing, and frequent mental distress with breast (mammogram) and cervical (Pap test) cancer screening use among women in the United States (mammogram model, n = 844; Pap model n = 774), using the 2023 Behavioral Risk Factor Surveillance System dataset. The social-ecological model provided the framework. Two logistic regression models were conducted, adjusting for age, race/ethnicity, education, income, marital status, and employment status. The mammogram model was statistically significant overall, x^2(23) = 304.09, $p < .001$, with strong classification accuracy (91.1%). Age (*AOR* = 0.27, 95% *CI* [0.21, 0.35], $p < .001$) and race/ethnicity ($p = .018$), particularly among Asian, non-Hispanic women (*AOR* = 7.85, 95% *CI* [1.48, 41.55], $p = .015$), were significant predictors, whereas disability and mental health indicators were not. The Pap model was also statistically significant, x^2(23) = 128.14, $p < .001$, with 68.6% classification accuracy. Frequent mental distress was associated with lower Pap utilization (*AOR* = 0.53, 95% *CI* [0.30, 0.93], $p = .026$), along with significant effects for age, education, income, and selected race/ethnicity contrasts. The implications for positive social change include informing public health strategies and clinical practice guidelines to improve access to cancer screening among women with mental health challenges and across diverse sociodemographic subgroups.

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Dedication

To all those fighting for equal rights and healthcare for women in the United States.

Acknowledgments

To Faith, who has been there for each of my college degrees, thank you for your unconditional support and for showing me that we should always strive to be better. Being your mom is my greatest accomplishment and blessing. Thank you to my wife for always believing in our ability to complete this, despite the many tears and years spent together and apart through this journey. I could have never gotten here without your persistence and confidence. To Mathew and Janice, thank you for your support and the hours lost together. To my mom and dad, for cheering me on at all turns, even when you had no idea what I was talking about; to my sister, for providing comedic relief; to my brother, for unconditional love; and lastly, to my grandma, for always believing that women deserve an education.

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Section 1: Foundation of the Study and Literature Review

Introduction

This study examines differences in breast and cervical cancer screening behaviors among women in the United States who experience disabilities such as serious difficulty hearing, seeing, or poor mental health. These individuals may encounter heightened barriers to preventative healthcare. Although breast and cervical cancer screenings are essential for early detection and improved outcomes, there is limited research on how difficulty hearing or seeing and poor mental health may influence screening behaviors. As a result, this population remains underrepresented in the public health literature, despite being at an elevated risk for delayed or missed preventive care (Bidassie et al., 2020; Chang & Kim, 2023). Further evaluation through this study has helped to close the literature gap and improve further understanding.

This study addressed this gap and contributed to a more equitable understanding of access and utilization of preventative services for women in the United States who experience serious difficulty hearing, serious difficulty seeing, and/or poor mental health. By examining this unique population, the findings may inform policy development, resource allocation, and outreach strategies within the American healthcare system. These insights contribute to positive social change by promoting equitable, disability-inclusive care models that improve screening rates and health outcomes. Section 1 includes the background, problem statement, purpose of the study, theoretical and conceptual frameworks, nature of the study, key definitions, assumptions, scope and delimitations, limitations, and significance of the study.

Background

Breast and cervical cancer remain significant public health concerns among women in the United States and globally (U.S. Preventive Services Task Force, 2018). Early detection through routine screening can significantly improve survival rates and reduce long-term morbidity (Smith et al., 2021). Despite long-standing screening recommendations and the availability of preventative services, disparities persist in screening participation, especially among underserved populations (Rosen et al., 2024). Women facing overlapping social or health-related barriers are more likely to experience delays in diagnosis and treatment, increasing the risk of poor outcomes (Wilkerson et al., 2024). These persistent disparities demonstrate the need to identify and reduce barriers such as cost, transportation, language, health literacy, and provider access to ensure that all women can benefit equally from timely breast and cervical cancer screening.

Women with significant hearing loss, poor vision, or mental health issues face documented barriers to cancer screening participation (Taylor et al., 2020; Ugurlu & Kocak, 2024; Walker & Schwartz, 2022). Researchers have discovered that individuals with communication challenges, mobility limitations, and cognitive concerns often encounter greater difficulty accessing preventative healthcare services (Iezzoni et al., 2020). These barriers may include transportation limitations, discomfort or anxiety related to procedures, and difficulty navigating the healthcare systems (Schuttner et al., 2021). As a result, women with hearing or visual difficulties or poor mental health may be less likely to participate in timely breast and cervical cancer screenings, leaving them vulnerable to delayed diagnoses and higher cancer-related mortality (Bidassie et al., 2020). This study examined the locations of these gaps and their interconnections.

Women with specific disabilities represent a unique subgroup shaped by their own unique experiences and difficulties. This population may have distinct healthcare needs resulting from occupational exposures, service-connected injuries, or long-term physical and psychological effects of service (Jester et al., 2024). Prior research highlights that some women with health disabilities report lower screening rates compared to their differently abled counterparts (Jones et al., 2022). Health history, disability, and systemic barriers may contribute to healthcare inequities within this population, underscoring the need for focused research and policy attention, which my study explored.

Despite growing awareness of cancer disparities, limited research has focused on how the combination of deafness or serious difficulty hearing, blindness or serious difficulty seeing, and poor mental health intersect to influence cancer screening behaviors among American women, which is why this study is essential to expanding the literature. The complex interplay among these factors has not been adequately explored in current literature, leaving a gap in understanding how to support preventative care for this population in a more proactive manner (Richardson-Parry et al., 2023). This study addressed the gap by exploring how hearing, vision, and mental health impairments influence breast and cervical cancer screening participation among women in the United States. The findings help to inform health equity efforts and improve access to preventative services through targeted interventions within healthcare systems.

Problem Statement

There is limited understanding of how specific disabilities, including hearing impairments, visual impairments, and poor mental health, influence breast and cervical cancer screening behaviors among women in the United States. Previous research has documented disparities in access to preventative care based on race, geographic location, socioeconomic status, and disabilities; however, few studies have focused on the intersection of these factors within this population (Bidassie et al., 2020; Smith et al., 2021). Women with disabilities often encounter communication barriers, mobility limitations, and inconsistent care, which may contribute to delayed or missed cancer screenings (Mkuu et al., 2022). These challenges are particularly relevant for women navigating complex systems such as the American healthcare system. Although evidence suggests that disability can reduce screening participation (Jones et al., 2022), research has not yet fully explored the degree to which specific impairments impact cancer screening among women residing in the United States. Addressing this issue is crucial for advancing science and improving equitable access to preventive care, ultimately leading to better health outcomes for this underserved population.

Few studies have examined how self-reported visual and hearing disability and mental health challenges affect breast and cervical cancer screening behaviors among women who live in the United States. Research has largely treated these variables in isolation, failing to capture how disabilities may interact to impact screening participation (Rattray et al, 2023). Understanding these overlapping barriers is crucial for developing practice-based solutions to reduce disparities in access to preventive care (Chang & Kim, 2023; Richardson-Parry et al., 2023). This study builds on current literature by targeting a population that remains largely underrepresented in research on screening behaviors. By examining how specific impairments impact participation, this study addresses a critical knowledge gap and supports the development of future outreach strategies, policy reforms, and health equity interventions tailored to women in the United States.

Purpose of the Study

The purpose of this quantitative, retrospective, cross-sectional study is to investigate the correlation between independent variables, which are hearing impairments, visual impairments, and poor mental health, with dependent variables, breast and cervical cancer screening behaviors, among the identified population of women living in the United States. This study used secondary data from the Behavioral Risk Factor Surveillance System (BRFSS) for 2023 to examine the association between independent variables, including deafness or serious difficulty hearing, blindness or serious difficulty seeing, and poor mental health, and the dependent variables of mammogram participation and Pap smear screenings. The identified population consists of women residing in the United States. This study was designed to address a gap in the literature concerning how disability-related barriers influence cancer screening behaviors within this underserved group. Findings from this study may hold significance for policymakers, public health practitioners, and healthcare providers, as they identify specific barriers to care and inform targeted outreach and intervention strategies. Ultimately, this research can enhance access to preventive care and reduces disparities for women experiencing these difficulties in the United States.

In addition to addressing this knowledge gap, this study yields tangible field-based products that translate the findings into practice, with a policy brief and community health intervention plan. These products are designed to provide policymakers, public health practitioners, and healthcare providers with concrete strategies to mitigate the identified screening barriers and improve preventive care outreach for the target population of women in the United States. By doing this, this study not only explores a problem but also delivers actionable solutions aligned with its results.

Research Questions and Hypotheses

RQ1: What is the relationship between self-reported serious difficulty hearing, serious difficulty seeing, and poor mental health and breast cancer screening behaviors (mammogram utilization) among women in the United States, when controlling for employment status, education level, income, marital status, race/ethnicity, and age?

$H_0$1: There is no significant relationship between self-reported serious difficulty hearing, serious difficulty seeing, and poor mental health and breast cancer screening behaviors (mammogram utilization) among women in the United States, when controlling for employment status, education level, income, marital status, race/ethnicity, and age.

H_A1: There is a significant relationship between self-reported serious difficulty hearing, serious difficulty seeing, and poor mental health and breast cancer screening behaviors (mammogram utilization) among women in the United States, when controlling for employment status, education level, income, marital status, race/ethnicity, and age.

RQ2: What is the relationship between self-reported serious difficulty hearing, serious difficulty seeing and poor mental health and cervical cancer screening behaviors (Pap test utilization) among women in the United States, when controlling for employment status, education level, income, marital status, race/ethnicity, and age?

$H_0 2$: There is no significant relationship between self-reported serious difficulty hearing, serious difficulty seeing, and poor mental health and cervical cancer screening behaviors (Pap test utilization) among women in the United States, when controlling for employment status, education level, income, marital status, race/ethnicity, and age.

$H_A 2$: There is a significant relationship between self-reported serious difficulty hearing, serious difficulty seeing, and poor mental health and cervical cancer screening behaviors (Pap test utilization) among women in the United States, when controlling for employment status, education level, income, marital status, race/ethnicity, and age.

Theoretical Framework: Social-Ecological Model

The social-ecological model (SEM) suggests that health behaviors are influenced by individual characteristics, interpersonal relationships, community factors, and broader societal influences (Golden & Earp, 2012). SEM examines multifaceted factors that influence breast cancer and cervical cancer screening behaviors among women in the United States who are experiencing a self-reported disability. These overlapping factors may create compounded barriers to accessing preventive care, particularly for individuals who simultaneously face physical and psychological challenges (Golden & Earp, 2012).

Rather than attributing screening disparities solely to individual behaviors, the social-ecological model emphasizes the importance of addressing broader systemic, social, and environmental factors that shape health outcomes across multiple levels (Golden & Earp, 2012). This perspective recognizes that focusing on a single factor, such as personal motivation or knowledge, is insufficient to explain the complex barriers faced by women in the United States, many of whom experience compounded challenges related to healthcare access, disability, and limited community resources (Rattray et al., 2023). By applying the SEM, this study examined how multilevel influences interact to affect breast and cervical cancer screening behaviors, informing the identification of interventions that extend beyond individual-level change and address the broader contexts that shape health outcomes in this population.

Nature of the Study

This study utilized a quantitative methodology with a retrospective, cross-sectional research design to analyze breast and cervical cancer screening behaviors, as well as the impact of visual or hearing impairments and poor mental health on cancer screening behaviors among women in the United States. The study examined data from the 2023 BRFSS dataset using binomial logistic regression analysis in SPSS. Independent variables include deafness or serious difficulty hearing, blindness or serious difficulty seeing, and poor mental health. The dependent variables were breast cancer screening and cervical cancer screening. The identified population for this study includes women in the United States. Confounders accounted for include age, socioeconomic status, marital status, income, education level, and employment status.

Literature Search Strategy

To locate literature from past studies, a search was conducted with sources from various databases, including PubMed, MEDLINE, Embase, CINAHL, and Google Scholar. To search for the literature, the following terms were used singularly or in combination using Boolean operators: *breast cancer screening, cervical cancer screening, disabilities and cancer screening, hearing impairment and breast cancer screening, visual impairment and cancer screening, mental health and cancer screening, socioeconomic status and cancer screening, breast cancer screening, social determinants of health, Andersen's Behavioral Model, access to care, perceived need for preventative care, SEM, social ecological model,* and *enabling factors in healthcare utilization*. Of the selected and reviewed sources, nearly all were published between 2019 and 2024, while the rest included a few seminal sources relating to theory and methodology. Incorporating recent sources enabled the review to reflect the latest literature and identify existing gaps that require further investigation.

Theoretical Framework

The social ecological model (SEM) is widely used as a framework in public health, conceptualizing how multiple layers of influence shape health barriers and outcomes (Golden & Earp, 2012; McLeroy et al., 1988). In the context of this study, SEM provides a relevant and comprehensive lens for understanding the complex interplay between individual, interpersonal, organizational, community, and policy-level factors that affect breast and cervical cancer screening behaviors among women in the United States who self-report visual or hearing disability or poor mental health. The framework is particularly relevant for examining how intersecting barriers influence breast and cervical cancer screening behaviors (Spencer et al., 2023). In this study, SEM supports the inclusion of individual, social, and structural variables to capture the complexity of cancer screening disparities. Its application aligns with public health efforts to develop targeted, multilevel interventions.

Historical and Theoretical Foundations

For decades, the social ecological model has been widely utilized in health promotion and public health research to explore the layered influences on health behaviors. Originally developed by McLeroy et al. (1988), the model expanded on Bronfenbrenner's ecological systems theory to address how interpersonal, organizational, and community-level factors interact with individual-level determinants. Since its introduction, SEM has become foundational in designing multilevel health interventions and guiding public health strategies (Golden & Earp, 2012). Researchers have applied the model to topics ranging from obesity prevention to mental health care access, affirming its versatility across populations and health conditions (Coughlin et al., 2020; Korn et al., 2023). The model's emphasis on upstream influences has helped shift attention from individual blame to structural and contextual barriers in health behavior research.

Application to Cancer Screening Disparities

Numerous studies have employed SEM to examine disparities in preventive health services, particularly in populations facing social and structural barriers. For instance, Golden and Earp (2012) found that interventions incorporating multiple ecological levels, such as individual education combined with community outreach, were more effective in changing behavior than approaches focused solely on individuals. SEM has also been leveraged to understand cancer screening disparities in underserved communities, with research identifying institutional mistrust, inadequate provider communication, and community stigma as key barriers (Levine et al., 2020; Spencer et al., 2023). This body of literature demonstrates the utility of SEM in uncovering the interconnected factors contributing to the underutilization of preventive care. The model supports more comprehensive intervention strategies by capturing dynamics beyond the individual.

Relevance to the Current Study

The flexibility of the social ecological model has rendered it particularly valuable in addressing health disparities across diverse contexts. Public health researchers have adapted SEM to examine how race, socioeconomic status, disability, and geographic location influence access to care (Coughlin et al., 2020; Korn et al., 2023). For example, Korn et al. (2023) applied SEM in a systematic review of cancer screening interventions, noting that multilevel approaches were significantly more effective in reaching marginalized populations. Similarly, Spencer et al. (2023) utilized the framework to analyze racial and ethnic disparities in cervical cancer screening across three healthcare systems. These studies highlight that barriers to care are rarely isolated to individual behavior and are often shaped by structural inequities embedded within healthcare systems.

While SEM is commonly used in program design and evaluation, it has also informed survey-based and cross-sectional research methodologies. Golden and Earp

(2012) emphasized that even in secondary data analysis, SEM can guide the selection of variables that reflect different levels of influence. This includes not only individual demographics and health status, but also social support, healthcare access, and regional or policy-level factors. Researchers studying mental health, reproductive health, and chronic disease have all leveraged SEM to contextualize statistical associations within broader ecological forces (Levine et al., 2020; Vohra-Gupta et al., 2023). In this way, SEM strengthens the logic of interventions and the interpretation of correlational findings in observational studies.

Strengths and Limitations

One strength of applying the SEM to public health issues is its comprehensive multi-level perspective. By considering individual, interpersonal, community, and societal influences on behavior, SEM helps prevent overemphasizing personal factors and instead highlights the interaction of various determinants. This broad view is especially useful for issues like cancer screening disparities, which stem from complex causes. Using SEM can help practitioners identify leverage points at multiple levels, such as improving individual patient education, strengthening family and social support, and changing community or healthcare system factors, thereby promoting more holistic and effective intervention strategies (Golden & Earp, 2012). The SEM's inclusive framework is a major strength in creating interventions that reflect the real-world complexity of health behaviors.

Despite its strengths, there are important limitations to applying the SEM to public health problems. A key challenge is the complexity of multi-level interventions;

addressing factors across several SEM layers often requires significant resources and coordination. It can be difficult to determine which level of influence has the greatest impact on an outcome, and interventions targeting many levels may become costly or logistically complicated. Additionally, the broad scope of SEM means it serves as a guiding framework rather than a specific predictive model; it does not specify which element to change first or how to weigh the influence of each level. Improving cancer screening rates might involve patient education, provider training, and policy changes simultaneously, and SEM by itself doesn't indicate which of these will produce the largest improvement. Being aware of these limitations ensures that, while SEM informs the study, complementary strategies and practical considerations, such as resource availability, are also taken into account (Golden & Earp, 2012).

