RELATIONSHIPS AMONG IDENTITY DISCLOSURE, MENTAL HEALTH SYMPTOMS, AND PARTICIPATION IN CERVICAL CANCER SCREENING AMONG BISEXUAL ADULTS

By

Callie Joy Harris

A DISSERTATION

Submitted to
Michigan State University
in partial fulfillment of the requirements
for the degree of

Nursing – Doctor of Philosophy

2025

ABSTRACT

Screening reduces incidence of a late-stage cervical cancer diagnosis by 60%–90%. Yet, bisexual people are participate less than their heterosexual counterparts, putting them at higher risk for late-stage diagnosis. Guided by an adaptation of Quinn & Earnshaw's Concealable Stigmatized Identity – Outcomes Model (CSI-O), this dissertation aimed to identify and investigate relationships among key determinants of cervical cancer screening participation among bisexual adults eligible for screening. With a focus on bisexual adults, three Manuscripts served to answer 4 research questions: (1) What determinants of health are associated with cancer screening participation?; (2) What is the predictive relationship between identity disclosure and mental health symptoms?; (3) What is the predictive relationship between identity disclosure and cervical cancer screening participation?; and (4) What is the predictive relationship between mental health symptoms and cervical cancer screening participation?

Manuscript 1 was a systematic literature review that identified how determinants of health relate to cancer screening participation among differing stigmatized sexual identities. Gaps identified within existing literature supported priority areas of study, including (1) cancer screening contexts; (2) stigmatized sexual or gender identity groups; and (3) determinants of health affecting screening participation. Priorities identified in this systematic review were applied to the CSI-O model to support the remaining chapters.

Manuscript 2 applied a secondary analysis of a broader study and examined the relationships between gender identity disclosure and mental health symptoms among people assigned female at birth who identified as bisexual and transgender. Findings supported that lower identity disclosure was associated with poorer mental health, but the association of identity disclosure with mental health depended on the disclosure setting; people who disclosed in healthcare settings, but not at home, reported higher anxiety and depressive symptoms. Additionally, identity disclosure patterns provided a comprehensive understanding of the relationships between identity disclosure and mental health.

Manuscript 3 used a descriptive cross-sectional study to examine how identity disclosure and mental health predict cervical cancer screening participation among bisexual adults. Broadening the findings from the secondary analysis (Manuscript 2), the sample included bisexual adults, either cisgender or transgender. Findings suggested that identity disclosure was associated with cervical cancer screening participation among bisexual people, but associations were dependent on how identity disclosure was measured, and the cervical cancer screening participation outcome considered. Identity disclosure pattern was significantly associated with cervical cancer screening participation, and individuals who disclosed identity at their last cervical cancer screening were more likely to be up-to-date. However, level of identity disclosure in an individual setting was not associated with any cervical cancer screening participation outcome. Compared to those who reported no fear of stigma in healthcare, those who reported having fear were significantly less intent to screen.

Research: Key relationships were identified in the adapted CSI-O model: identity disclosure and mental health symptoms predict behavioral outcomes, and identity disclosure predicts mental health. Strong statistical methods were employed in this study, including multiple regression, which supported the predictive relationships outlined in the adapted CSI-O model; however, they do not confirm causality. *Practice:* Past difficulty receiving healthcare due to stigmatized gender identity was related to poor mental health, and fear of stigma in healthcare was related to lower intention to screen. To prevent negative outcomes, providers should maintain affirming care environments for bisexual people. *Policy:* To support unique care needs of stigmatized groups, creative solutions are needed to replace previously available government funding. At-home testing kits are available for cervical cancer self-screening, and should be more widely available to support increased participation for bisexual people. *Conclusion:* This dissertation is the first step towards understanding unique needs of bisexual people in cancer screening. Bisexual-specific factors for cervical cancer screening participation are identified, and findings provide a pathway toward individualized care for at-risk groups.

This dissertation is dedicated to my greatest supporter and partner in life, Greg. Thank you for loving me, and for always making sure that I remembered to eat. I wouldn’t be here without you.

I also dedicate this work to my late father, Brian Kluitenberg, and to anyone in the LGBTQIA+ community who has ever felt alone or out of place in this unforgiving world.
You are loved. You are not alone.

ACKNOWLEDGEMENTS

This dissertation was made possible by the careful and tireless guidance of my mentors, the generosity of my funders, the support and encouragement of my peers, the time and effort of my participants, the determination of my fellow chronic illness academics, and the love, support, and patience of my family and friends.

To my mentors: Sincerest thanks to my guidance and dissertation committee members for their mentorship and patience as I learned the ways of philosophical and academic writing. To Dr. Horng-Shiuann Wu, Dr. Rebecca Lehto, Dr. Gwen Wyatt, Dr. Jae Puckett, Dr. Barbara Given, and Dr. Emma Schlegel, thank you for your careful attention to my learning and growth. Your feedback and expertise have been invaluable. To Dr. Dola Pathak and Jessica Sender, thank you for sitting with me countless times to help me solve problems and ease my worries.

Special thanks:

To Dr. Horng-Shiuann Wu, my Faculty Advisor, thank you for the countless hours spent working with me, helping me to learn and improve throughout this program. Your mentorship was invaluable not only to the completion of this dissertation, but also to the wellbeing of myself and my peers. Your enthusiastic service to the Doctoral Nurses Association contributed greatly to the success, collaboration, and joy of all members.

To Dr. Gwen Wyatt, thank you for your considerable contribution of time and expertise, and for always going above and beyond to support and encourage me. I cannot express how much I have learned, and how significantly my work has benefited from your help.

To Dr. Rebecca Lehto, who served as Faculty Advisor for a considerable portion of my program, thank you for your mentorship and unwavering support. You challenged me to think differently, and your calming presence is always appreciated.

To my funders: Without you, I would not have been able to conduct this research, or complete this program. I am forever thankful for your generosity, and your belief in me.

To my peers: To my DNA companions, Teresa Ng, Arienne Patano, Hesam Varpaei, and Alli Walsh, I will forever value our time spent together. Thank you for everything you have done to support and uplift me, our fellow peers, and the program at large. To Kellen Suriyawong, I was incredibly lucky to have you as my classmate. Our individual strengths and weaknesses could not have complimented each other better. To Lauren Pageau, Mohammed Alanazi, Muna Alali, and Eak Kantawong, thank you for sharing your experience and your encouragement, and for showing me the path towards success. To Kristy Griswold and Alexa Andersen, thank you for your listening ears. I'm so glad to have had you as friends and confidantes.

To my participants, and to the LGBTQIA+ community: Without you, my work would not be possible. I offer my sincerest gratitude to my participants for their trust and vulnerability, and for their thoughtful and significant contributions to this work. To my fellow members of the LGBTQIA+ community, I hope that this work will shine a light on underserved communities, and ultimately bring about positive change.

To fellow chronic illness academics: Thank you for showing me that it is possible to succeed with a chronic illness in academia. We face unique challenges, yet we persevere.

To my family and friends: You are incredible. Your love and support have been overwhelming. Thanks for sticking with me through it all. To Greg, my love, your unconditional encouragement and love has gotten me through the toughest of times, and I'm lucky to have you as a partner in life. To Karen Sessums, Melissa Durfee, and Adam Mullett, I don't know who I would be without you. Thank you for everything, I love you all beyond words. To Emmett and Isadora, you bring me more joy than you know. I can't wait to watch your lives unfold. To Verne, Josh, Justin, Jeremy, Jason, and Adriane, I am so grateful to have you in my life, and in my family. To Paige Quarterman, thank you for your endless patience, love, and encouragement. To Brian and Anabelle Kluitenberg, some of my strongest supporters who are not here to witness this accomplishment, know that you were with me through it all.