The present study was informed by the SEM, which focuses on both individual and structural barriers to cancer screening among women living in the United States. While the SEM is not directly tested, it provides a theoretical foundation for understanding how factors such as disability, mental health, and socioeconomic status interact to influence screening behaviors. This alignment supported the study's methodological approach, which includes multiple levels of confounding variables and emphasizes the intersectionality of identities and experiences. By grounding the research in SEM, the study builds on a well-established framework that has guided numerous public health investigations into disparities in access and outcomes. This enhances the study's relevance and ensures its findings can contribute meaningfully to intervention and policy design.

Construct Alignment

The SEM's core constructs include the multiple levels of influence on health behavior, typically defined as the individual, interpersonal, organizational/community, and societal levels (McLeroy et al., 1988). This study's research questions, which focus on individual disability factors such as healing difficulty, vision difficulty, and poor mental health, in relation to cancer screening uptake, mainly align with the personal level of SEM. By controlling for covariates like marital status, education, and income, the analysis also considers interpersonal and social factors. All participants live in the United States, indicating a broad national context of healthcare access. Therefore, the RQs are based on the SEM framework, emphasizing individual variables while placing them within larger social and environmental contexts. This shows that the study design is theory-based, as it explores how individual impairments interact with interpersonal and community barriers to influence screening behavior, as SEM would suggest.

Importantly, the constructs of the SEM not only shape the research questions but also inform the Public Health Intervention Plan proposed in Section 4. In developing solutions, the intervention strategies correspond to SEM levels; for example, individual-level constructs (knowledge, mental health) are addressed through public-focused education and counseling, while community-level constructs are addressed through mobile screening clinics and partnerships with local providers. By clearly mapping intervention components to the SEM's layers, the plan ensures that the multilevel factors identified in this study are directly targeted. This alignment between theory and practice underscores the rationale for choosing SEM, as it provides a blueprint for the eventual intervention (Field Product 2) to tackle the various ecological levels influencing screening behavior comprehensively.

Literature Review Related to Key Variables

Blindness or Serious Difficulty Seeing and Breast Cancer Screening

Women with blindness or serious difficulty seeing may face unique challenges in accessing breast cancer screening services. Individuals with visual impairments may encounter barriers to accessing healthcare, including difficulties navigating healthcare facilities, communicating with healthcare providers, and obtaining health information (Ugurlu & Kocak, 2024). Women with visual disabilities are disproportionately underrepresented in breast cancer screening programs, with studies indicating a significant disparity in screening rates compared to their non-disabled counterparts (Almohammed, 2024; Centers for Disease Control and Prevention [CDC], n.d.; Chen & Deng, 2023; Decker & Quigley, 2022). Evidence indicates that women with visual impairments are at a higher risk of inadequate breast cancer screening, with lower rates of mammography and clinical breast examinations reported compared to women without visual impairments (Wu et al., 2021). These findings suggest that women living in the United States with blindness or serious difficulty seeing, deafness or serious difficulty hearing, and poor mental health may be at risk for delayed or inadequate breast cancer screening, which can have serious consequences for their health and well-being.

Women with visual impairments are significantly less likely to undergo mammography and other protective screenings (Wu et al., 2021). One reason for this is that women with visual impairments may require specialized assistance or accommodations to complete breast cancer screening exams, such as mammograms or clinical breast exams (Chen et al., 2023). Healthcare providers may not always be aware of the specific needs of women with visual impairments, which can lead to inadequate or incomplete screening (Matin et al., 2021). These disparities and inconsistencies highlight the need for continued research and the challenges faced by this population, specifically this population of women living in the United States, who may be at higher risk of poor health outcomes.

Women with visual impairments may experience cognitive dissonance related to the screening process, which can further discourage them from seeking breast cancer screening services (Ponce-Chazarri et al., 2023). There is often a cognitive-behavioral gap in key information in participation in screening among visually impaired women (Zhou et al., 2024). Even the assessment of breast cancer can cause various emotional and cognitive difficulties for many women (Ashton & Murray, 2022). This suggests that there are physically and emotionally different needs of visually impaired women when undergoing breast cancer screenings. This is important to this study because it may affect cancer screening behaviors among women living in the United States with self-reported blindness or serious difficulty seeing.

Visual impairments can limit a woman's ability to navigate healthcare facilities, communicate with healthcare providers, and access health information (Matin et al., 2021). Women with visual impairments may require specialized assistance or accommodations to complete breast cancer screening exams, such as mammograms or clinical breast exams (Andersen & Batchelor, 2023). Healthcare providers may not always be aware of the specific needs of women with visual impairments, which can lead to inadequate or incomplete screening (Devokta et al., 2017). Understanding the significant physical barriers highlights the gaps within various systems that hinder access to healthcare for these women. Understanding these dynamics is crucial for understanding the disparities in research and application, particularly among women in the United States.

Deafness or Serious Difficulty Hearing and Breast Cancer Screening

Women with hearing impairments are less likely to undergo breast cancer screenings compared to women without hearing impairments (CDC, n.d., Al-Khatib et al., 2021; Chen & Deng, 2023). Access to breast cancer screening remains disproportionately difficult for women who are deaf or hard of hearing (Perrodin- Njoku et al., 2024). Deaf and hard-of-hearing individuals are significantly more likely to encounter challenges such as misunderstanding medical instructions or missing critical health communications (Iezzoni et al., 2022); these issues are likely to contribute to reduced screening uptake and delayed care across populations with hearing loss. Understanding these practices is relevant to my study because it evaluates a portion of the population with similarities to women living in the United States.

This disparity particularly affects women living in the United States, who may face additional barriers, including limited access to specialized healthcare facilities and the unique demands and challenges they encounter in their lives. These barriers are particularly pronounced among individuals with hearing impairments, who may require accommodations that are inconsistently available in many environments (McKee et al., 2022; Perrodin-Nijok et al., 2024). Inaccessible communication practices significantly reduce screening adherence among hearing-impaired populations, especially when providers lack training in disability-inclusive care (Iezzoni et al., 2022). The persistence of these disparities across health systems suggests a systemic issue rather than isolated experiences. The evidence from resources suggests that this disparity is not an isolated incident, but rather a systemic problem that leads to evident healthcare inequality. The literature indicates that there is an urgent need to address general access to breast cancer screening among women living in the United States who experience hearing impairments.

Women with hearing impairments may face challenges in communicating with healthcare providers, understanding health information, and navigating healthcare facilities (Perrodin-Njoku et al., 2024). Women with hearing impairments may have trouble understanding screening recommendations and procedures, while women with other physical disabilities may have difficulty accessing healthcare facilities (Matin et al., 2023). Women with hearing impairments may require specialized assistance or accommodations, such as sign language interpreters or written materials, to complete breast cancer screening exams (Almohammed, 2024). Healthcare providers may not always be aware of the specific needs of women with hearing impairments, which can lead to inadequate or incomplete screening (Piao et al., 2023). The need for these special accommodations highlights the barriers women with hearing impairments face while they attempt to access equitable healthcare services; this may also be an issue for women living in the United States.

Poor Mental Health and Breast Cancer Screening

Women with mental health conditions, such as depression or anxiety, may experience symptoms that interfere with their ability to seek and receive breast cancer screenings (Godier-McBard et al., 2021). Women with depression may experience a lack of motivation or energy, which can make it more challenging for them to access breast cancer screenings (Dang et al., 2024). Women with anxiety may experience increased anxiety or fear related to the screening process, which can further discourage them from seeking breast cancer screenings (Ponce-Chazarri et al., 2023). Additionally, women with mental health conditions may face logistical barriers, such as difficulty navigating the healthcare system or accessing healthcare facilities, which can further impede their ability to receive breast cancer screenings (Saldaña-Téllez et al., 2024). This evidence indicated that mental health conditions create both psychological and logistical barriers that hinder women's ability to access breast cancer screenings. This is likely to be especially true among women living in the United States.

Women living in the United States who experience mental health conditions, such as depression or anxiety, could face challenges in adhering to recommended breast cancer screening protocols. Breast cancer screening adherence among women found that those with poor mental health or mental health diagnoses were less likely to adhere to screening guidelines, suggesting that mental health diagnoses do impede screening adherence (Godier-McBard et al., 2021; Ponce-Chazarri et al., 2023). This decreased adherence may stem from the complex nature of mental health symptoms, such as lack of motivation or increased anxiety, and logistical barriers, including difficulty navigating the health care system; combining this along with the stigma surrounding mental health, women are often discouraged from seeking health care (Ahad et al., 2023). Mental health symptoms shape access to care, understanding of care, and navigation of care in a unique way. The complexities of these variables are multifaceted and understanding how women living in the United States are likely to have similar challenges with breast cancer screening is crucial. This is relevant to this study because it adds to the body of literature while highlighting the need for additional research.

The evidence suggests that women with mental health conditions are less likely to adhere to breast cancer screening guidelines compared to women without mental health conditions (Godier-McBard et al., 2021; O'Neill, 2023). This is likely due to the stigma surrounding mental health, which can discourage women from seeking healthcare, including breast cancer screenings (Saldaña-Téllez et al., 2024). Research also shows that healthcare providers who receive training on working with patients with mental health conditions are more likely to provide specialized assistance or accommodation during breast cancer screening exams (Matin et al., 2021). Women with mental health conditions are less likely to follow breast cancer screening guidelines; this disparity is partially attributed to the stigma associated with mental illnesses. This is relevant to this study because it is likely true among women living in the United States.

Women with poor mental health face many difficulties (Ahad, Sanchez-Gonzalez & Juanquera, 2023). These mental health conditions can affect a woman's ability to seek and receive breast cancer screenings, as well as her overall health and well-being (Fortin et al., 2021). Women with PTSD may experience avoidance behaviors, which can prevent them from seeking breast cancer screenings (Fortin et al., 2021). Women with depression or anxiety may experience decreased motivation or energy, which can make it more challenging for them to access breast cancer screenings (Fortin et al., 2021; Moore et al., 2024). Women with poor mental health likely face increased difficulty with increased mental health diagnoses, therefore creating more barriers to accessing breast cancer screenings. This evidence highlights how these symptoms, as they relate to mental health, can directly impede these women's ability to seek critical cancer screenings. This is relevant to this study because women living in the United States would also likely be affected by these specific barriers.

The healthcare needs of women are complex, and it is essential to consider the unique challenges faced by those with cognitive disabilities, who may encounter unique barriers to accessing breast cancer screening and other important health services. Women with disabilities are at a higher risk of developing breast cancer, and they may face unique challenges in accessing breast cancer screenings (Ponce-Chazarri et al., 2023). Women with cognitive disabilities may face challenges in comprehending health information or communicating effectively with healthcare providers (Matin et al., 2021). Women with mental disabilities encounter additional barriers to screening that women without these challenges might experience due to difficulty understanding health information and communication difficulties. This highlights the need to address mental and physical health in breast cancer screening for women living in the United States who experience poor mental health. This is relevant to this study because it adds to the body of literature while highlighting the need for additional research.

Employment Status and Breast Cancer Screening

Employment status can significantly impact access and use of breast cancer screening services. Women who are employed may have better access to health insurance, which can increase their likelihood of receiving breast cancer screenings (Berrian et al., 2021). Some employed women may have more opportunities to take time off work to attend breast cancer screenings, which can further increase their likelihood of receiving these services (Richman et al., 2021). Conversely, women who are unemployed or underemployed can face significant barriers in accessing breast cancer screenings, including a lack of health insurance and limited access to healthcare facilities (Ponce-Chazarri et al., 2023). Socioeconomic disparities, such as low income and limited education, can exacerbate barriers related to disabilities or mental health, further complicating access to preventive care (Coombs et al., 2021). Employment status significantly influences access to breast cancer screening services due to financial constraints and improved insurance coverage. Understanding the interplay between these factors is important to developing effective strategies to understand breast cancer screening rates and reduce disparities in healthcare outcomes among women living in the United States. This is relevant to this study because research must account for as many confounders as possible.

The relationship between employment status and breast cancer screening rates among women living in the United States is complex. Employment status can influence access to healthcare and breast cancer screenings through various mechanisms, such as health insurance coverage, paid time off, and workplace wellness programs (Elbogen et al., 2023). Women who are employed generally have better access to health insurance, which can increase their chances of receiving breast cancer screenings (Berrian, 2021). Conversely, women who are unemployed or underemployed may encounter significant barriers to accessing breast cancer screenings, including a lack of health insurance and limited access to healthcare facilities (Fedewa et al., 2021; Ponce-Chazarri et al., 2023). Employment difficulties may also affect employment status and access to breast cancer screenings, underscoring the need for targeted interventions to address the unique needs of women from all backgrounds living in the United States and to promote consistent breast cancer screening practices. This is especially important for this study, as it may influence the cancer screening behaviors of women in the United States.

Education Level and Breast Cancer Screening

Women with higher levels of education and income may be more likely to have access to health insurance and healthcare facilities, which can increase their likelihood of receiving breast cancer screenings (Kosog et al., 2020). Women with lower levels of education and income may face significant barriers in accessing breast cancer screenings, including a lack of health insurance and limited access to healthcare facilities (Wang et al., 2023). To account for these potential confounders, it is essential to control for employment status, education, income, marriage status, race, and age when analyzing the relationship between independent variables and breast cancer screening behavior. This is relevant to this study because all aspects of these confounders may influence breast cancer screening behaviors among women living in the United States.

Educational levels should also be evaluated in women's breast cancer screening practices. Higher education levels are associated with greater awareness and utilization of preventive health services, including mammography (Korn et al., 2023; Ponce-Chazarri et al., 2023). Women with more education are more likely to engage in regular breast cancer screenings, owing to better health literacy and proactive health behaviors (Almoajel et al., 2022). Women who have attained higher education generally demonstrate improved health literacy, which can increase their participation in breast cancer screening and other preventive health actions, helping them navigate the healthcare system in the United States more effectively (Cadet et al., 2022). Higher educational attainment is a crucial factor in promoting proactive breast cancer screening among women by enhancing health literacy and simplifying navigation of healthcare systems. This study examines how education influences women living in the United States and these cancer screening behaviors.

The relationship between education level and breast cancer screening rates among women in the United States is an important factor to consider as a confounder in this study. Higher education levels are linked to increased awareness and utilization of preventive health services, such as mammography (Cadet et al., 2022). Women with more education are more likely to have health insurance, which can enhance their chances of receiving breast cancer screenings (Berrian et al., 2021). Additionally, higher education often provides women with greater flexibility to take time off work for screenings, further increasing their access to these services (Cadet et al., 2022). Educational attainment significantly influences health literacy, aiding women in navigating healthcare systems, understanding screening guidelines, and prioritizing preventive care (Cadet et al., 2022; Vernon et al., 2024). Women with higher education typically have better health literacy, more access to insurance, and greater employment flexibility—all of which contribute to higher rates of breast cancer screening. This is an important confounder for this study because it likely affects women across the United States equally.

The intersection of education levels with other factors, such as income and employment status, can complicate the relationship between education and breast cancer screening rates. For example, women with higher education and incomes are more likely to access healthcare and breast cancer screenings, regardless of their employment status (Korn et al., 2023). Conversely, women with lower education levels and incomes may face significant barriers to these screenings, including a lack of health insurance and limited access to healthcare facilities (Ponce-Chazarri et al., 2023; Vernon et al., 2024). Developing effective solutions to support women requires a nuanced understanding of their unique needs and challenges, as well as the creation of personalized and multifaceted interventions tailored to their specific circumstances (Decker & Quigley, 2022). The interaction of education, income, and employment status significantly influences breast cancer screening rates, with higher socioeconomic advantages facilitating access to care and lower socioeconomic status increasing barriers. This is relevant to this study because all these sociodemographic factors impact all women and, therefore, likely also affect women living in the United States.

Income Level and Breast Cancer Screening

Income levels can affect breast cancer screening rates among women. Women with lower incomes are less likely to get regular mammograms, mainly due to financial constraints and limited access to healthcare services (Korn et al., 2023; Ponce-Chazarri et al., 2023). Understanding how income relates to screening rates is key for creating targeted interventions that meet the specific needs of women, especially those with lower incomes who face significant barriers to care (Nayyar et al., 2023). Low income is associated with lower screening rates because of financial barriers and limited healthcare access, highlighting the importance of interventions to reduce these disparities. This information is important for this study because it emphasizes the need to evaluate and improve services for women living in the United States.

The intersection of income and breast cancer screening behaviors among women offers a unique area of inquiry, as socioeconomic factors influence access to and utilization of healthcare services, including breast cancer screenings. Women with lower incomes are less likely to undergo regular mammograms, often due to financial constraints and limited access to healthcare (Berrian et al., 2022). They also face significant barriers, such as lack of health insurance and limited availability of healthcare facilities (Mondragón Márquez et al., 2023). Additionally, women with lower incomes may experience financial constraints that prevent them from taking time off work for screenings, further reducing their likelihood of receiving these services (Ponce-Chazarri et al., 2023). Income plays an equally important role in determining access to preventive care (Wang et al., 2023). Overall, lower income levels are a key factor influencing breast cancer screening behaviors among women, as financial limitations and reduced access to healthcare collectively hinder their ability to obtain preventive care. Understanding the link between income and screening behaviors is essential for this study to address the existing gap in the literature and the specific needs of women living in the United States.