TABLE OF CONTENTS

CHAPTER 1: INTRODUCTION 1
  REFERENCES 28
  APPENDIX A: MEASURES & QUESTIONNAIRES 35

CHAPTER 2: RELATIONSHIPS AMONG DETERMINANTS OF HEALTH, CANCER SCREENING PARTICIPATION, AND SEXUAL MINORITY IDENTITY: A SYSTEMATIC REVIEW 47
  REFERENCES 79

CHAPTER 3: MENTAL HEALTH AND IDENTITY DISCLOSURE FOR BISEXUAL TRANSGENDER IDENTITY: EVALUATING RISK FOR PEOPLE WITH COMMONLY INTERSECTING IDENTITIES 86
  REFERENCES 106
  APPENDIX A: CHAPTER 3 SUPPLEMENTAL MATERIALS 108

CHAPTER 4: EXAMINATION OF IDENTITY DISCLOSURE AND MENTAL HEALTH AS PREDICTORS OF CERVICAL CANCER SCREENING PARTICIPATION AMONG BISEXUAL INDIVIDUALS 118
  REFERENCES 143
  APPENDIX A: CHAPTER 4 SUPPLEMENTAL MATERIALS 149

CHAPTER 5: CONCLUSIONS AND IMPLICATIONS RESULTING FROM THIS DISSERTATION STUDY 168
  REFERENCES 183

CHAPTER 1: INTRODUCTION

Introduction

Problem

Screening reduces the incidence of a late-stage cervical cancer diagnosis by 60%–90%.[1,2] However, bisexual people (a stigmatized sexual identity: attraction to more than 1 gender) are significantly less likely to participate in cervical cancer screening than their heterosexual counterparts (sexual identity: attraction to the opposite gender).[4] This health disparity in screening participation contributes to a 2 times greater cervical cancer diagnosis among bisexual people as compared to heterosexual people,[5,6] and puts this population at higher risk for late-stage diagnosis.[4] Identifying unique determinants of health influencing cervical cancer screening participation among bisexual people could provide a path to reduce disparities by alerting healthcare providers to bisexual patients' unique health risks and needs. To promote screening and reduce risk for late-stage cancer diagnosis, the purpose of this dissertation was to identify and examine the influence of key determinants of health (e.g., identity disclosure, anxiety, depressive symptoms, fear of stigma) on cervical cancer screening participation among bisexual people eligible for screening.

State of the Science

Despite bisexual people being the largest stigmatized sexual identity group (i.e., sexual minority; group whose sexual identity differs from societal norms e.g., gay, lesbian, bisexual),[3] cancer screening research that centers on bisexual populations is scant, and a significant proportion of cervical cancer screening studies does not disaggregate bisexual people from other stigmatized sexual identity groups in their analyses. Some health disparities, such as increased rates of anxiety, disordered eating, or heavy drinking,[7] are disproportionately experienced among bisexual people due to unique sexual identity-related stigma experiences (e.g., pervasive societal assumption of bisexual people as promiscuous or sexually confused).[7]

However, due to limited research, it is unknown whether such identity-related stigma may affect bisexual disparities in cervical cancer screening participation.

Further limiting current knowledge, studies investigating cervical cancer screening among bisexual people often exclusively address cisgender women (assigned female sex at birth and identify gender as women), but not transgender people who were assigned female sex at birth. Still, one study suggests that among bisexual people, those with intersecting (i.e., co-occurring) transgender identity have a greater risk for cancer screening nonparticipation than those with cisgender identity.[47] As a commonly intersecting stigmatized gender identity (i.e., transgender),[8] cancer screening research involving sexual minorities should consider including both cisgender and transgender individuals. **Figure 1.1** provides a visual depiction of how these sexual and gender identities intersect.

Each of the key concepts in this dissertation (identity disclosure, anxiety, depressive symptoms, fear of stigma) is essential to understanding cervical cancer screening participation (the primary outcome) among bisexual people. Current research that includes stigmatized sexual identities suggests that the effects of identity disclosure are dependent on social setting (e.g., in healthcare) and context (e.g., cervical cancer screening), but how disclosure across different social settings affects cervical cancer screening participation among bisexual people is unknown. While prior studies have investigated associations between identity disclosure and mental health, it is not known how the setting and context of identity disclosure affect mental health symptoms. Mental health symptoms, including anxiety and depressive symptoms, are highly prevalent among bisexual individuals.[9,10] It is known that stigma-related mental health symptoms may decrease an individual’s motivation to participate in preventive healthcare services;[11,12] however, research examining the effects of mental health symptoms on cervical cancer screening participation among bisexual people is limited.