Marital Status and Breast Cancer Screening

Marital status affects many aspects of a person's life, including health practices and outcomes (Li et al., 2020). Married women are more likely to participate in healthy lifestyle activities, such as regular mammography screenings, compared to their unmarried counterparts (Li et al., 2020; Ding et al., 2021). This difference may be due to the support systems within marriage, which can encourage proactive health behaviors (Ding et al., 2021). Marital status plays a significant role in health practices, as married women, supported by strong interpersonal networks, are more likely to engage in proactive behaviors like regular mammography screenings than their unmarried counterparts. This is important for this study because it is likely relevant to the group of women living in the United States.

Evaluating the relationship between marital status and breast cancer screening rates in women is an important area of research. Married women are more likely to participate in regular mammography screenings compared to unmarried women, which may be due to the support systems that come with marriage (Mottram et al., 2021). Married women might have a spouse who encourages and supports them in maintaining regular health screenings, increasing their chances of receiving breast cancer screenings (Hanske et al., 2016). They may also have better access to healthcare services and health insurance, further raising their likelihood of getting screened for breast cancer (Paranjpe et al., 2022). Marital status is positively linked to breast cancer screening rates because the support systems, better access to healthcare, and improved insurance among married women contribute to their higher participation in regular mammography screenings compared to unmarried women. This is relevant to this study because it highlights how these financial and social supports are connected, which is likely similar for women living in the United States who experience blindness or serious difficulty seeing, deafness or serious difficulty hearing, or poor mental health.

Married women often have naturally available supportive resources. Those with higher incomes and education levels are more likely to participate in regular mammography screenings than unmarried women with lower incomes and education levels, and they receive social support from their partners (Korn et al., 2023). Unmarried women with lower incomes and education levels may face major barriers to accessing breast cancer screenings, such as lack of health insurance and limited access to healthcare facilities (Ponce-Chazarri et al., 2023). Both marital status and socioeconomic factors show that married women are more likely to undergo regular breast cancer screenings, while unmarried women tend to face lower socioeconomic status and more obstacles to accessing these preventive healthcare services.

Race and Ethnicity and Breast Cancer Screening

It is essential to evaluate the cancer screening behaviors of women from ethnically diverse backgrounds. Women in these groups may encounter unique obstacles in accessing breast cancer screenings, such as a lack of health insurance or limited healthcare facilities (Jones et al., 2023). Women from different racial and ethnic backgrounds might face cultural and language barriers that can hinder their access to these screenings (Ferreira et al., 2021). Women from diverse backgrounds confront various barriers, including insufficient health insurance, limited healthcare access, and cultural challenges, all of which can reduce participation in breast cancer screening. To effectively address the needs of these women living in the United States who experience blindness or serious difficulty seeing, deafness or significant hearing loss, or poor mental health, it is crucial to thoroughly understand this population, which is the goal of this study.

By examining the challenges faced by women in different populations, cancer outcomes can be improved for all women. Women of color may face unique obstacles in accessing breast cancer screenings, including a lack of health insurance and limited availability of healthcare facilities (Korn et al., 2023). Furthermore, women from diverse racial and ethnic backgrounds often encounter cultural and linguistic barriers that can restrict their access to breast cancer screenings (Ferreira et al., 2021; Korn et al., 2023). They face distinct challenges such as inadequate health insurance, limited healthcare options, and cultural issues that hinder their ability to receive timely screenings and enhance cancer outcomes. This is crucial for this study, as these factors are likely affecting women living in the United States who experience blindness or serious difficulty seeing, deafness or serious difficulty hearing, or poor mental health.

Race and ethnicity influence breast cancer screening behaviors among women, reflecting ongoing disparities in healthcare access and outcomes. Non-Hispanic, white women may report equal or higher rates of initial breast cancer screening compared to women of color (Korn et al., 2023; Ponce-Cházarri et al., 2023). This disparity is often linked to systemic inequities, such as limited access to timely follow-up care, delays in diagnostic services, and unequal treatment options, which disproportionately impact minority women (Jindal et al., 2023). Addressing racial disparities in breast cancer screening is crucial, as these gaps persist even within organized healthcare systems, where minority women may encounter barriers to follow-up care and treatment (Rosen et al., 2024). These disparities highlight the broader social determinants of health and underline the importance of targeted efforts to promote equitable outcomes. Among women in the United States experiencing blindness, serious difficulty seeing, deafness, serious hearing difficulties, or poor mental health, a similar pattern may also be observed.

A growing amount of research highlights significant racial and ethnic disparities in cancer screening behaviors among women. Non-Hispanic white women may report higher initial breast cancer screening rates compared to women of color, often due to systemic inequities (Korn et al., 2023; Rolle et al., 2022). Minority women might face reduced access to timely follow-up care, delays in diagnostic services, and unequal treatment options, which can disproportionately impact their breast cancer screening outcomes (Wilkerson et al., 2024). These disparities contribute to racial and ethnic differences in cancer screening as shown in the research (Korn et al., 2023; Rolle et al., 2022; Wilkerson et al., 2024). This is relevant to this study because women in the United States who experience blindness or severe vision loss, deafness or severe hearing loss, or poor mental health might face similar disparities.

Breast cancer screening among women has been extensively studied. Recently, all races have shown improvements in breast cancer screening practices (Alsheik et al., 2021). Women of color face higher mortality rates from breast cancer than their white counterparts, making earlier screening especially important for these women (Olufosoye et al., 2024). Despite recent progress across all races, earlier screening remains crucial for women of color due to their disproportionately higher mortality rates. This is particularly relevant for this study because it highlights the urgent need for targeted early screening efforts, especially for women of color who experience higher breast cancer mortality. This consideration is vital when analyzing health disparities among diverse populations, including women in the United States with blindness or serious vision impairment, deafness or hearing challenges, or poor mental health. This research will help to further address gaps in the existing literature.

Age and Breast Cancer Screening

Breast cancer screening behaviors among women are influenced by various factors, including age, which can affect access to and use of healthcare services. Age is a key factor that impacts risk levels and adherence to screening guidelines, with younger women often facing obstacles like lower perceived risk or competing priorities (Assfa Mossa, 2022). Younger women may be less likely to prioritize breast cancer screening because they perceive their risk as lower or have other demands, such as work or family responsibilities (Assfa Mossa, 2022). Age plays a significant role in shaping screening behaviors, as younger women frequently encounter barriers like underestimating their risk and balancing other responsibilities, which can reduce their adherence to recommended screening practices. This is relevant to this study because understanding how age-specific factors influence breast cancer screening behaviors can help develop targeted interventions that address the unique barriers faced by different age groups, especially among women in the United States who experience blindness or serious vision impairment, deafness or serious hearing difficulties, or poor mental health, once the literature gap is thoroughly explored.

Blindness or Serious Difficulty Seeing and Cervical Cancer Screening

Women with blindness or severe visual impairments face unique barriers to cervical cancer screening (Mkuu et al., 2022). They may also experience physical accessibility challenges (Matin et al., 2022). These issues can include the lack of braille or large print materials and difficulties navigating healthcare facilities (Martiniello et al., 2020). Women with blindness or severe visual impairments encounter obstacles that make it harder to get cervical cancer screenings, which can limit their access to vital resources. This study highlights how physical accessibility barriers and the absence of disability-specific accommodations, such as braille or large print materials, may result in lower cervical cancer screening rates among women living in the United States who are blind or have serious vision difficulties, deafness or severe hearing issues, or mental health challenges. It underscores the importance of addressing these disparities within this population.

Women with visual impairments may encounter significant obstacles to accessing cervical cancer screenings, such as challenges in communicating with healthcare providers and navigating healthcare facilities (Orji et al., 2023). Women with visual impairments who have access to disability-specific accommodations, like braille or large print materials, are more likely to undergo cervical cancer screenings (Iskander et al., 2023). To effectively address the complex needs of women with visual impairments, it is essential to develop and implement comprehensive and tailored interventions that address the specific challenges faced by this group (Iskander et al., 2023). Women with visual impairments face notable barriers to cervical cancer screening, but access to disability-specific accommodations can improve screening participation, emphasizing the importance of targeted, comprehensive interventions to overcome their unique healthcare challenges. This is relevant to this study because these factors are also likely pertinent to women living in the United States who experience blindness or severe visual impairment, deafness or severe hearing difficulties, or poor mental health.

For some women, these disparities may be worsened by challenges such as difficulty accessing healthcare facilities and navigating complex healthcare systems (Fitzke et al., 2023; Stryczek et al., 2023). Additional barriers, including physical accessibility issues, a lack of disability-specific accommodations in healthcare settings, and lower health literacy among visually impaired populations, further reduce screening opportunities (Matin et al., 2021). In the context of women, these challenges highlight the importance of addressing disability-specific barriers as part of broader cervical cancer prevention efforts (Gréaux et al., 2023). Visual impairments hinder participation in screening, creating another significant layer of challenges that require further investigation among women living in the United States who experience blindness or serious difficulty seeing, deafness or serious difficulty hearing, or poor mental health.

This is relevant to this study as it underscores how visual impairments contribute to disparities in cervical cancer screening, emphasizing the need to explore disability-specific barriers that may influence screening behavior in this group.

Deafness or Serious Difficulty Hearing and Cervical Cancer Screenings

Women with hearing impairments face significant challenges in accessing cervical cancer screening services. Women with hearing disabilities are less likely to undergo Pap smears than those without disabilities (El Sayed et al., 2022; Orji et al., 2023). They encounter multiple barriers, including communication difficulties with healthcare providers and a lack of accessible health information, which contribute to lower Pap smear participation rates (El Sayed et al., 2022). These barriers, such as communication challenges and inaccessible health information, result in lower Pap smear participation among women with hearing impairments compared to women without disabilities (Ponce-Chazarri et al., 2023; Iezzoni et al., 2022). This is important for this study because further research is needed to include women with hearing impairments and examine cervical cancer screening among women living in the United States.

Women with hearing disabilities face numerous challenges in accessing cervical cancer screening, including difficulty communicating with healthcare providers and navigating healthcare facilities (Powell et al., 2022; Srinath et al., 2023). They may struggle to understand screening recommendations and procedures, which limits their ability to make informed healthcare decisions (Powell et al., 2022). Additionally, women with hearing impairments often encounter barriers when scheduling appointments and reaching healthcare facilities, further restricting their access to screenings (Mondragón

Márquez et al., 2023). These barriers—such as communication difficulties, misunderstanding screening guidelines, and logistical challenges—play a significant role in lower cervical cancer screening rates among women in the United States who experience blindness or serious vision impairment, deafness or serious hearing difficulties, or poor mental health.

Poor Mental Health and Cervical Cancer Screening

Among women, poor mental health also correlates with lower participation in cervical cancer screening. Depression, anxiety, and other mental health conditions can disrupt health-seeking behaviors by reducing motivation, increasing avoidance, and making communication with providers more difficult (Murphy et al., 2021; Remes et al., 2021). Women with mental health diagnoses are less likely to attend regular gynecological visits, especially when their mental health issues are untreated or stigma discourages them from seeking care (Matin et al., 2021). These specific psychological barriers probably contribute to disparities in Pap test adherence among women with poor mental health and cervical cancer screenings. This underscores the need for further research into how poor mental health affects cervical cancer screening behaviors among women living in the United States.

Mental health also affects cervical cancer screening rates among women. Women experiencing conditions like depression or anxiety face difficulties in following recommended screening protocols (Murphy et al., 2021). Mental health impacts cervical cancer screening rates among women, as those with conditions such as depression or anxiety encounter challenges in adhering to screening guidelines (Korn et al., 2023). This is relevant to this study because it highlights how mental health issues can lead to lower adherence to cervical cancer screening, underscoring the need for tailored interventions to improve screening outcomes among women in the United States who are blind, have serious vision or hearing impairments, or experience poor mental health.

Employment Status and Cervical Cancer Screening

Employed women may have better access to health insurance, which can increase their likelihood of receiving cervical cancer screenings (Srinath et al., 2022). The intersection of employment status with other confounding variables, such as education and income, can complicate the relationship between employment and cervical cancer screening behaviors (Srinath et al., 2022). Women who are employed and have higher levels of education and income may be more likely to have access to healthcare resources, including cervical cancer screenings (Korn & Kim, 2023). Conversely, women who are unemployed and have lower levels of education and income may face significant barriers to accessing these services (Korn & Kim, 2023). Overall, employment, combined with reliable health insurance, enhances cervical cancer screening behaviors among women. This is relevant to this study because it is also likely true for women living in the United States who experience blindness or serious difficulty seeing, deafness or serious difficulty hearing, or poor mental health.

Education Level and Cervical Cancer Screening

Educational attainment significantly influences cervical cancer screening rates among women. Studies indicate that women with higher education levels are more likely to participate in regular cervical cancer screenings (Fuzzell et al., 2021). Increased education often correlates with more significant health literacy and awareness of preventive health measures (Fuzzell et al., 2021; Ponce-Chazarri et al., 2023). Educational attainment significantly influences cervical cancer screening rates among women, as higher education correlates with increased participation in screenings, improved health literacy, and greater awareness of preventive measures. This is relevant to this study because it demonstrates that educational attainment, by influencing health literacy and awareness, plays a crucial role in cervical cancer screening behaviors among women living in the United States who experience blindness or serious difficulty seeing, deafness or serious difficulty hearing, or poor mental health, highlighting the need for targeted interventions to bridge educational disparities in preventive healthcare.

Women with higher levels of education and income typically enjoy better access to healthcare resources, including cervical cancer screenings, primarily due to improved health literacy and increased availability of resources (Rolle et al., 2024). In contrast, women with lower educational attainment and income encounter significant barriers, such as lack of health insurance and limited access to healthcare facilities, regardless of their employment status (Kang & Kim, 2023; Korn et al., 2023; Rolle et al., 2024). These disparities underscore the urgent need for targeted interventions designed to reduce socioeconomic barriers to cervical cancer screening. This is relevant to this study as it highlights how socioeconomic factors, particularly education and income, influence cancer screening behaviors which should be further evaluated among women living in the United States who experience blindness or serious difficulty seeing, deafness or serious difficulty hearing, or poor mental health.

Women with higher education levels are more likely to participate in regular cervical cancer screenings (Higgason et al., 2024). Increased education often correlates with greater health literacy and awareness of preventive health measures (Higgason et al., 2024). These women also typically recognize the significance of regular cervical cancer screening (Mondragón Márquez et al., 2023). Due to enhanced health literacy, greater awareness of preventive measures, and a deeper understanding of screening's importance, women with higher education levels are more likely to engage in regular cervical cancer screenings (Higgason et al., 2024; Mondragón Márquez et al., 2023). This is relevant to this study as it illustrates that higher educational attainment, which boosts health literacy and awareness of preventive measures, plays a crucial role in promoting regular cervical cancer screenings among women, thereby guiding targeted strategies to improve screening rates among women living in the United States who experience blindness or serious difficulty seeing, deafness or serious difficulty hearing, or poor mental health.

Women with higher levels of education may have better health insurance coverage, which can further increase their access to cervical cancer screening (Rolle et al., 2024). Women with lower educational attainment may face challenges in accessing and understanding the importance of cervical cancer screenings, including a lack of health insurance and limited access to healthcare facilities (Fuzzell et al., 2021). Having more inclusive health insurance allows women with better health insurance to have more readily available access to cervical cancer screenings (Mondragón Márquez et al., 2023). Women with higher educational attainment generally secure better health insurance coverage that facilitates access to cervical cancer screenings, while lower educational attainment is often associated with significant barriers that hinder both the understanding and utilization of these preventive services. This is relevant to this study because it demonstrates that educational disparities, through their impact on health insurance coverage and access to healthcare, may contribute to differences in cervical cancer screening rates, thereby informing targeted interventions to improve preventive care among women living in the United States who experience blindness or serious difficulty seeing, deafness or serious difficulty hearing, or poor mental health.

Women in these racially and ethnically diverse populations may face unique challenges in accessing cervical cancer screenings, including a lack of health insurance or limited access to healthcare facilities (Petersen et al., 2022). Women from diverse racial and ethnic backgrounds may experience cultural and linguistic barriers that can limit their access to cervical cancer screenings (Petersen et al., 2022). To meet the needs of these women, key stakeholders must create and implement clear, tailored programs that address the specific challenges they face (Rolle et al., 2024). By working together, healthcare providers, policymakers, and community organizations can help to reduce the disparities in cervical cancer screenings among women from diverse populations and improve the overall health and well-being of women living in the United States.

Income Level and Cervical Cancer Screening

Socioeconomic disparities can significantly impact cervical cancer screening rates among women, highlighting the need for targeted interventions to address these inequities. Women with lower incomes are less likely to undergo regular Pap smears, often due to financial constraints and limited access to healthcare services (Petersen et al., 2022). Women with lower incomes may face significant barriers in accessing healthcare services, including cervical cancer screenings, due to a lack of health insurance or limited access to healthcare facilities (Petersen et al., 2022; Rolle et al., 2024). Women with lower incomes may experience financial constraints that limit their ability to take time off work to attend cervical cancer screenings, which can further decrease their likelihood of receiving these services (Petersen et al., 2022; Rolle et al., 2024). Women with higher incomes and higher levels of education may have better access to healthcare services, including cervical cancer screenings. Women with lower incomes and lower levels of education may face significant barriers to accessing these services (Fuzzell et al., 2021). By addressing these socioeconomic disparities that affect cervical cancer screening rates among women living in the United States who experience blindness or serious difficulty seeing, deafness or serious difficulty hearing, or poor mental health, society can see improved health measures.