Background & Significance

Identity Disclosure

Identity disclosure is the sharing of a person’s stigmatized identity with others. For those with stigmatized sexual identities, *identity disclosure* is the sharing of an individual's sexual identity (personal self-identification with sexual and/or romantic attraction [e.g., bisexual]) or gender identity (personal self-identification with gender [e.g., woman]) with people in a particular social setting (i.e., in public, at work, in healthcare, with friends, with family, or at home).

Bisexual people are 20%-30% less likely than gay or lesbian people to disclose their identity to any healthcare provider.[7] Studies showed that among lesbian people (sexual identity: attracted to same gender), disclosing sexual identity in healthcare settings significantly improved cervical cancer screening participation.[13-15] Yet, it is unknown how disclosure of bisexual identity in healthcare settings affects cervical cancer screening participation. To address this gap, this dissertation examines how identity disclosure influences cervical cancer screening participation among bisexual individuals.

Mental Health Symptoms

Mental health symptoms are affective determinants of health, including anxiety and depressive symptoms, and fear of stigma, each defined and described in the following sections.

Anxiety

Anxiety is an adaptive fear-induced affective response to stressors.[16] It can be classified as either a trait (chronic anxiety, tendency toward anxiety, or anxiety sensitivity) or a state (situational anxiety response).[17] Anxiety is comprised of 4 key components: behavioral, cognitive, physiological, and somatic. The behavioral component includes physical interactions with the environment, such as avoidance, observable agitation, and withdrawal.[18] The cognitive component involves the mental manifestations of anxiety, including difficulty concentrating, intrusive, perseverative thought processes, and bias toward threats that are associated with worry.[19] The physiological component of anxiety includes objective physical and biological changes, such as increased heart rate, sweating, pupil dilation, and modified cortisol slope.[20] Finally, the somatic component is comprised of subjective bodily sensations and feelings, such as uneasiness, jitteriness, or dizziness.[21] This dissertation focused on subjective components (behavioral, cognitive, and somatic), which could be measured by self-report.

Anxiety and Cancer Screening Participation in Bisexual Individuals

Social acceptance of individuals with stigmatized sexual identities has generally increased in recent decades. However, a current study showed that 47% of heterosexual-identifying people are still unaccepting of sexual and gender minority people.[12] Thus, bisexual individuals continue to face stigma from heteronormative culture. Often as a result of their unique and greater perceived stigma, bisexual people are 8% more likely to meet criteria for generalized anxiety when compared to other stigmatized sexual identities.[9,10] Additionally, bisexual people have 3.29- and 1.61-times greater odds of reporting experiences of anxiety than heterosexual or lesbian individuals, respectively.[22]

Anxiety may contribute to avoidance of preventive care.[12] However, due to limited research that analyzes bisexual people separate from other sexual minority identities, the prevalence of anxiety among bisexual people is yet to be confirmed. Some qualitative studies have found that individuals with stigmatized sexual and/or gender identities experience increased mental health symptoms, including anxiety, in cervical cancer screening contexts.[23-26] Anxiety related to sexual identity stigma was pronounced in cervical cancer screening contexts where healthcare providers discuss sexual habits with bisexual people.[11] The Concealable Stigmatized Identities Outcomes Model (CSI-O) theorizes psychological outcomes (i.e., anxiety) as important determinants that influence behavioral outcomes (i.e., cervical cancer screening participation) among people with stigmatized identities. Guided by the CSI-O, this dissertation validates the theoretically supported relationship between anxiety and cervical cancer screening participation among bisexual people.