The intersection of poor mental health and socioeconomic status, or income level, can further complicate the relationship between poor mental health and cervical cancer screening. Women with poor mental health who are unmarried and have lower socioeconomic status may face significant barriers in accessing cervical cancer screenings, including a lack of health insurance and limited access to healthcare facilities (Korn et al., 2023). Women with poor mental health who are married and have a higher income status may have better access to healthcare services and cervical cancer screenings (Henderson et al., 2020). The intersection of poor mental health with marital and socioeconomic status complicates cervical cancer screening access, as unmarried women with lower socioeconomic status face significant barriers such as inadequate insurance and limited healthcare access, while married women with higher socioeconomic status tend to have better screening opportunities. This is relevant to this study because it underscores the need to consider the intersectionality of mental health, marital status, and socioeconomic factors when developing targeted interventions to improve cervical cancer screening access among women living in the United States experiencing blindness or serious difficulty seeing, deafness or serious difficulty hearing, or poor mental health.

Marital Status and Cervical Cancer Screening

Marital status also influences cervical cancer screening rates among women. Married women are more likely to participate in regular Pap smears than their unmarried counterparts (Elenwo et al., 2023; Mondragón Márquez et al., 2023). This trend may be due to the support systems inherent in marriage, which can encourage proactive health behaviors (Ghanbari et al., 2020). Having a spouse may provide additional motivation and resources for maintaining regular health screenings (Mallonee et al., 2020). Beyond marital status, race and ethnicity further contribute to disparities in cervical cancer screening rates, emphasizing the need to address systemic inequities among women. This is relevant to this study because it adds to the body of literature and highlights the need for further research.

The relationship between marital status and cervical cancer screening rates among women is complex, emphasizing the need for a deeper understanding to develop effective interventions. Married women are more likely to participate in regular Pap smears than their unmarried counterparts, possibly due to the support systems inherent in marriage (Momeni et al., 2020). A spouse may encourage and support them in maintaining regular health screenings or provide financial or emotional support, all of which can increase their chances of receiving cervical cancer screenings (Rolle et al., 2024). Additionally, married women may have better access to healthcare services, including cervical cancer screenings, thanks to their spouse's health insurance coverage (Fuzzell et al., 2021). The presence of a spouse may also offer extra motivation and resources for maintaining regular health screenings, helping to counteract the stressors and mobility challenges linked with a busy life (Elenwo et al., 2023). Understanding how marital status, social support, and healthcare access are interconnected is essential for creating targeted interventions that encourage cervical cancer screening and improve health outcomes among women in the United States who experience blindness or serious difficulty seeing, deafness or serious difficulty hearing, or poor mental health. This is relevant to this study because it underscores the complexities of demographics that this research aims to address.

The intersection of marital status with other factors such as race and ethnicity can complicate the relationship between marital status and cervical cancer screening rates. Married women from different racial and ethnic backgrounds may face cultural and linguistic barriers that limit their access to cervical cancer screenings (Mondragón Márquez et al., 2023). Unmarried women from diverse racial and ethnic backgrounds may encounter significant barriers to accessing cervical cancer screenings, including lack of health insurance and limited healthcare facility access (Kang & Kim, 2023). This is relevant to this study because it expands the existing literature while highlighting gaps and the need for further research.

Race and Ethnicity and Cervical Cancer Screening

It is also crucial to examine the challenges women from diverse racial and ethnic backgrounds face. These women may encounter unique obstacles in accessing cervical cancer screenings, such as lack of health insurance or limited healthcare access (Srinath et al., 2022). They might also face cultural barriers that restrict their ability to get screened (Zeno et al., 2022). To effectively serve these populations, it is essential to develop comprehensive and tailored interventions that address their specific challenges (Zeno et al., 2022). Understanding the full range of demographics within this community enhances insight into their needs. This is relevant to this study because, although some factors are considered, gaps remain in the existing literature.

Disparities in cervical cancer screening rates continue, especially among women of color. Black women face higher rates of cervical cancer incidence and mortality compared to White women (Zeno et al., 2022). They may encounter barriers to follow-up care after an abnormal Pap smear, leading to delays in diagnosis and treatment (Zeno et al., 2022). Hispanic women often face cultural and language barriers that limit their access to screenings, such as a lack of healthcare providers who speak their language or understand their cultural beliefs (Rolle et al., 2024; Zeno et al., 2022). These disparities highlight the need for ongoing research to better understand how race, ethnicity, and structural barriers influence cervical cancer screening behaviors. This is especially important for women in the United States who experience blindness or serious difficulty seeing, deafness or serious difficulty hearing, or poor mental health.

Women from diverse racial and ethnic backgrounds with lower socioeconomic status and education levels may face significant barriers to accessing cervical cancer screenings (Elenwo et al., 2023; Zeno et al., 2022). A lack of health insurance and limited healthcare access contribute to these obstacles (Elenwo et al., 2023; Zeno et al., 2022). Women from diverse racial and ethnic groups may be less likely to understand the importance of regular screenings (Mondragón Márquez et al., 2023). Conversely, women from these backgrounds who have higher socioeconomic status and education levels tend to have better access to healthcare services, including cervical cancer screenings (Kor et al., 2023). These findings highlight the need to address how overlapping factors such as race, ethnicity, and socioeconomic status contribute to disparities in cervical cancer screening, especially among underserved populations.

Women from ethnically and racially diverse populations may face unique challenges in accessing cervical cancer screenings, such as lack of health insurance or limited healthcare access (Fedewa et al., 2021). Women from different socioeconomic backgrounds might experience financial barriers that hinder their ability to get screened (Mondragón Márquez et al., 2023). Conversely, women from various racial and ethnic groups have fewer difficulties accessing these lifesaving screenings (Zeno et al., 2022). These increased challenges due to limited resources unfairly burden women of color, making it harder for ethnically and racially diverse women to obtain cervical cancer screenings. This is relevant to this study because it suggests that women in the United

States who experience blindness or serious difficulty seeing, deafness or serious difficulty hearing, or poor mental health are also likely to face increased barriers to screening due to resource limitations.

Age and Cervical Cancer Screening

The USPSTF recommends starting cervical cancer screening at age 21 and continuing until age 65, with screening frequency depending on age and test type (Rayner et al., 2023). Younger women might underuse screenings because they perceive their risk as low (Murphy et al., 2021). Meanwhile, older women may face disruptions in continuity of care after leaving a structured healthcare system (Murphy et al., 2021). This is relevant to this study because it shows how differences in screening adherence—caused by age-related risk perceptions and care disruptions after healthcare transitions—may affect cervical cancer screening among women in the United States who experience blindness or severe vision loss, deafness or severe hearing loss, or poor mental health.

Younger women from lower socioeconomic backgrounds may encounter significant barriers to accessing cervical cancer screenings, such as a lack of health insurance and limited healthcare facilities (Rolle et al., 2024). Older women from higher socioeconomic backgrounds might have better access to healthcare services, including screenings for cervical cancer (Korn et al., 2023). Women of older ages may also be more likely to recognize the importance of regular screenings (Kang & Kim, 2023). This emphasizes how age and socioeconomic status influence cervical cancer screening behaviors among women. Additionally, these disparities may also exist among women living in the United States who experience blindness or serious difficulty seeing, deafness or serious difficulty hearing, or poor mental health, which is important for this study to address in filling the gap in the literature.

The experiences of women can be affected by factors like socioeconomic status, geographic location, and access to healthcare services (Zeno et al., 2022). Women from different racial and ethnic backgrounds may face unique barriers to care, such as cultural and linguistic differences that can make it harder for them to navigate the healthcare system (Rolle et al., 2024). These experiences are shaped by socioeconomic status, geographic location, and healthcare access, while women from diverse racial and ethnic backgrounds often encounter additional cultural and linguistic challenges that complicate their ability to effectively navigate the healthcare system (Zeno et al., 2022; Rolle et al., 2024). This is important for this study because it shows the complex barriers women face when accessing healthcare, offering valuable insights into how similar socioeconomic, geographic, and cultural factors might also impact cervical cancer screening outcomes among women in the United States who experience blindness or serious difficulty seeing, deafness or serious difficulty hearing, or poor mental health.

Definitions

Behavioral Risk Factor Surveillance System: A nationally representative, state-based telephone survey conducted by the CDC to gather data on health-related risk behaviors, chronic health conditions, and use of preventative services (CDC, 2023).

Blindness: Defined as self-reported blindness or serious difficulty seeing, measured categorically as either present or absent, according to participant responses in the Behavioral Risk Factor Surveillance System (BRFSS) (CDC, 2023).

Breast cancer screenings: Defined as adherence to recommended mammogram screening, operationalized as self-reporting a mammogram within the past two years, measured categorically as either compliant (yes) or non-compliant (no).

Cervical cancer screenings: Defined as adherence to cervical cancer screening guidelines, operationalized by self-reporting receipt of a Pap test within the past three years on the BRFSS, categorized as compliant (yes) or non-compliant (no) (CDC, 2023; USPSTF, 2018).

Disability: Defined according to BRFSS standards as self-reported serious difficulty with vision, hearing, cognition, mobility, self-care or independent living (CDC, 2023).

Hearing loss: Operationally defined as self-reported deafness or serious difficulty hearing, measured categorically as present or absent based on participant responses in the BRFSS (BRFSS; Centers for Disease Control and Prevention [CDC], 2023).

Mammogram: An X-ray imaging test used to screen for breast cancer in women, typically recommended every two years for women aged 50-74 (CDC, 2023).

Pap test: A medical procedure used to screen for cervical cancer by collecting cells from the cervix (CDC, 2023).

Poor mental health: Defined as reporting 14 or more days of poor mental health in the past 30 days, based on the BRFSS item: “Now thinking about your mental health, which includes stress, depression, and problems with emotions, for how many days during the past 30 days was your mental health not good?” (CDC, 2023).

Preventive screening: Health services used to detect disease early, before symptoms appear, to improve health outcomes. This includes mammograms and Pap tests (USPSTF, 2018).

Socioeconomic status (SES): Operationalized as a composite measure based on income level, employment status, education attainment, and marital status, representing the economic and social positioning of individuals (American Psychological Association [APA], 2020; CDC, 2023).

Assumptions

This study assumed that the integrity and validity of the secondary dataset obtained from the 2023 Behavioral Risk Factor Surveillance System (BRFSS) were maintained and met scientific standards. The BRFSS is a nationally representative survey that uses standardized questions and rigorous data collection protocols. It was assumed that participant responses are truthful and accurate despite being self-reported. The survey's anonymity was further assumed to reduce social desirability bias, thereby enhancing the reliability of the data used in this analysis (CDC, 2023). It also assumed that the BRFSS sampling strategy adequately captures a representative population of women living in the United States and those experiencing disabilities such as hearing loss, blindness, or poor mental health. Because BRFSS data are stratified and designed to reflect the adult population across geographic and demographic variables, it was assumed that the data used in this study are generalizable to the target populations of interest (CDC, 2023).

Scope and Delimitations

This study specifically examined breast and cervical cancer screenings among women in the United States who reported disabilities such as hearing loss, blindness, or poor mental health. No other populations, regions, or health conditions were included. The independent variables are hearing impairment, visual impairment, and poor mental health. The dependent variables are self-reported adherence to recommended breast and cervical cancer screenings. Control variables include employment status, education level, marital status, income, age, and race/ethnicity to assess how these demographic and socioeconomic factors might influence cancer screening participation among women with self-reported disabilities living in the United States.

This study was further limited by its reliance on secondary data from the 2023 Behavioral Risk Factor Surveillance System (BRFSS), which provides a nationally representative dataset. Because the BRFSS data was restricted to self-reported responses from non-institutionalized adults, it did not include any clinical measures or follow-up interviews, and no primary data collection was carried out. These boundaries were set to keep the study manageable, focused, and consistent with the variables available in the secondary dataset.

Limitations

For this study, archival data was used to analyze the relationship between the dependent and independent variables. While using archival data**,** specifically the 2023 Behavioral Risk Factor Surveillance System (BRFSS)**,** offers several advantages, it also presented some limitations. One primary concern was the completeness and quality of the data, as it was collected retrospectively and may contain errors, missing values, or inconsistencies that could affect reliability (Bidassie et al., 2020). The BRFSS provides nationally representative data, but it may not fully capture the women living in the United States who experience blindness or serious difficulty seeing, deafness or serious difficulty hearing, or poor mental health who meet the inclusion criteria for this study. Sampling biases in archival datasets may limit the generalizability of findings to all the women living in the United States with hearing impairments, visual impairments, or mental health challenges (Chang & Kim, 2023). Despite these challenges, BRFSS remains one of the most comprehensive datasets available for assessing health behaviors at a population level, making it an appropriate source for this study.

Another limitation of archival data was that it may not include all relevant variables needed to control for confounders or fully explain the relationships between disability status, geographic isolation, and cancer screening behaviors. This may impact the ability to account for additional factors influencing preventive healthcare participation, such as provider recommendations or access to culturally competent care (Hoffmire et al., 2024). This study may be subject to endogeneity concerns, particularly if there is a bidirectional relationship between mental health status and cancer screening behaviors; for instance, if poor mental health reduces healthcare engagement while lack of preventive care exacerbates mental health concerns. Since primary data was not collected, some unmeasured factors may remain unaddressed, potentially influencing the observed relationships between disabilities, mental health, and cancer screening participation**.** Acknowledging these limitations was essential to accurately interpreting the study's findings and ensuring that conclusions were drawn with appropriate caution.

Despite these limitations, the use of archival BRFSS data provided a valuable opportunity to explore these associations within a large, nationally representative sample, allowing for meaningful insights into health disparities among women living in the United States who experience blindness or serious difficulty seeing, deafness or serious difficulty hearing, or poor mental health**.** By leveraging this dataset, this study contributes to a broader understanding of how disability and mental health affect access to preventive healthcare, highlighting potential areas for intervention and policy change.

While this study strived to provide an accurate and comprehensive examination of the factors affecting breast and cervical cancer screenings among the living in the United States, several potential biases could have still influenced the outcomes. One potential source of bias was selection bias, as the study focuses on a specific population of women, including those with self-reported disabilities, which may not fully represent all women with disabilities or the general female population. Additionally, recall bias could have affected self-reported screening behavior data, as participants may not accurately recall or report their screening history. Another limitation was the study's cross-sectional design, which cannot establish causality between the variables of interest. To mitigate this, the study included data from existing studies whenever possible to provide a richer context. Finally, the use of binary logistic regression analyses helped control for potential confounding variables, such as age, socioeconomic status, and access to healthcare, that could have distorted the relationships between disability and cancer screening behaviors

(Ponce-Chazarri et al., 2023; Kinney et al., 2021). By implementing these measures, the study aimed to minimize biases and produce more reliable findings that could contribute to the improvement of public health policies and practices for women living in the United States.

Significance

This study contributed to public health research by deepening the understanding of how disability status and poor mental health relate to breast and cervical cancer screening behaviors among women living in the United States. This specific population has been largely underrepresented in cancer prevention research, particularly in studies using nationally representative datasets such as the BRFSS. By narrowing the scope to women with self-reported disability status, this study aided in focus and insight into how overlapping barriers may influence screening behaviors.

Guided by the social-ecological model (SEM), the study explored how individual, interpersonal, and community-level factors interact with healthcare access and screening participation. This framework supported a more comprehensive analysis of how disabilities and mental health challenges intersect, offering valuable insight for future research and interventions. The findings from this study informed practice and policy by identifying specific screening disparities faced by this group. Public health efforts could be strengthened by adapting outreach strategies and cancer screening recommendations to better serve women with disabilities and mental health conditions who live in the United States. This research also contributed to improved provider education and system-level changes that promote culturally competent, accessible care across some communities.

Summary and Conclusion

This study was built on existing literature that highlighted persistent disparities in preventive cancer screenings among women who report disabilities or poor mental health and breast and cervical cancer screening behaviors. Previous research has shown that individuals with hearing loss, blindness, or mental health conditions are less likely to receive recommended mammograms or Pap tests (Bidassie et al., 2020; Chang & Kim, 2023). Socioeconomic status and difficulties with healthcare navigation have also been found to negatively influence screening participation, especially among underserved populations (Hoffmire et al., 2024). These factors are particularly relevant for women living in the United States, who may face additional systemic barriers within the healthcare system. This study examined these overlapping barriers using a nationally representative dataset to better understand their combined impact on cancer screening behaviors.

This study addressed a gap in the literature by focusing specifically on women living in the United States who experience blindness or serious difficulty seeing, deafness or serious difficulty hearing, or poor mental health. Although prior research has addressed cancer screening disparities, few studies have examined this population using large-scale survey data. Existing studies often combine broad groups or focus primarily on clinical outcomes, failing to explore the behavioral patterns of preventive health practices among women living in the United States (Chang & Kim, 2023; Hoffmire et al., 2024). Additionally, limited research has examined this intersection using the BRFSS, a robust national dataset suitable for population-level health behavior analysis. By focusing on this underrepresented group, this study contributed targeted insight to both public health literature and research.

This study was guided by the social-ecological model (SEM) to examine how individual, interpersonal, and community-level factors were associated with cancer screening participation. SEM provides a multi-level lens for analyzing health behavior and is widely used in public health to understand how social, structural, and individual factors interact (Bronfenbrenner, 1994). This study used this model to evaluate how poor mental health and sensory disabilities intersect in shaping healthcare access. The SEM framework provided a deeper understanding of the barriers affecting this population's participation in preventive health services. These findings help guide future intervention development, research, and policy recommendations.

In the next section, I outline the research design and methodology used to examine these relationships. Section 2 provides a detailed description of the sample population, operational definitions of key variables, and the data analysis approach using the 2023 BRFSS dataset. It also discusses the theoretical framework and the rationale for applying logistic regression to test associations between disability status, mental health, and cancer screening participation. By linking the research gap identified here with the methods outlined later, this study presents a cohesive plan for addressing disparities in preventive cancer screenings.

Section 2: Research Design and Data Collection

Introduction

The purpose of this quantitative retrospective cross-sectional study was to explore the relationships between the independent variables of hearing impairment, visual impairment, and poor mental health, and the dependent variables of breast and cervical cancer screening behaviors. The population of interest consisted of women residing in the United States. This study utilized data from the 2023 Behavioral Risk Factor Surveillance System (BRFSS) to investigate these associations, providing new insights into an underrepresented group in cancer prevention research. This section includes a description of the study design, population, and sampling procedures, instrumentation, operationalization of variables, data analysis plan, threats to validity, and ethical considerations. The section concludes with a summary of the procedures used to ensure clarity, transparency, and rigor in the research design and implementation.

In conducting the statistical analysis, several methodological assumptions were also made. First, it was assumed that each observation regarding breast and cervical cancer screening behaviors is independent of all other observations, meaning that one participant's response does not influence another's. Second, the assumption was that homoscedasticity is made, indicating that the variance of residuals is constant across all levels of the independent variables. Third, multicollinearity was assumed to be absent, meaning that poor mental health, visual impairment, and hearing loss are not highly correlated and can be analyzed as distinct variables. Lastly, the assumption of no endogeneity was made, meaning that the model includes all relevant variables and that no omitted variables significantly bias the relationship between disabilities, mental health, and cancer screening participation (Bidassie et al., 2020; Chang & Kim, 2023; Hoffmire et al., 2024). By adhering to these assumptions, this study maintained statistical integrity and theoretical justification to examine the relationship between disability status, poor mental health, and cancer screening behaviors among women living in the United States.

Research Design and Rationale

This study employed a quantitative retrospective cross-sectional research design to examine whether blindness or serious difficulty seeing, deafness or serious difficulty hearing, and poor mental health are associated with cancer screening behaviors among women living in the United States. This design allowed for analysis of self-reported health behaviors at a single point in time using a large, nationally representative dataset (Creswell & Cresswell, 2018). The BRFSS served as the data source for this study, providing standardized questions, stratified sampling, and validated measures (CDC, 2023). The cross-sectional design was suitable for identifying patterns and associations between variables without requiring primary data collection (Cummings, 2017). This approach supported the goal of identifying disparities in cancer screening participation with an understudied population of women living in the United States.

A cross-sectional, correlational design using secondary data analysis was selected to explore the relationships between independent variables (self-reported hearing disability, vision disability, and poor mental health) and dependent variables (breast and cervical cancer screenings). Logistic regression analysis was chosen as the analytic approach because it allows examination of binary outcomes (screened vs. not screened) while adjusting for relevant covariates. This aligns with methods used in prior secondary data studies investigating health disparities among underserved populations.

The independent variables included hearing disability, vision disability, and poor mental health, as measured by the BRFSS self-report. The dependent variables were participation in breast cancer screening (mammography) and cervical cancer screening (Pap test). Covariates included age, race/ethnicity, income, education, marital status, and employment. No mediating or moderating variables were included.

The research design aligned with the study's guiding framework, the SEM, by capturing multilevel influences on health behaviors. SEM emphasizes the interaction of individual, interpersonal, organizational, community, and policy-level factors, making logistic regression an appropriate analytic method for exploring these layered associations (Golden & Earp, 2012). This approach reflected practices used in similar studies, such as those by Bytnar et al. (2020) and Seay et al. (2022), which employed logistic models to analyze BRFSS data and assess preventive screening disparities among women in the United States.

No time or resource constraints affected the study design, as the BRFSS dataset is publicly available and de-identified. This design advanced public health knowledge by addressing gaps related to how disability and mental health intersect with women living in the United States to affect preventive cancer screening. The study's findings are expected to inform multilevel interventions aimed at improving cancer screening rates and reducing disparities.

Methodology

Population

The target population for this study will include women residing in the United States. This population will be identified using the Behavioral Risk Factor Surveillance System (BRFSS) 2023 dataset, which includes a total of 433,232 respondents. Women living in the United States accounted for 229,541 of these respondents, and the analysis was evaluated.

Sampling Procedure

The BRFSS employs a stratified, random-digit-dialing sampling strategy to collect data from non-institutionalized U.S. adults aged 18 years or older. It uses both landline and cell phone sampling frames to ensure representative responses across all 50 states, Washington, D.C., and U.S. territories (CDC, 2023). This method ensured inclusion of geographically and demographically diverse subpopulations. This study included only female respondents living in the United States. These selection criteria ensured sufficient statistical power and generalizability for this specific subpopulation.

Inclusion and Exclusion Criteria

Inclusion criteria included female respondents aged 18 or older who reported living in the United States.

Procedure for Gaining Access to Data

The BRFSS dataset used in this study is publicly available and was accessed through the Centers for Disease Control and Prevention (CDC) BRFSS website (CDC, 2023). No special permissions, approvals, or data use agreements were required to obtain the data, as it is provided for public use by researchers and policymakers. The BRFSS is a nationally recognized, reputable data source that adheres to rigorous data collection and validation protocols to ensure high-quality, reliable information on population health behaviors.

Reputability and Quality of the Data Source

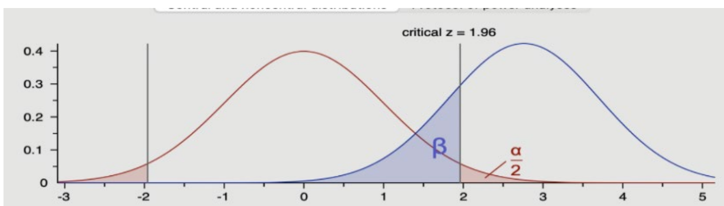
The BRFSS is one of the largest continuously conducted health surveys worldwide and is widely recognized for its methodological rigor, large sample size, and high data quality. Administered by the CDC, the survey utilized validated questions, standardized data collection protocols, and complex sampling designs to ensure representativeness and reliability across U.S. states and territories. Data undergo rigorous cleaning and quality checks before public release, making BRFSS a trusted source for public health surveillance and research (CDC, 2023).

G-Power Analysis

A priori power analysis was conducted using G*Power version 3.1 to determine the minimum required sample size for this study's binary logistic regression analysis. The analysis specified a two-tailed test with an alpha level of 0.05 (a) to minimize the risk of Type I error and a power level (1−B) of 0.80, the widely accepted threshold for ensuring an 80% chance of detecting a true effect. Planning assumptions were set to reflect the most prevalent focal predictor in the dataset: a base outcome rate under the null hypothesis of Pr(Y = 1|X = 1) = 0.70, a binomial predictor prevalence (pi) of 0.20, and modest correlation between the focal predictor and covariates (R^2_otherX = 0.05). The target effect size was set to an odds ratio (OR) of 4.55, which corresponds to the smallest effect detectable with N =213 under these assumptions. Based on these parameters, the required minimum total sample size was calculated to be 213 participants. This sample size provides sufficient statistical power to detect significant relationships between independent variables (blindness or serious difficulty seeing, deafness or serious difficulty hearing) and poor mental health, and the dependent variables (breast and cervical cancer screening compliance), while adjusting for relevant covariates.

Figure 1

*Sample Size Calculation in G*Power 3.1*



Operationalization

Blindness or serious difficulty seeing was measured using the BRFSS question: Are you blind or do you have serious difficulty seeing, even when wearing glasses? Responses were categorized dichotomously as 0 = No and 1 = Yes (CDC, 2023). Deafness or serious difficulty hearing will be assessed using the BRFSS item (Are you deaf or do you have serious difficulty hearing?) with the same binary coding. Poor mental health will be operationalized using responses to the question: Now thinking about your mental health, which includes stress, depression, and problems with emotions, for how many days during the past 30 days was your mental health not good? This variable was analyzed as continuous and dichotomous, using a cutoff of 14+ days for frequent mental distress (CDC, 2023). The dependent variables, breast and cervical cancer screenings, were measured using BRFSS items on recent mammograms (past 2 years) and Pap tests (past 3 years), coded as 1 = compliant and 0 = non-compliant with recommended screening guidelines (USPSTF, 2018).

Table 1

Operationalization of Variables

Variable Name	Type	Categorization/Question	Level of Measurement
Blindness or Serious Difficulty Seeing	Independent	BRFSS: “Are you blind or do you have serious difficulty seeing, even when wearing glasses?” (0 = No, 1 = Yes)	Nominal
Deafness or Serious Difficulty Hearing	Independent	BRFSS: “Are you deaf or do you have serious difficulty hearing?” (0 = No, 1 = Yes)	Nominal
Poor Mental Health	Independent	BRFSS: “Now thinking about your mental health, for how many days during the past 30 days was your mental health not good?” (14+ days = Yes, <14 days = No)	Nominal
Breast Cancer Screening Compliance	Dependent	BRFSS: Mammogram past 2 years (1 = compliant, 0 = non-compliant)	Nominal
Cervical Cancer Screening Compliance	Dependent	BRFSS: Pap test past 3 years (1 + compliant, 0 = non-compliant	Nominal
Age	Covariate	“What is your age?”	Continuous
Race / Ethnicity	Covariate	“Which one or more of the following would you say is your race?”	Nominal
Income	Covariate	“Is your annual household income from all sources…?”	Ordinal
Education Level	Covariate	“What is the highest grade or year of school you completed?”	Ordinal
Marital Status	Covariate	“Are you married, divorced, widowed, separated, never married, or a member of an unmarried couple?”	Nominal
Employment Status	Covariate	“Are you currently…? (employed, unemployed, homemaker, student, retired, unable to work)”	Nominal

Data Analysis Plan

Data were analyzed using IBM SPSS Statistics (Version 30), applying the appropriate BRFSS weighting variables to account for the complex sampling design. The analytical approach aligns with prior public health studies that have used BRFSS data to examine health disparities and behavioral outcomes. Descriptive statistics were used to summarize the sample’s demographic characteristics, including age, race/ethnicity, income, education, marital status, employment status, hearing disability, vision disability, poor mental health, and participation in breast and cervical cancer screening. Frequencies and percentages were calculated for categorical variables, and means with standard deviations were calculated for continuous variables. Binary logistic regression analyses were conducted to estimate the odds of breast and cervical cancer screening participation associated with the independent variables.

Separate models were estimated for each dependent variable: mammography screening compliance and Pap test compliance. The primary independent variables are self-reported hearing disability, vision disability, and poor mental health status. Covariates include age, race/ethnicity, income, education level, marital status, and employment status. Adjusted odds ratios (AORs) with 95% confidence intervals will be reported, and statistical significance will be set at $p < .05$. Model fit will be assessed using tests such as the Hosmer-Lemeshow test and pseudo-R^2 measure.

Data Cleaning Procedures

Although the BRFSS dataset is extensively cleaned and validated by the CDC prior to public release, additional data preparation steps were conducted to ensure readiness for analysis. This included verifying all included cases meet the study's inclusion and exclusion criteria, checking for missing data across independent, dependent, and covariate variables, and examining patterns of missingness. Cases with missing values on key variables were addressed using listwise deletion since missing data for these variables was minimal.

Variable coding was reviewed against the BRFSS codebook, and recoding was performed as necessary to align variables with the planned logistic regression models, such as dichotomizing responses or collapsing categories where appropriate. Continuous variables were assessed for normality and outliers, which were handled according to standard statistical procedures. All data cleaning and preparation steps were systematically documented to ensure analytic transparency and reproducibility.

Research Questions and Hypotheses

RQ1: What was the relationship between self-reported serious difficulty hearing, serious difficulty seeing, and poor mental health (defined as 14 or more days of poor mental health in the past 30 days) and breast cancer screening behaviors (mammogram utilization) among women living in the United States, when controlling for employment status, education level, income, marital status, race/ethnicity, and age?

> H01: There is no significant relationship between serious difficulty hearing, serious difficulty seeing, and poor mental health (14+) days and breast cancer screening behaviors among this population after controlling for the listed covariates.

Ha1: There is a significant relationship between serious difficulty hearing, serious difficulty seeing, and poor mental health (14+) days and breast cancer screening behaviors among this population after controlling for the listed covariates.

RQ 2: What is the relationship between self-reported serious difficult hearing, serious difficulty seeing, and poor mental health (defined as 14 or more days of poor mental health in the past 30 days) and cervical cancer screening behaviors (Pap test utilization) among women living in the United States, when controlling for employment status, education level, income, marital status, race/ethnicity, and age?

H02: There is no significant relationship between serious difficulty hearing, serious difficulty seeing, and poor mental health (14+) days and cervical cancer screening behaviors among this population after controlling for the listed covariates.

Ha2: There is a significant relationship between serious difficulty hearing, serious difficulty seeing, and poor mental health (14+) days and cervical cancer screening behaviors among this population after controlling for the listed covariates.

Statistical Analysis Plan

Binary Logistic Regression. Logistic regression was the primary statistical test used in this study to examine the relationships between the independent variables (serious difficulty hearing, serious difficulty seeing, and poor mental health) and the dependent variables (breast and cervical cancer screenings). Poor mental health was operationalized as 14 or more days of poor mental health in the past 30 days, aligning with the CDC’s definition of frequent mental distress (CDC, 2023). Given the binary nature of the dependent variables, logistic regression is appropriate for this analysis, coded as 'yes' (1) and 'no' (0). Each logistic regression model was controlled for covariates, including employment status, education, income, marital status, race/ethnicity, and age, due to their potential confounding influence on preventative health behaviors.

Before conducting the logistic regression analysis, key assumptions were carefully evaluated and verified to ensure the appropriateness of the statistical approach. First, the assumption of a binary dependent variable was met, as the primary outcome, screening behavior, was coded dichotomously (i.e., screening was performed or not performed). Second, the assumption regarding independent variables and covariates was satisfied, as the independent variables included categorical predictors, such as self-reported serious difficulty seeing, serious difficulty hearing, and poor mental health, alongside sociodemographic covariates like employment status, education, income, marital status, race/ethnicity, and age. Third, the assumption of independence of observations was addressed through the BRFSS sampling design, which employs random digit dialing and stratified sampling to ensure representative, independent responses. These considerations confirmed that logistic regression was an appropriate and valid method for examining the research questions in this study.

Each of these assumptions was formally tested before analysis using SPSS. Multicollinearity among the independent and control variables was assessed by examining the variance inflation factor values, with values exceeding 5 indicating potential concern. The assumption of linearity in the logit for the continuous covariate of age will be evaluated using the Box-Tidwell transformation to determine whether the relationships between the logit and the predictor is linear. Although independence is supported by the BRFSS design, frequency distributions and cross-tabulations will be reviewed to identify any irregularities in the data structure that may suggest dependent responses. These procedures ensure the assumptions were sufficiently met to support a valid interpretation of the logistic regression models.

For each research question, crude and adjusted odds ratios, along with 95% confidence intervals, will be reported. The odds ratios illustrate how changes in independent variables impact the odds of engaging in preventative cancer screenings. Statistical significance was determined by p-values, with a threshold set at $p < 0.05$ for hypothesis testing. The null hypothesis was rejected if significant associations between independent variables and cancer screening behaviors were found after controlling for covariates. This analysis plan provided a structured and comprehensive approach for examining the associations between serious difficulty hearing, serious difficulty seeing, poor mental health, and cancer screening behaviors, ensuring robust interpretation of results that are meaningful for women living in the United States.

To evaluate model performance and interpret the results, several key statistical measures were reported. Wald statistics was used to test the significance of each predictor variable, indicating whether each independent variable makes a meaningful contribution to the model. Overall model fit was assessed using the Hosmer-Lemeshow goodness-of-fit test to evaluate how well the predicted values align with the observed outcomes. In addition, pseudo-R^2 values, including Cox and Snell R^2 and Nagelkerke R^2, were reported to estimate the proportion of variance in the dependent variables explained by the model. These evaluation methods support the validity of the logistic regression models used to address the study's research questions.

Threats to Validity

The data selected to analyze the research questions in this study was derived from the 2023 BRFSS survey administered by the CDC. Threats to validity in this study included external and internal validity threats, which influenced the generalizability and accuracy of the study's conclusions. External validity pertained to the extent to which the results of a study can be generalized to other populations or settings. A potential threat to external validity in this study was related to the specificity of the study population, women. Due to this highly defined subgroup, findings might not fully generalize to all women. To address this threat, this study explicitly outlines the characteristics of the sample, allowing for precise interpretation and cautious generalization. Clearly defining and transparently reporting on including criteria ensured that readers understand the boundaries of generalizability, thereby enhancing external validity.

Internal validity concerned the degree to which the study accurately established the relationship between the independent and dependent variables, free from the influence of confounding factors. This study has minimal threat to internal validity since the data was obtained from the BRFSS, which employs standardized and rigorous data collection methods. However, as this is a cross-sectional observational study, causality cannot be established; only associations can be. Several covariates (employment, education, income, marital status, race/ethnicity, and age) were included to mitigate internal validity threats further, based on their known relationships with preventative healthcare behaviors. These covariates were controlled statistically within logistic regression analyses to enhance the internal validity of the findings.