Depressive Symptoms

Depressive symptoms are a subjective affective experience of depressed mood, resulting in negative feelings, such as sadness, anhedonia, and irritability, as well as a reduced ability to function effectively.[27] Depressive symptoms can result from a depressive disorder or as a result of a stressful life event.[28] Depressive symptoms have been linked with many negative health outcomes, including insomnia, suicide and suicidal ideation, and cardiovascular illness.[30] Recent science has indicated a concerning rise in depressive symptoms related to the use of social media, particularly among adolescents and young adults.[29] Even more concerning, the prevalence of depressive symptoms has more than doubled since the COVID-19 pandemic.[31] As an exponentially increasing global threat to morbidity and mortality, it is crucial that preventable causes of depressive symptoms are identified and addressed.

Depressive Symptoms and Cancer Screening Participation in Bisexual People

Among commonly reported stigmatized sexual identity groups (i.e., gay, lesbian, bisexual), bisexual people have the greatest risk for depressive symptoms.[22] Bisexual people are at 2.38 and 1.45 times greater odds of reporting experiencing depressive symptoms than heterosexual individuals and lesbian individuals, respectively.[22] Depressive symptoms are typically non-motivating regardless of the context, even at low levels.[33] Thus, people with more significant depressive symptoms may be less motivated to participate in preventive healthcare activities.[34,35] However, how depressive symptoms influence cervical cancer screening participation among bisexual individuals is currently unknown.

Fear of Stigma

For the purposes of this dissertation, the “fear of stigma” is a minority stress factor (i.e., stressor specific to a minoritized individual's experiences with stigma).[69] Past experiences with stigma associated with disclosing one's concealable stigmatized identity may contribute to a fear of subsequent stigma experiences.[68] For example, a person who experienced social isolation or bullying after disclosing their identity as an alcoholic with colleagues may be afraid of facing similar stigma experiences if their identity is disclosed in other social encounters in the future. Concerningly, fear of stigma in future healthcare encounters among people with mental health disorders contributed to nonparticipation in preventive care, even among those who were aware of the benefits of participation.[90]

Fear of Stigma and Cancer Screening Participation in Bisexual Individuals

Fear toward expected future stigma-related events (i.e., fear of stigma) is a proximal minority stress factor (i.e., stressor specific to a minoritized individual's experiences with stigma).[69] Fear of stigma towards one's stigmatized sexual or gender identity has been reported in many qualitative studies of people who did not participate in cervical cancer screening.[25,70,71,72] These fears may be a response to prior experiences with stigma in healthcare environments where one's identity had been disclosed.[71,72] However, few studies have quantitatively examined the relationship between fear of stigma and cervical cancer screening participation. Thus, the relationship between fear of stigma and cervical cancer screening participation among bisexual people is yet to be confirmed.

Framework

This 3-manuscript dissertation consists of the following: (1) a systematic review of the state of science (chapter 2) identifying determinants of health (including personal/demographic characteristics) for cancer screening participation among stigmatized sexual identities; (2) a secondary data analysis (chapter 3) evaluating the predictive relationship between identity disclosure and mental health symptoms; and (3) a descriptive cross-sectional study (chapter 4) examining identity disclosure and mental health symptoms as predictors of cervical cancer screening participation. Completion of the 3 manuscripts advances the science on the key determinants of health contributing to cancer screening (non)participation among bisexual individuals. In particular, this dissertation provides a new perspective on how mental health symptoms and disclosure of stigmatized identities can affect cervical cancer screening participation for people with a particular stigmatized sexual identity (i.e., bisexual identity). To address the unique experience of bisexual people, this dissertation investigated the concepts specific to people with concealable stigmatized identities (i.e., bisexual identity). The theoretical foundation of CSI-O Model is described in more detail below.

Theoretical Model: Concealable Stigmatized Identities Outcomes

This dissertation is guided by Quinn and Earnshaw's CSI-O model **(Figure 1.2)**.[36] The CSI-O model examines the relationships among major concepts: (1) construction of identity, (2) psychological outcomes, and (3) behavioral outcomes that are specific to people with concealable stigmatized identities. While physical outcomes (i.e., chronic illness symptoms, immune function, overall health) are included in the CSI-O model, this concept (physical outcomes) is not examined in this dissertation as it requires long-term follow-up. Therefore, this concept is not further described in this chapter. The CSI-O model provides a theoretical basis specifying the relationships among key determinants of health and cervical cancer screening participation among bisexual individuals. The following sections (1) describe the original CSI-O theory; (2) introduce a conceptual model adapted from the CSI-O for this dissertation; and (3) present an operational model as it is applied to each chapter of this dissertation.