Statistical conclusion validity pertained to the accuracy of statistical analyses and the conclusions drawn from them, specifically considering different Type I and Type II errors. To mitigate threats to statistical conclusion validity, appropriate statistical measures, including logistic regression assumptions, were thoroughly assessed and validated. To address the increased risk of Type I errors arising from multiple statistical comparisons, a Bonferroni correction was applied, adjusting the alpha (a) level for each test to a more conservative threshold. This approach effectively reduced the likelihood of incorrectly rejecting the null hypotheses when no true relationship exists (Type I error), while simultaneously maintaining sufficient statistical power to detect genuine associations (avoiding Type II errors). Careful attention to external, internal, and statistical conclusion validity ensured robust findings that accurately reflect relationships between serious difficulty seeing, serious difficulty hearing, poor mental health, and cancer screening behaviors among women.

Ethical Procedures

This study utilized publicly accessible secondary data from the 2023 BRFSS, which is maintained and distributed by the Centers for Disease Control and Prevention (CDC). The BRFSS dataset is de-identified, and all personal identifiers are removed prior to public release. The BRFSS dataset is de-identified, and all personal identifiers are removed prior to public release. No contact with human subjects was made for this study, and no identifying information was accessed or collected by me. A data use agreement was reviewed and accepted, as required by the CDC, to ensure ethical use of the data for statistical analysis and dissemination.

As this study involves secondary data analysis only, and that dataset is publicly available and de-identified, no direct interaction with human participants was required. The Walden University Institutional Review Board (IRB) reviewed and approved this study prior to data analysis. All relevant IRB documents and approvals were submitted as part of the final research protocol. To ensure continued data security and confidentiality, the dataset was stored on a password-protected and encrypted personal device accessible only to the researcher. Data analysis and reporting occurred solely in aggregate form, with no individual-level data reported. Upon completion of the study and acceptance by Walden University, all data files will be securely deleted.

Ethical considerations primarily relate to confidentiality, data integrity, and responsible use of public health data. Two primary ethical issues relevant to this study include: potential indirect identification risks, and equitable and unbiased interpretation of findings. All data has been securely stored on encrypted, password-protected devices, and results are presented exclusively at the aggregated level to protect participant confidentiality. Secondly, there was an ethical imperative to interpret results without perpetuating stigma or bias towards individuals with disabilities or mental health conditions. To address this concern, data interpretation explicitly emphasizes the role of systemic and structural barriers influencing screening behaviors, framing disabilities as conditions requiring accommodation rather than as deficits of the individuals themselves.

The ethical integrity of this study has been maintained through rigorous adherence to confidentiality measures and through deliberate, equity-focused interpretation strategies. These safety guards reflect a commitment to protecting participant privacy, promoting responsible research practices, and align with public health ethics and standards set forth by Walden University and the broader public health community.

Data Security

Although the data used in this study has been de-identified and publicly available through the BRFSS, I have implemented robust data security measures throughout all stages of the project. Raw data files were stored on a password-protected and encrypted device accessible only to the researcher. No personal identifiers, such as names, addresses, or contact information, were included in the BRFSS dataset; however, I have maintained strict confidentiality practices to prevent unauthorized access or accidental disclosure of any sensitive variables. All analyses were conducted on a secure local system without the use of shared drives or unsecured cloud services. Interim analysis files, output files, and any derived datasets were stored securely and labeled clearly to prevent accidental sharing or exposure. Upon completion of the dissertation, all datasets and analytic files will be securely deleted in accordance with institutional policies and ethical research standards. I followed Walden University's Institutional Review Board (IRB) requirements, ensuring that all ethical and security protocols were met or exceeded federal and institutional guidelines for the use of secondary data.

Equity in Research Design

This study intentionally applied an equity-focused lens to both research design and interpretation of results. While disability status (such as serious difficulty hearing, serious difficulty seeing, or poor mental health) and cancer screening behaviors are the primary variables of interest, these characteristics were not framed as individual deficits. Instead, the study explored how structural factors, including systemic barriers and healthcare access disparities, shape cancer screening behaviors among women living in the United States.

I avoided pathologizing or deficit-based interpretations and ensured that analyses and discussions highlight the social determinants of health that contribute to disparities. By focusing on contextual influences such as geographic isolation, healthcare infrastructure, and socioeconomic challenges, the study aimed to generate findings that support public health interventions promoting equity, rather than perpetuating stigma or bias against individuals with disabilities or marginalized populations. I remained attentive to ethical language, inclusive reporting practices, and culturally sensitive interpretations that align with Walden University's social change mission.

Summary

In Section 2, the research design was detailed, including the methodology and data analysis plan to be used in this study. The research employed a quantitative, retrospective, cross-sectional design using secondary data from the 2023 Behavioral Risk Factor Surveillance System (BRFSS). The study focused on exploring the association between serious difficulty shearing, serious difficulty seeing, and poor mental health, and the likelihood of receiving breast and cervical cancer screening among women living in the United States. Binary logistic regression analysis was used to assess these associations while controlling for employment status, education, income, marital status, race/ethnicity, and age. Ethical considerations, including participant confidentiality, secure data storage, and equitable interpretation of findings were thoroughly addressed throughout the study. The following section will present the results and findings of the research questions and hypotheses.

Section 3: Presentation of the Results and Findings

Introduction

The purpose of this quantitative, cross-sectional secondary analysis was to examine whether deafness or serious difficult hearing, blindness or serious difficulty seeing or poor mental health (as defined as more than 13 days per month of self-reported mental health ‘not good’) were associated with women’s breast cancer screening (ever having had a mammogram) and cervical cancer screening (ever had a pap smear) behaviors in the United States, while controlling for sociodemographic covariates. Two research questions guided this study:

RQ1: What is the relationship between self-reported serious difficulty hearing, serious difficulty seeing, and poor mental health and breast cancer screening behaviors (mammogram utilization) among women in the United States, when controlling for employment status, education level, income, marital status, race/ethnicity, and age?

$H_0$1: There is no significant relationship between self-reported serious difficulty hearing, serious difficulty seeing, and poor mental health and breast cancer screening behaviors (mammogram utilization) among women in the United States, when controlling for employment status, education level, income, marital status, race/ethnicity, and age.

H_A1: There is a significant relationship between self-reported serious difficulty hearing, serious difficulty seeing, and poor mental health and breast cancer screening behaviors (mammogram utilization) among women in the United

States, when controlling for employment status, education level, income, marital status, race/ethnicity, and age.

RQ2: What is the relationship between self-reported serious difficulty hearing, serious difficulty seeing and poor mental health and cervical cancer screening behaviors (Pap test utilization) among women in the United States, when controlling for employment status, education level, income, marital status, race/ethnicity, and age?

$H_0$2: There is no significant relationship between self-reported serious difficulty hearing, serious difficulty seeing, and poor mental health and cervical cancer screening behaviors (Pap test utilization) among women in the United States, when controlling for employment status, education level, income, marital status, race/ethnicity, and age.

H_A2: There is a significant relationship between self-reported serious difficulty hearing, serious difficulty seeing, and poor mental health and cervical cancer screening behaviors (Pap test utilization) among women in the United States, when controlling for employment status, education level, income, marital status, race/ethnicity, and age.

Accessing the Data Set for Secondary Data

Section 3 presents the data source and time frame, any deviations from Section 2, missing data, and cleaning procedures, descriptive and demographic characteristics with reference to the mammogram analytic sample and pap smear analytic sample, univariate analyses justifying covariate inclusion, statistical assumptions, results for each research question, post hoc sensitivity notes, and a summary and transition into Section 4.

Data Source, Timeframe, and File Management

The dataset was drawn from the 2023 Behavioral Risk Factor Surveillance System (BRFSS), an annual, state-based telephone survey of noninstitutionalized U.S. adults conducted by the Centers for Disease Control and Prevention (CDC, 2023). The public-use file was downloaded and analyzed in SPSS. The primary working file included 433,323 initial rows, each containing a respondent's answers. A female-only analytic frame was applied (filter_$ = 1), yielding 229,541 valid female cases. Analyses were conducted unweighted.

Deviations from the Plan

There were no conceptual deviations from the analytic plan outlined in Section 2. Both outcomes were analyzed via binary logistic regression. A technical clarification is that SPSS treated ordered covariates as ordinal numeric terms with single coefficients, which was appropriate for their categorical structure. Additionally, covariates that were categorized as ordinal but required recategorization into ordinal categories were also recategorized, which is also pertinent given the nature of the variables.

Missing Data and Cleaning Procedures

BRFSS user-defined missing codes were retained and treated as missing in SPSS. Listwise deletion was applied in the regression models. The resulting model-specific analytic samples were n = 844 for the mammogram model and n = 774 for the Pap smear model.

Recoding

Frequent mental distress was the value assigned to poor mental health and was recoded as 0–13 days a month, assigned a value of 1, and 14–30 days per month was given a value of 2. This is consistent with CDC conventions. The categorical predictors were assigned numerical values, which is appropriate given the nature of SPSS.

Descriptive and Demographic Characteristics

Descriptive frequencies and percentages for demographic variables (e.g., race/ethnicity, marital status, employment, age groups, income) for each model's analytic sample are provided below for readability and completeness. Table 2 includes demographic characteristics of women in the mammogram analytic sample (n = 844). Table 3 includes demographic characteristics of women in the Pap smear analytic sample (n = 774).

Table 2

Demographic Characteristics of Women in the Mammogram Analytic Sample

Characteristic	*n*	%
Race/Ethnicity		
White, non-Hispanic	93	11.0
Black, non-Hispanic	573	67.9
Asian, non-Hispanic	13	1.5
American Indian/Alaskan Native, non-Hispanic	2	0.2
Hispanic	113	13.4
Other race, non-Hispanic	50	5.9
Marital Status		
Married	304	36.0
Divorced	151	17.9
Widowed	103	12.2
Separated	19	2.3
Never married	235	27.8
Member of unmarried couple	32	3.8
Employment Status		
Employed for wages	384	45.5
Self-employed	67	7.9
Out of work (≥1 year)	22	2.6
Out of work (<1 year)	19	2.3
Homemaker	28	3.3
Student	9	1.1
Retired	282	33.4
Unable to work	33	3.9
Disability Indicators		
Serious difficulty seeing (yes)	38	4.5
Serious difficulty hearing (yes)	47	5.6
Frequent poor mental health (14+ days)	85	9.6
Total	844	100.0

Table 3

Demographic Characteristics of Women in the Pap Smear Analytic Sample

Characteristic	*n*	%
Race/Ethnicity		
White, non-Hispanic	85	11.0
Black, non-Hispanic	520	67.2
Asian, non-Hispanic	12	1.6
American Indian/Alaskan Native, non-Hispanic	2	0.3
Hispanic	105	13.6
Other race, non-Hispanic	50	6.5
Marital Status		
Married	276	35.7
Divorced	141	18.2
Widowed	92	11.9
Separated	17	2.2
Never married	220	28.4
Member of unmarried couple	28	3.6
Employment Status		
Employed for wages	360	46.5
Self-employed	61	7.9
Out of work (≥1 year)	20	2.6
Out of work (<1 year)	18	2.3
Homemaker	27	3.5
Student	8	1.0
Retired	247	31.9
Unable to work	33	4.3
Disability Indicators		
Serious difficulty seeing (yes)	35	4.5
Serious difficulty hearing (yes)	43	5.6
Frequent poor mental health (14+ days)	64	11.2
Total	774	100.0

Representativeness of the Sample

The BRFSS employs a complex sampling design to support state-representative estimation. Because the present study used unweighted logistic regression and listwise deletion, results represent within-sample associations rather than population prevalence estimates. To illustrate the composition of the analytic samples relative to known BRFSS characteristics, several examples are provided.

For the mammogram sample, the age distribution was skewed towards older women, consistent with national screening guidelines. Among the available case crosstabs, women aged 65 years or older accounted for 463 of 1,086 valid cases (42.6%), and nearly all of these women, aged 65 years or older, reported having had a prior mammogram. In contrast, only 24.4% of women aged 18–24 and 24.2% of women aged 25–34 reported ever having had a mammogram. This strong age gradient reflects both eligibility and adherence patterns in mammography, underscoring the need to retain age as a covariate in multivariable models.

The racial and ethnic composition also demonstrated concentration within certain groups. In the mammogram crosstab, Black, non-Hispanic women comprised 749 of 1,086 valid cases (68.9%), while White, non-Hispanic women accounted for 110 cases (10.1%). The regression analytic sample displayed similar proportionality. These patterns suggest that the results should be interpreted primarily as associations within a sample of Black, non-Hispanic respondents, rather than being generalized to the entire U.S. female population.

The Pap analytic sample displayed similar trends. Among the available cases, women aged 65 years or older constituted 408 of 983 valid cases (41.5%), with a Pap utilization rate of 57.4%. Younger women reported much lower utilization, only 27.3% of women aged 18-24. Racial/ethnic composition was again disproportionately represented by Black, non-Hispanic women, 679 of 983 valid cases, 69.0%, with Pap test prevalence of 57.3%. These sample characteristics align with known disparities in screening behavior by both age and race/ethnicity, reinforcing the need for covariate adjustment in regression models.

By providing these examples, the representativeness of the analytic sample is clarified: while the BRFSS design supports external validity in principle, the analytic samples used here reflect complete-case subsets that are disproportionately older and Black, non-Hispanic. Accordingly, the findings are interpreted as analytic associations within these subgroups, not design-weighted national prevalence estimates.

Table 4

Examples of Age and Race/Ethnicity Composition in Crosstabs for Mammogram and Pap Test Outcomes

Characteristic	Category	Mammogram *n* (%)	Mammogram screening %	Pap test *n* (%)	Pap screening %
Age group	18–24	45 (4.1%)	24.4%	44 (4.5%)	27.3%
	25–34	66 (6.1%)	24.2%	63 (6.4%)	41.3%
	65+	463 (42.6%)	95.9%	408 (41.5%)	57.4%
Race/ ethnicity	Black, non-Hispanic	749 (68.9%)	85.3%	679 (69.0%)	57.3%
	White, non-Hispanic	110 (10.1%)	90.9%	98 (10.0%)	84.7%
	Hispanic	142 (13.1%)	76.1%	129 (13.1%)	54.3%

Tables provide observed distributions in each analytic sample to support the evaluation of proportionality and external validity when considered alongside known BRFSS population characteristics.

Univariate Screening and Covariate Inclusion

Univariate/bivariate associations between each predictor and the two screening outcomes were evaluated using Pearson Chi-Square tests. Available-case Ns were used, consistent with SPSS Crosstabs output. Significant predictors ($p < .05$) were retained for multivariable modeling.

Table 5

Univariate Associations Between Predictors and Mammogram Utilization

Predictor	X^2	*df*	*p*	*N*
Marital status	87.42	5	< .001	1,079
Education level	3.76	5	.585	1,071
Employment status	105.26	7	< .001	1,077
Race/ethnicity	21.70	5	< .001	1,086
Age group	441.35	5	< .001	1,086
Income category	0.56	6	.997	878
Frequent mental distress	15.24	1	< .001	1,047
Hearing difficulty	2.69	1	.101	1,083
Vision difficulty	0.07	1	.794	1,081

Table 6

Univariate Associations Between Predictors and Pap Test Utilization

Predictor	X^2	*df*	*p*	*N*
Marital status	16.15	5	.006	976
Education level	70.52	5	< .001	970
Employment status	28.31	7	< .001	976
Race/ethnicity	33.24	5	< .001	983
Age group	39.58	5	< .001	983
Income category	60.42	6	< .001	806
Frequent mental distress	0.26	1	.608	947
Hearing difficulty	3.11	1	.078	980
Vision difficulty	5.43	1	.020	979

Evaluation of Statistical Assumptions

The logistic regression assumptions were carefully evaluated to ensure the validity of the models. First, the requirement of dichotomous outcomes and independence of observations was satisfied by design, as the dependent variables (mammogram utilization and Pap smear utilization) were coded as binary, and the BRFSS survey design ensured independent responses. Overall model fit was examined using the –2 Log Likelihood, Cox and Snell R^2, Nagelkerke R^2, and the Hosmer–Lemeshow goodness-of-fit test. These indicators provided a comprehensive assessment of the explanatory strength and adequacy of the models.

Overall model fit was examined using several tests. For the mammogram model, the omnibus test of model coefficients was significant, $x^2(23, N = 844) = 304.09$, $p < .001$, with −2 Log Likelihood = 403.87, Cox & Snell $R^2 = .303$, and Nagelkerke $R^2 = .533$. The Hosmer–Lemeshow goodness-of-fit test was nonsignificant, $x^2(8, N = 844) = 8.11$, $p = .422$, supporting adequate fit. For the Pap model, the omnibus test was significant, $x^2(23, N = 774) = 128.14$, $p < .001$, with −2 Log Likelihood = 901.66, Cox & Snell $R^2 = .153$, and Nagelkerke $R^2 = .207$. The Hosmer–Lemeshow test was also nonsignificant, $x^2(8, N = 774) = 4.40$, $p = .819$, indicating that this was an acceptable fit.

Potential issues of multicollinearity and data sparsity were also assessed. Correlation matrices and standard errors were reviewed, and while most variables met assumptions, some small cell counts were observed for specific race and ethnicity categories. These sparse cells contributed to large coefficients and wide confidence intervals, suggesting quasi-complete separation. As such, these estimates should be interpreted with caution.

In this logistic regression, no serious multicollinearity issues were detected. Most predictors' coefficients had modest standard errors and stable signs (for example, the age variable's coefficient was $B = -1.302$ with $SE = 0.134$), and the parameter correlation matrix revealed only moderate intercorrelations between covariates (all $r < 0.5$). However, data sparsity (quasi-complete separation) was evident for certain low-frequency categories. The American Indian/Alaska Native subgroup (n = 2) produced an extreme coefficient (B = -41.794, SE = 25,584.141) with an odds ratio essentially zero and an unbounded confidence interval. Similarly, the student employment category (n = 9) yielded B = 19.571 (SE = 12,432.157), corresponding to an astronomically large odds ratio (Exp(B) = 3.2 × 10^8) and a 95% CI spanning from approximately zero up to infinity. The model struggled to converge with these sparse cells (the output noted “Final solution cannot be found” after 20 iterations), confirming that those categories caused quasi-complete separation. The assumption of sufficient cell counts was violated for these predictors, so their estimates should be interpreted with caution. Combining sparse categories or applying specialized modeling techniques may be warranted to assess the robustness of these results.

The assumption of linearity in the logit was considered. Because most independent variables were categorical, this assumption was not directly applicable. For ordinal covariates, including age, education, and income, variables were entered as single ordered terms, which aligned with best practices for treating ordinal predictors in logistic regression.

Results for Research Question 1

The logistic regression examining mammogram history was statistically significant, x ^2 (23) = 304.09, p < .001, with –2LL = 403.87, Cox & Snell R^2 = .303, and Nagelkerke R^2 = .533. The H–L x^2 (8) = 8.11, p = .422, suggested a good fit, and overall classification accuracy was 91.1%.

Table 7

Model Fit and Classification for Logistic Models

Outcome	X^2 (*df*)	*p*	-2LL	Cox & Snell *R*^2	Nagelkerke *R*^2	H-L X^2 (*df*)	*p*
Mammogram	304.09 (23)	< .001	403.87	.303	.533	8.11 (8)	.422
Pap Smear	128.14 (23)	< .001	901.66	.153	.207	4.40 (8)	.819

Note. X^2 = omnibus model test; –2LL = −2 Log Likelihood; H–L = Hosmer–Lemeshow test. Models estimated unweighted.

After adjustment for covariates, age was a significant predictor (AOR = 0.27, 95% CI [0.21, 0.35], p < .001), indicating that older age groups had lower odds of being in the “no mammogram” category, meaning that they have a higher likelihood of having had a mammogram. Race/ethnicity demonstrated a significant overall effect (p= .0118); specifically, Asian, non-Hispanic women had higher offs of mammography relative to the model reference (AOR = 7.85, 95% CI [1.48, 41.55], p = .015). The three focal predictors, serious difficulty hearing, serious difficulty seeing, and poor mental health (frequent mental distress, (≥14 days), did not reach statistical significance in this model once covariates were included. Consistent with these results, H01 was partially rejected: the overall model and some contrasts (race/ethnicity) were significant, but the focal predictors were not individually significant. Summary effect sizes (AORs) for key predictors are displayed in Table 3.

Table 8

Key Adjusted Predictors of Screening Outcomes

Predictor	AOR	95% CI	*p*
Mammogram			
Age	0.27	[0.21, 0.35]	< .001
Race/ethnicity	-	-	.018
Asian, non-Hispanic	7.85	[1.48, 41.55]	.015
Pap Smear			
Frequent mental distress (>14 vs 0-13)	0.53	[0.30, 0.93]	.026
Education	0.70	[0.53, 0.83]	< .001
Age	0.74	[0.63, 0.86]	< .001
Income	0.79	[0.69, 0.89]	< .001
Race/ethnicity	-	-	.065
Black, non-Hispanic	2.00	[≈1.07, ≈3.74]	.031
Hispanic	2.11	[≈1.01, ≈4.42]	.048

Note. AOR = adjusted odds ratio; CI = confidence interval. Only significant predictors and overall factor tests are displayed. Full SPSS coefficient tables are provided in the appendices upon request.

Results for Research Question 2

The logistic regression for Pap history was also statistically significant, x^2 (23) = 128.14, p < .001, with -2LL = 901.66, Cox & Snell R^2 = .153, and Nagelkerke R^2 = .207. The H-L x^2(8) = 4.40, p = .819 indicated good fit; overall classification accuracy was 68.6% (Table 1).

In the adjusted model, poor mental health, labeled as frequent mental distress, was associated with lower odds of having had a Pap test (AOR = 0.53, 95% CI [0.30, 0.93], p = .026). Several covariates were also significant: education (AOR = 0.70, 95% CI [0.58, 0.83], p < .001), age (AOR = 0.74, 95% CI [0.63, 0.86], p < .001, and income (AOR = 0.79, 95% CI [0.69, 0.89, p < .001), indicating lower odds of being in the 'no Pap' category with higher levels of the ordinal term. Race/ethnicity had an overall effect trending toward significant (p = .065), with selected contrasts significant (Black, non-Hispanic = AOR 2.00, p = .031; Hispanic = AOR 2.11, p = .048) relative to the model reference. Based on the focal predictor results H02 was rejected. Key effect sizes with confidence sizes are summarized in Table 2.

Table 9

Adjusted Predictors of Pap Test

Predictor	AOR	95% CI	*p*	Interpretation
Frequent mental distress (≥ 14 d)	0.53	[0.30, 0.93]	.026	Women with frequent mental distress had lower odds of Pap test utilization.
Education (ordinal)	0.70	[0.58, 0.83]	< .001	Higher education associated with greater Pap screening uptake.
Age (ordinal)	0.74	[0.63, 0.86]	< .001	Older age associated with higher Pap screening uptake.
Income (ordinal)	0.79	[0.69, 0.89]	< .001	Higher income associated with greater Pap screening uptake.
Race/Ethnicity: Black, NH	2.00	[=1.07, =3.74]	.031	Black, non-Hispanic women more likely to receive Pap screening than reference.
Race/Ethnicity: Hispanic	2.11	[=1.01, =4.42]	.048	Hispanic women more likely to receive Pap screening than reference.

Post Hoc and Sensitive Analysis

Given evidence of small cell counts in several race/ethnicity categories (quasi-complete separation, a reasonable sensitivity check would be to collapse sparse categories by combining rate race groups into an 'other/multiracial' category and refit the models to evaluate the stability of race contrasts. In addition, because BRFSS is a complex survey, a design-based analysis using SPSS Complex Samples with strata and weights would provide robustness checks for standard errors and confidence intervals. These post hoc steps would not change the modeling strategy but would assess the sensitivity of inferences to separation and design effects. No additional post hoc hypothesis tests altered the conclusion reported above. Beyond the main hypothesis, no additional a priori hypotheses were tested. Omnibus model tests, classification metrics, and H-L goodness-of-fit are reported to characterize model performance fully, as shown in Table 1.

Summary of Results

This study utilized the 2023 BRFSS women's subpopulation to assess whether serious difficulty hearing, serious difficulty seeing, and frequent mental distress were linked to mammogram and Pap test usage after adjusting for sociodemographic covariates. Descriptive characteristics of the analytic samples are shown in the tables above (mammogram, $n = 844$) and (Pap, $n = 774$). Both models met core logistic regression assumptions and showed adequate fit based on omnibus tests and Hosmer–Lemeshow diagnostics; full model fit indices and classification accuracy are reported in Table 1.

Final Results

The mammogram model was statistically significant overall, x^2(23) = 304.09, $p < .001$, with acceptable fit (H–L x^2 (8) = 8.11, $p = .422$) and strong classification accuracy (91.1%). Age was a significant predictor (AOR = 0.27, 95% CI [0.21, 0.35], $p < .001$), indicating lower odds of being in the "no mammogram" category as age increases. Race/ethnicity had a significant overall effect ($p = .018$), with Asian, non-Hispanic women more likely to have had a mammogram compared to the reference group (AOR = 7.85, 95% CI [1.48, 41.55], $p = .015$). The three focal predictors—serious difficulty hearing, serious difficulty seeing, and frequent mental distress—were not statistically significant after adjusting for covariates. Therefore, H01 was partially rejected: the overall model and some contrasts were significant, but the focal disability and mental health indicators did not independently predict mammogram history.

The Pap model was statistically significant, x^2(23) = 128.14, $p < .001$, with good fit (H–L x^2(8) = 4.40, $p = .819$) and 68.6% classification accuracy. Frequent mental distress (≥14 days) was associated with reduced odds of having had a Pap test (AOR = 0.53, 95% CI [0.30, 0.93], $p = .026$). Education, age, and income were also significant ordinal predictors (education: AOR = 0.70, 95% CI [0.58, 0.83], $p < .001$; age: AOR = 0.74, 95% CI [0.63, 0.86], $p < .001$; income: AOR = 0.79, 95% CI [0.69, 0.89], $p < .001$), each indicating lower odds of being in the “no Pap” category with higher levels of the covariate. Race/ethnicity had an overall effect trending toward significance ($p = .065$), with selected contrasts significant (e.g., Black, non-Hispanic ≈ AOR 2.00, $p = .031$; Hispanic ≈ AOR 2.11, $p = .048$). Based on the focal predictor, H02 was rejected.

Small cell counts for several race/ethnicity categories produced wide confidence intervals and occasional extreme coefficients consistent with quasi-complete separation. As sensitivity checks, collapsing sparse race categories and/or estimating design-based standard errors using SPSS Complex Samples were identified as reasonable follow-up analyses; neither alters the substantive conclusions above.

Together, the findings suggested that disability indicators did not independently predict mammogram history once sociodemographic covariates were considered, that frequent mental distress uniquely reduced the likelihood of Pap screening, and that screening behaviors followed transparent socioeconomic and age gradients across both outcomes. In Section 4, these results will be interpreted in light of the study framework and prior literature, with attention to: actionable implications for clinical and public health practice, policy considerations for improving access among subgroups identified here, and recommendations for future research.

Section 4: Application to Professional Practice and Implications for Social Change

Introduction

The purpose of this quantitative study was to determine whether serious difficulty hearing, serious difficulty seeing, and poor mental health were associated with breast and cervical cancer screening among women in the United States. A secondary analysis of the 2023 Behavioral Risk Factor Surveillance System (BRFSS) dataset was conducted using binary logistic regression to evaluate predictors of mammogram and Pap test utilization while adjusting for sociodemographic covariates.

The main findings showed that disability indicators were not independently associated with mammogram screening, but age and race/ethnicity were significant. Older women were more likely to be screened, while Asian, non-Hispanic women had higher odds of never being screened compared to White, non-Hispanic women. For Pap testing, lower education, lower income, and younger age were associated with lower screening rates, and Black, Asian, and Hispanic women had higher odds of never being screened compared to White women. Employment status also mattered, with students and retirees less likely to be screened. Together, these results suggest that sociodemographic and structural factors, rather than disability status, play the strongest role in shaping women's screening behaviors.

Interpretation of the Findings

Breast Cancer Screening/ Mammography

The mammography model indicated that disability-related factors, including hearing difficulty, vision difficulty, and poor mental health, were not significant predictors of mammogram use after accounting for sociodemographic covariates. Instead, age and race/ethnicity emerged as the most influential variables. Older women were substantially more likely to have received a mammogram, which aligns with clinical guidelines that prioritize breast cancer screening in midlife and older adults. This suggests that providers are largely following evidence-based practices and that women are more likely to engage with preventive care as they age. However, the lower screening rates among younger women point to the need for early education about guidelines and strategies to establish preventive care habits before midlife.

Racial and ethnic disparities also emerged, particularly among Asian, non-Hispanic women, who had higher odds of never being screened compared to White, non-Hispanic women. This gap may reflect barriers such as limited culturally appropriate outreach, language barriers, or differences in navigating the health system. In contrast, Black, Hispanic, and other-race women did not differ significantly from the White reference group in this model, though small sample sizes in some categories may have masked disparities. These findings underscore the importance of tailoring breast cancer screening campaigns to communities with persistent barriers to participation, with a special focus on Asian subpopulations.

From a public health perspective, the absence of significant associations with disability indicators suggests that screening programs have not systematically excluded women with sensory or mental health challenges. However, the presence of strong socioeconomic and racial patterns indicates that inequities remain. This highlights the need for public health practice to emphasize culturally competent provider training, expanded use of community health workers, and policies that ensure mammography services are affordable and accessible in underserved areas. Additionally, targeted outreach campaigns should focus on younger women to encourage early initiation of preventive practices, as well as on Asian American communities to reduce racial disparities in breast cancer screening uptake.

These mammography findings confirm prior evidence that age is the most consistent predictor of screening uptake, with older women more likely to complete mammograms in line with guideline-driven care (Assfa Mossa, 2022). At the same time, the absence of independent effects for hearing difficulty, vision difficulty, and poor mental health disconfirms smaller or condition-specific studies that documented lower participation among women with sensory and mental health challenges (Bidassie et al., 2020; Godier-McBard et al., 2021; Wu et al., 2021). This divergence may indicate that population-level accessibility has improved or that barriers operate within specific subgroups not fully captured in aggregate models. Finally, the higher odds of never being screened among Asian, non-Hispanic women extended the literature by drawing attention to disparities in an understudied subgroup and by reinforcing the need for culturally and linguistically tailored strategies highlighted in Section 1 (Ferreira et al., 2021; Jones et al., 2023).

Cervical Cancer Screening/Pap Smear

The cervical screening model suggests that socioeconomic factors, particularly education, income, and age, play a major role in whether women receive Pap tests. Women with lower education and income were less likely to have been screened, underscoring the ongoing impact of structural inequities such as access to affordable care, insurance coverage, and health literacy. Younger women were also less likely to be screened, which may indicate gaps in awareness of screening guidelines or barriers to consistent primary care engagement in early adulthood.

Disparities were also evident across racial and ethnic groups. Black, Asian, and Hispanic women had higher odds of never being screened compared to White, non-Hispanic women, pointing to systemic inequities that persist in preventive health care. Language barriers, cultural norms, medical mistrust, or inadequate outreach may shape these differences. Tailored community interventions, culturally competent health education, and policies that expand access to linguistically and culturally appropriate services are essential to address these gaps.

Employment status merged as an important factor, with students and retirees showing higher odds of not being screened. For students, this likely reflects challenges such as transient living situations, lack of insurance, and competing academic or financial priorities. For retirees, barriers may include limited mobility, fixed incomes, or a lack of provider recommendations. These findings highlight the need for flexible service delivery models such as school-based health programs, mobile screening units, or outreach in senior centers.

Although physical disability indicators (hearing or vision difficulties) did not predict Pap test use, women experiencing frequent poor mental health were more likely to report having been screened. This could reflect greater engagement with the health care system among women with ongoing mental health needs, offering a potential point of leverage for integrated care. Strengthening partnerships among primary care providers, mental health professionals, and public health agencies could further enhance preventive care delivery.

In practice, these results reinforce the importance of addressing social determinants of health and tailoring interventions to high-risk groups. Public health programs should prioritize expanding access for women with lower socioeconomic status, developing culturally relevant outreach for minority communities, and embedding preventive services within the contexts where students, retirees, and women with mental health needs are already receiving support.

For cervical screening, the strong effects of education and income confirm well-established links between socioeconomic status and Pap test participation, and the observed racial/ethnic differences confirm persistent inequities reported in prior work (Fuzzell et al., 2021; Korn et al., 2023; Rosen et al., 2024; Zeno et al., 2022). In contrast, the lack of associations for hearing and vision difficulty disconfirms studies that found these disabilities depress Pap uptake (Mkuu et al., 2022; Orji et al., 2023). Notably, higher screening among women reporting frequent poor mental health extends the evidence base by suggesting that ongoing contact with the healthcare system for behavioral health may create touchpoints for preventive care, opposite to earlier findings that depression and anxiety reduce adherence (Murphy et al., 2021; Remes et al., 2021). The identification of lower screening among students and retirees further extends the literature by highlighting life-stage groups that may require flexible, setting-based outreach (e.g., campus health and senior services), complementing the access mechanisms discussed in Section 1 (Korn et al., 2023; Srinath et al., 2022).

Summary of Interpretation

The results of this study show that disability indicators such as hearing or vision difficulty, and poor mental health were not the strongest predictors of cancer screening once sociodemographic factors were considered. Instead, structural and demographic characteristics emerged as the primary drivers of screening disparities. Older women were more likely to receive mammograms and Pap tests, which reflects adherence to clinical guidelines and increased health system engagement with age. However, younger women had significantly lower screening rates, underscoring the need for targeted outreach to encourage earlier preventative behaviors.

Socioeconomic status also played a critical role. Women with higher education and income were more consistently screened, pointing to persistent barriers for lower-income and less-educated women who may face challenges such as limited insurance coverage, competing priorities, or reduced access to regular care. Employment patterns reinforced these inequities, with retirees and students being less likely to undergo screening, highlighting unique gaps at transitional life stages where preventive care may be overlooked.

Racial and ethnic disparities were evident across both outcomes. Asian, Hispanic, and Black women all showed lower likelihoods of Pap testing compared with White women, and Asian women were also less likely to undergo mammography. These disparities likely reflect systemic inequities, including cultural or linguistic barriers, experiences of discrimination in health care, and uneven access to trusted providers. These findings point to the urgent need for culturally responsive outreach, tailored education, and community-based screening initiatives to bridge gaps in preventive care.

These results suggest that while disability status alone may not drive screening disparities, structural inequities rooted in age, race, income, education, and employment continue to shape women's access to life-saving preventative services. Public health practice must therefore prioritize multi-level strategies that reduce socioeconomic and racial barriers, expand culturally competent care, and strengthen early engagement with preventative health services.