The CSI-O model presents theoretical relationships among stigmatized identity construction experiences, psychological outcomes, and behavioral outcomes; it has been successfully applied in the study of psychological outcomes of disclosing one's stigmatized sexual identity.[37-39] However, the CSI-O has not been used in the study of bisexual-identifying people and cancer screening participation.[36] The model supports an examination of important stigma-related factors (i.e., identity disclosure, mental health symptoms) unique to bisexual populations that are not captured in the models that have historically been used in cancer screening literature, such as the Health Belief Model, the Theory of Planned Behavior, or the Trans-Theoretical Model.[32,40,41]

The CSI-O model focuses on how identity-specific concepts (e.g., identity disclosure) affect health outcomes. This dissertation investigates sexual identity, and not sexual behavior. The focus on sexual identity was supported by recent studies, which conclude that sexual identity and sexual behavior are distinctly different concepts, which are often incongruent.[73,74] Thus, the focus on sexual identity in this dissertation is supported by theory and prior research. The population of interest in this dissertation study centered on anyone who self-identified their sexual identity as 'bisexual,' defined as having sexual and/or romantic attraction to more than one gender.[37-39,49] To identify bisexual individuals for the study, bisexual identity was operationalized using the question "Do you consider yourself to be (select all that apply) (1) straight, (2) lesbian or gay, (3) bisexual, (4) asexual."

Construction of Identity

The construction of a person's concealable stigmatized identity includes *valenced content* (affective stigma-related experiences),[42] which helps "construct" how a person experiences their concealable stigmatized identity. The CSI-O model additionally examines *magnitude* (self-assigned significance of one's stigmatized identity)[42] as an identity construction factor. However, magnitude was not addressed in this dissertation study due to limited literature to support the relationship between bisexual identity magnitude and cervical cancer screening participation.

Valenced content includes affective experiences, such as *anticipated stigma* (expectation of discrimination or negative stereotypes),[42] *disclosure experiences* (extent of identity disclosure or concealment),[42,43] *internalized stigma* (perception that negative stereotypes are true of oneself),[42] *enacted stigma* (discrimination experiences related to identity),[42] and *counter-stereotypic* or *specialized positive information* (affirming experiences).[42] The CSI-O model suggests that someone with negatively valenced content (i.e., negative affective experiences related to their concealable identity) is more likely to have adverse psychological outcomes.[42] The relationship between negatively valenced content and psychological outcomes may differ depending on the type of the concealable identity being addressed (e.g., sexual vs racial/ethnic identity).[42] In this dissertation, valenced content is defined as positive or negative experiences related to one's stigmatized sexual or gender identity, and was represented by level of identity disclosure (the experience of sharing one's stigmatized sexual or gender identity to others) in various social settings, which may yield negative psychological outcomes (i.e., mental health symptoms).

Psychological Outcomes

Psychological outcomes are described as indicators of mental health, including anxiety and depressive symptoms, and negative experiences with fear of stigma.[36] Negative identity disclosure experiences have been associated with increased anxiety and depressive symptoms.[36] In turn, one's psychological outcomes can affect behavioral outcomes, such as healthcare utilization or substance use.[42] Psychological outcomes were examined in this dissertation as 3 major mental health symptoms: anxiety and depressive symptoms,[9,10,22] and fear of stigma. For the purposes of this dissertation, the "fear of stigma" is used to evaluate the psychological outcome of 'stress' as described in the CSI-O model.[69] Current literature supports the examination of anxiety and depressive symptoms, and fear of stigma as potential determinants of cancer screening participation.