Summary

Taken together, these results indicate that socioeconomic position (education and income), age, and race/ethnicity explain much of the variation in screening among U.S. women, while binary indicators of serious hearing or vision difficulty were not independently associated with mammography or cervical screening in these adjusted models. The strong age gradient for mammography aligns with long-standing patterns of higher use among older women within recommended screening windows. The racial/ethnic pattern—particularly the higher odds of never being screened among Asian, non-Hispanic women for both mammography and cervical screening, and among Black and Hispanic women for cervical screening—converges with disparities described in Section 1 and underscores persistent structural and cultural barriers to preventive services.

The inverse association between poor mental health days and never having cervical screening contrasts with much of the prior literature that links psychological distress to lower preventative care use. A conservative interpretation is that women with frequent poor mental health may have more frequent health-care contact, facilitating screening through opportunistic offers, or that the BRFSS single-item measure captures distress that co-occurs with help-seeking. Because this is cross-sectional, directionality cannot be inferred, and the finding should be treated as hypothesis-generating rather than definitive.

Viewed through the social–ecological model, the findings emphasize multilevel influences. At the individual level, age, education, income, and mental health shape knowledge, efficacy, and access. At the interpersonal level, family and social networks may facilitate appointment scheduling and transport, which could help explain higher screening among some older groups. At the organizational level, clinic practices (extended hours, reminder systems, accessible materials) likely mediate the racial/ethnic differences observed. At the community and policy levels, insurance design, language access, transportation, and culturally responsive outreach remain pivotal. These interpretations are bounded by the data and do not assert causality.

Limitations of the Study

Several limitations constrain generalizability and causal inference. First, both outcomes and predictors are self-reported and may be affected by recall and social desirability bias. Second, the dependent variables were coded as odds of not being screened; results were interpreted accordingly, but this coding may be less intuitive for some readers. Third, listwise deletion led to substantial case loss (mammography n = 844; cervical screening n = 774), raising the possibility of selection bias and imprecision. Fourth, several categories (e.g., American Indian/Alaska Native; student) were extremely small, producing unstable coefficients, quasi-complete separation, and SPSS iteration warnings for the mammography model. Fifth, complex survey weights were not applied in the models reported here; as a result, population estimates may be biased, and standard errors may be conservative or inflated. Sixth, the binary disability indicators lack detail on severity, duration, assistive technology, and accommodation use, which likely attenuates true associations. Finally, cross-sectional data preclude conclusions about temporal ordering or causality.

Recommendations for Future Research

Future work should do the following: recode outcomes so that Yes = 1 to present odds of being screened; apply complex survey methods with design weights, strata, and primary sampling units; collapse sparse categories (e.g., employment and race/ethnicity “other” groups) or use penalized logistic regression to address separation; incorporate richer disability measures and validated mental-health scales; and consider mixed-methods designs to clarify mechanisms behind the higher odds of never being screened among Asian, Black, and Hispanic women and the unexpected association between poor mental health and cervical screening. These recommendations are grounded in the present study’s strengths and limitations and remain within its scope.

Implications for Public Health Practice and Field-Based Products

The results point to actionable strategies to increase screening among U.S. women, particularly women with lower education or income and women identifying as Asian, Black, or Hispanic. Health systems and health departments can institutionalize reminder/recall systems, provide culturally and linguistically tailored outreach, expand mobile screening in underserved neighborhoods, and ensure transportation support. Integrating routine, brief mental-health screening with warm handoffs during preventive visits may further normalize screening uptake. To translate evidence into action, four field-based products accompany this study as appendices:

Policy Brief Memo (Appendix A; DrPH Field Product #1). The memo, titled *Advancing Equitable Breast and Cervical Cancer Screening for U.S. Women*, succinctly describes the problem, current approaches, and the proposed policy program. It identifies major constituencies, recommends codified accommodations: accessible materials & interpreter services, sustained funding for patient navigation and mobile units, and concludes with specific, referenced calls to action.

Community Health Intervention Plan (Appendix B; DrPH Field Product #2). The plan, titled *Women's Screening Access Program (WSAP)*, states the problem and goal, defines the target population (women 25–65 for cervical screening and 40–74 for mammography, with prioritized outreach to Asian, Black, and Hispanic communities and women with lower education or income), and details strategies (navigation, culturally tailored education, multilingual reminders, mobile events, transportation vouchers). It provides an implementation timeline, staffing and partnership map, and an evaluation plan specifying process and outcome metrics with data sources and analytic methods.

Visual Representation of the Intervention (Appendix C; DrPH Field Product #3). A flowchart links social–ecological model constructs to WSAP components and their modes of delivery (e.g., clinic-based reminders, community workshops, mobile screening days, telephonic navigation, and transportation support), clarifying how each activity produces measurable outputs and outcomes.

Audience-Focused Fact Sheet (Appendix D; DrPH Field Product #4). A one-page, flyer designed to grab attention to provide a couple of facts and what to ask. The fact sheet is designed for readability and accessibility.

Positive Social Change

Implementing the recommended policy and program actions can advance equity at multiple levels. For individuals, navigation, reminders, and accommodations reduce cognitive and logistical burdens, increasing agency and timely screening. For families, reliable scheduling and transportation lessen caregiving strain and normalize preventive care. At the organizational level, embedding culturally responsive practices and accessibility standards enhances quality for all patients. At the community and policy levels, funded mobile capacity, transportation support, and codified language and disability accommodations build durable infrastructure that narrows screening gaps and promotes fairness in access to lifesaving preventive services. These implications remain within study boundaries and do not presume causal effects.

Conclusion

In summary, this secondary analysis indicates that education, income, age, and race/ethnicity are consistent determinants of breast and cervical cancer screening among U.S. women, whereas binary measures of serious hearing or vision difficulty were not independently associated after adjustment. Notably, Asian, non-Hispanic women had higher odds of never being screened for both outcomes, and Black and Hispanic women had higher odds for cervical screening. The findings are limited by self-report, substantial missingness, sparse categories, and lack of survey weighting, but they offer clear directions for practice and research. The accompanying field products convert these results into concrete policy and program tools.

This study demonstrates the following DrPH competencies. First, it designed and executed a quantitative analysis using multivariable logistic regression to address a pressing public health issue. Second, it analyzed the strengths and limitations of applying the social–ecological model, using it to interpret multilevel detriments while noting measurement constraints. Third, it addressed ethical considerations in secondary data analysis by using de-identified data and avoiding stigmatizing interpretations. Fourth, it communicated public health science to diverse stakeholders through a policy brief, intervention a policy brief, intervention plan, visual map, and accessible fact sheet. Finally, it proposes a feasible policy package that can influence positive social change by expanding access to equitable breast and cervical cancer screening for women in the United States.

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Appendix A: Policy Brief Memo

Advancing Equitable Breast and Cervical Cancer Screening for Women in the U.S.

To: Health Department leadership; Federally Qualified Health Centers (FQHCs) executives; Health system population health leaders; Medicaid plan directors

From: Kathleen Young, LCSW, DrPH Candidate

Date: Fall 2025

Subject: Raising Breast and Cervical Cancer Screening Among Women in the United States Through Navigation, Language Access, and Community Delivery.

This memo translates findings from a secondary analysis of BRFSS data restricted to women living in the United States into an actionable plan for practice. Multivariable logistic regression modeled the odds of ever being screened for mammography and cervical cancer.

Screening coverage remains uneven despite long-standing national recommendations. Older women were much more likely to receive mammograms, while younger women often missed recommended screenings. For cervical cancer, women with higher education and income were more likely to be screened, showing the influence of access and health literacy. Women experiencing frequent poor mental health were somewhat more likely to complete screenings, likely due to greater engagement with the healthcare system. Significant racial and ethnic gaps also remain: Asian women were far less likely than White women to receive mammograms or Pap tests, and Black and Hispanic women were less likely to receive cervical screening. Employment status also mattered, with students and retirees less likely to be screened than women working for wages.

Current approaches often include guideline dissemination, EHR reminders, and opportunistic screening to improve averages but do not consistently address language access, navigation, transportation, childcare, or trusted community delivery. These persistent structural gaps align with the disparities observed in this analysis.

Therefore, it is proposed that a *Women's Screening Access Program*, or WASP, is implemented over a 12-month rollout that combines policy levels with delivery changes. This policy change would allocate funds for patient navigation; require language and accessibility services (interpreters, translated, plain-language materials, accessible formats); provide transportation and childcare vouchers; expand mobile screening in priority neighborhoods; and set equity targets for stratified gap reduction in payer and clinic agreements. The program delivery would be a proactive navigator outreach and scheduling; evening/weekend appointments; multimodal reminders with simple booking; community screening events at trusted venues with on-site navigation and voucher redemption; EHR standing orders and best-practice alerts; monthly equity dashboards stratified by race/ethnicity, age, education, income, and preferred language; closed-loop follow-up for abnormal results and privacy safeguards. The expected impact would increase age-appropriate screening by 8-10% and reduce baseline racial/ethnic gaps by ≥25%**,** without exceeding the evidence from the current study.

The major constituencies affected include: health department cancer control; FQHCs and hospital systems; Medicaid and commercial payers; community-based organizations serving Asian American, Black, and Hispanic communities; faith and civic partners; patient navigators and community health workers; interpreter services; transportation and childcare vendors; academic evaluators.

In conclusion, targeted navigation, language access, structural supports, and community-based delivery directly address barriers identified in the BRFSS analysis for women—particularly Asian, non-Hispanic women (both screenings) and Black, non-Hispanic and Hispanic women (cervical). A WSAP rollout with equity dashboards is feasible within existing infrastructure and proportionate to observed disparities.

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Appendix B: Community Health Intervention Plan (DrPH Field Product #2)

Women's Screening Access Program (WASP): Increasing Evidence-Based Breast and Cervical Cancer Screening Among U.S. Women

Problem definition. Despite long-standing national recommendations, breast and cervical cancer screening remains uneven across women in the United States. In the present BRFSS analysis restricted to women, the adjusted odds of ever being screened differed by sociodemographic characteristics. For mammography, higher age groups had substantially greater odds of screening, while Asian, non-Hispanic women had markedly lower odds than White, non-Hispanic women. For cervical screening, higher education, older age, and higher income were associated with greater odds of screening; Black, non-Hispanic, Asian, and Hispanic women had lower odds relative to White, non-Hispanic women. These gaps indicate persistent access and structural barriers that can be addressed through navigation, language access, transportation, and childcare supports, and culturally tailored outreach.

Goal setting. Over 12 months, WSAP will increase the proportion of age-appropriate breast and cervical screening among eligible women receiving care in participating systems by 8–10% and reduce screening gaps between White, non-Hispanic women and (a) Asian, non-Hispanic women for mammography and cervical screening, and (b) Black, non-Hispanic and Hispanic women for cervical screening by at least 25% of the baseline disparity. All objectives will be tracked monthly and stratified by race/ethnicity, age group, income category, and preferred language.

Target population. Women residing in the United States who meet guideline-based eligibility for breast and/or cervical cancer screening. Priority subgroups include Asian, non-Hispanic women for both outcomes, Black, non-Hispanic, and Hispanic women for cervical screening, women with lower educational attainment or lower income, and women whose employment status, which includes retired and student, is associated with lower screening odds.

Intervention strategies

1. Patient navigation and outreach
    a. Trained navigators conduct proactive, culturally and linguistically tailored outreach, address questions, schedule appointments, and arrange transportation and childcare vouchers.
    b. Language access and accessibility
    c. Plain-language, translated reminders via SMS/phone/mail/portal; interpreter services; accessible formats for vision/hearing needs.
2. Community-based delivery
    a. Mobile mammography days and community cervical-screening events are hosted at trusted venues in neighborhoods with lower screening coverage.
    b. Provider supports.
    c. Standing orders and electronic best-practice alerts; monthly equity dashboards; micro-learning on culturally responsive communication and informed consent.
3. Structural supports.

a. Transportation and childcare vouchers; evening/weekend appointments; simplified scheduling with live call-backs for those with limited portal access.
b. Quality and safety.
c. Adherence to current evidence-based screening intervals; privacy protections; closed-loop referral for abnormal results.

Implementation plan

Governance and staffing. A project lead, a data analyst, two patient navigators per 25,000 eligible women, a community partnerships coordinator, and clinic champions at each site.

Partnerships. Federally qualified health centers, hospital systems, Medicaid plans, and community-based organizations serving Asian American, Black, and Hispanic communities; faith and civic groups.

Workflow. Monthly identification of eligible and overdue women; automated, multilingual reminders; navigator call-backs within 72 hours; on-site navigation at community events; voucher redemption at scheduling.

Timeline. Months 0–2: start-up, MOUs, staff training, data/IT build; Months 3–4: pilot in two clinics; Months 5–12: scale-up, monthly PDSA cycles, quarterly leadership reviews.

Risk management and ethics. HIPAA-compliant data handling; opt-out options for outreach; informed consent processes at events; rapid incident reporting.

Design. Pragmatic pre–post evaluation across participating clinics with monthly run charts and equity-stratified dashboards; if feasible, difference-in-differences with matched non-participating clinics.

Process measures. Number contacted, navigator encounters, vouchers issued and redeemed, mobile event attendance, interpreter utilization, and no-show rates will be collected for later analysis.

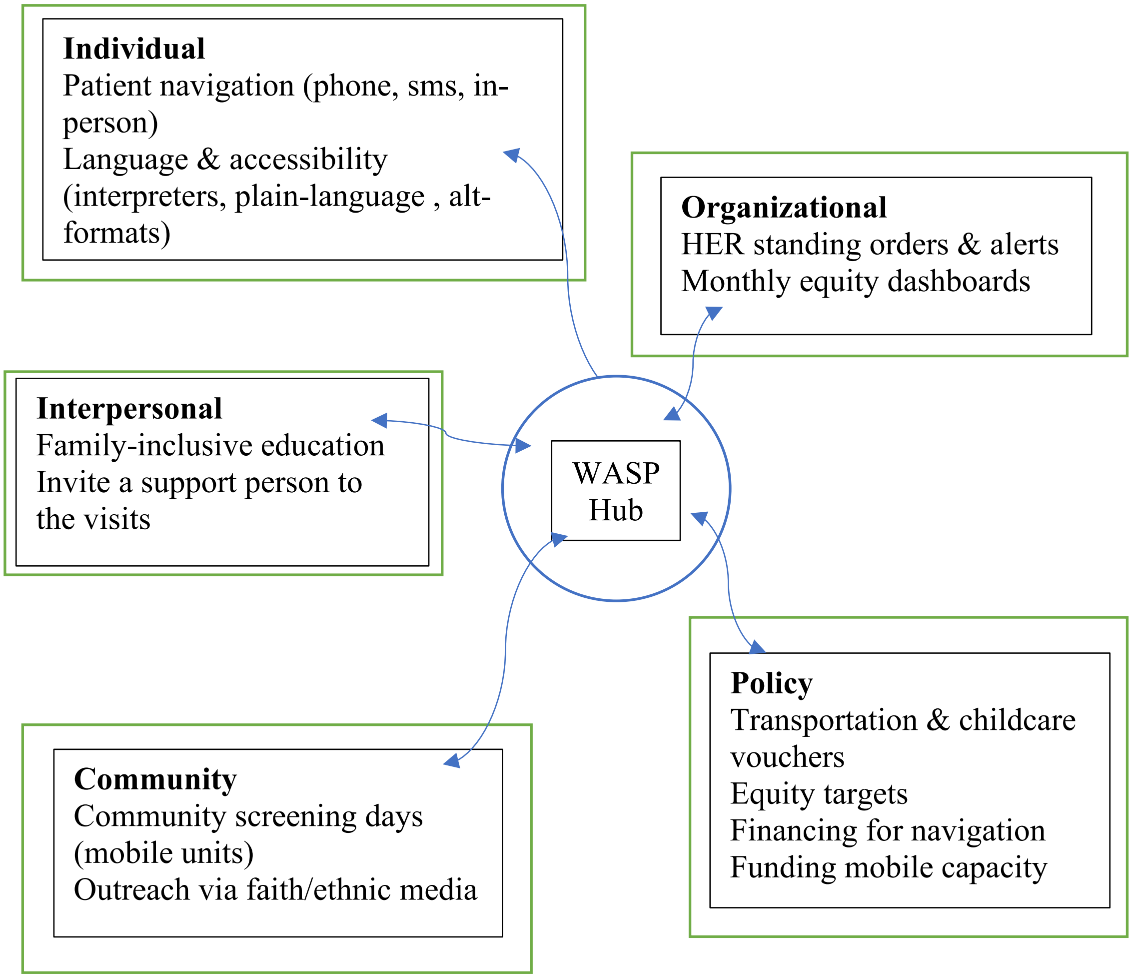
Outcomes. Age-appropriate screening completion of both mammography and cervical screening, time from outreach to completion, and disparity gap reduction across race/ethnicity, education, and income categories.

Analysis. Descriptive statistics, segmented regression of interrupted time series, and equity gap metrics of both absolute and relative differences.

Fidelity and cost. Audit navigation documentation to track program costs per additional screen completed, informing sustainability planning.

Dissemination. Quarterly reports to health system leadership and community partners and de-identified results shared with public health agencies.

Appendix C: Visual Representation of the Intervention (DrPH Field Product #3)



Appendix D: Fact Sheet for Patients (DrPH Field Product #4)