Behavioral Outcomes

Behavioral outcomes in the CSI-O model are the health-related actions of individuals with concealable stigmatized identities.[36] Some such behavioral outcomes include healthcare utilization, treatment adherence, and health-promoting behaviors.[36] In this dissertation, the behavioral outcome, i.e., cervical cancer screening participation, is the primary outcome.

CSI-O Model Relationships

The CSI-O model illustrates the inter-connectedness between identity construction and psychological, behavioral, and physical health. Within the model, construction of identity directly affects psychological, and directly and indirectly affects behavioral and physical outcomes.[42] Central to the model, psychological outcomes are directly affected by identity construction, and subsequently contribute to both behavioral outcomes and physical health outcomes.[42] Finally, behavioral outcomes can ultimately affect physical health outcomes.[42]

Model Limitations

While the CSI-O is explicit about the relationships among key concepts, an individual's personal/demographic characteristics (e.g., race/ethnicity, socioeconomic status, rurality) and intersecting stigmatized identities (e.g., bisexual and transgender) that can affect behavioral outcomes are not included within the model. Quinn and Earnshaw discussed the importance of acknowledging intersectional identities (e.g., having both stigmatized sexual and racial identities), and the influence of broader societal factors (e.g., systemic racism, classism) on an individual's experiences with concealable stigmatized identities.[44,45] Thus, key personal/demographic characteristics including intersecting stigmatized identities (i.e., intersecting sex assigned at birth, gender identity, rurality, partner gender, employment status, insurance level, education level, household income, race/ethnicity, age) and their effects on behavioral outcomes were added in the adapted model.

Conceptual Model: Adapted CSI-O Model for Bisexual Cervical Cancer Screening

Model Adaptations and Relationships

Quinn and Earnshaw's CSI-O model[42] has been applied in a study of quality of life for people who do not disclose sexual minority identity;[39] however, it has not been applied in the study of cancer screening among people with bisexual identity. In this dissertation, the CSI-O has been adapted by applying concepts within the model that are specific to cervical cancer screening among bisexual adults, as supported by current literature.

Concepts in the adapted conceptual CSI-O model were selected to represent the construction of identity, psychological outcomes, and behavioral outcomes from the original CSI-O model. To that end, the adapted conceptual model **(Figure 1.3)** that guided the dissertation addresses 4 main concepts: (1) identity construction expressed as *identity disclosure*; (2) psychological outcomes depicted as *mental health symptoms* (fear of stigma; anxiety and depressive symptoms); (3) behavioral outcomes identified as *participation in cervical cancer screening*; and (4) *personal/demographic characteristics* as they relate to behavioral outcomes. Personal/demographic characteristics were added to the adapted CSI-O model to acknowledge characteristics that are important to sexual minority groups, as supported by current literature. Additionally, the inclusion of personal and demographic characteristics in the adapted CSI-O model aligns with the underlying themes of Quinn and Earnshaw's work, which implicitly incorporates these characteristics.[14,44-48] In the following sections, each concept is described with the theoretical terminology provided in parenthetical italics.

Relationships in the adapted CSI-O model are represented by color-coded lines for each manuscript: (1) purple (Manuscript 1), (2) blue (Manuscript 2), and (3) pink (Manuscript 3). "RQ" (Research Questions) was added throughout the model to indicate the location of each research question addressed in this dissertation. These questions are explained in more detail in the following sections.

The relationship between personal/demographic characteristics and behavioral outcomes is consistent with Quinn and Earnshaw's discussions of health and intersecting stigmatized identities (e.g., health disparities among transgender and bisexual individuals with low socioeconomic status).[44,49] Thus, the relationships between personal/demographic characteristics and cervical cancer screening participation (behavioral outcomes) were examined in **RQ 1** (*What determinants of health [including personal/demographic characteristics] are associated with cancer screening participation (and nonparticipation) among adults with differing stigmatized sexual identities?)*.

The adapted CSI-O model retains the consecutive predictive relationships between identity disclosure (construction of identity), mental health symptoms (psychological outcomes), and cervical cancer screening participation (behavioral outcomes) were examined in **RQ 2** (*What is the predictive relationship between identity disclosure in 6 key social settings (at home, with family, with friends, at work, in public, and in healthcare) and mental health symptoms among bisexual individuals who were assigned female at birth and identify as bisexual and transgender?)*; **RQ 3.1** (*What is the predictive relationship between identity disclosure in 8 social settings (with family, extended family, people at work/school, strangers, healthcare settings, and heterosexual/straight, lesbian/gay, and bisexual people they socialize with), and cervical cancer screening participation among bisexual adults?)*; and **RQ 3.2** (*What is the predictive relationship between mental health symptoms and cervical cancer screening participation among bisexual adults?).*

Primary Concepts in the Adapted CSI-O Model

Identity Disclosure. Construction of identity was conceptualized as *identity disclosure,* that includes the disclosure of sexual identity (Manuscripts 1 and 3) or gender identity (Manuscript 2) in distinct social settings or social groups (in healthcare, with friends [heterosexual/straight, lesbian/gay, or bisexual friends], publicly/with strangers, at work/school, at home, with family [immediate or extended]). Identity disclosure is a significant affective experience of identity construction, representing valenced content within the CSI-O theoretical model, and refers to the disclosure of a concealable stigmatized identity with others.[50] Although the CSI-O theoretical model addresses “disclosure reactions” (i.e., others’ response to disclosure, including rejection or acceptance), studies have shown that the act of identity disclosure itself, separate from disclosure responses, can affect cervical cancer screening participation for some stigmatized groups (e.g., lesbian people). Thus, this dissertation examines “identity disclosure,” rather than disclosure responses. Quinn and Earnshaw found that those who do not disclose their stigmatized sexual identity had worse psychological well-being than those who disclosed their identity to others.[39] However, the effects of disclosure on psychological outcomes may differ by social setting (e.g., with family vs in healthcare).[39]

Mental Health Symptoms. Psychological outcomes were conceptualized as *mental health symptoms*, including anxiety and depressive symptoms (Manuscripts 2 and 3) and fear of stigma (Manuscript 3). Manuscript 1 was a systematic review that identified the determinants of cancer screening among people with stigmatized sexual identities, which may include mental health symptoms affecting one’s motivations to participate. Manuscript 2 was a secondary data analysis of existing data that examined the relationships between mental health symptoms and disclosure of stigmatized identities across 6 social settings using a large sample of individuals assigned female at birth with commonly intersecting identities, i.e., people who identify as bisexual and transgender. This second manuscript provided a more in-depth examination of the relationships between mental health and identity disclosure, which could be generalized to people who identify as bisexual and transgender and are eligible for cervical cancer screening. Manuscript 3 was a descriptive study that examined the relationships among mental health, identity disclosure, and screening participation in bisexual adults (with any intersecting gender identity) who were eligible for cervical cancer screening. Findings from this study could be generalized to all bisexual individuals eligible for routine cervical cancer screening.

Participation in Cervical Cancer Screening. The behavioral outcome was conceptualized as participation in cervical cancer screening, which was the primary outcome of this dissertation. The systematic review (Manuscript 1) identified that cancer screening participation (including cervical cancer) could be affected by determinants of health (including personal/demographic characteristics) among individuals with stigmatized sexual identities. Consistent with current cancer screening literature, the descriptive study (Manuscript 3) operationalized cervical cancer screening participation as self-reported screening behavior (ever screened, screened up to date) and intention to screen.

Personal/Demographic Characteristics. To overcome model limitations and consider other factors affecting an individual's cervical cancer screening participation, the *personal/demographic characteristics* concept was added to the adapted CSI-O model (**Figure 1.3**). Identified in Manuscript 1, key determinants of cervical cancer screening participation included personal/demographic characteristics at the individual, interpersonal, community, and societal levels. Some of these personal/demographic characteristics were statistically controlled in the evaluation of relationships among identity disclosure, mental health symptoms, and cervical cancer screening participation in Manuscripts 2 and 3.

Operational Model: Adapted CSI-O Model for Bisexual Cervical Cancer Screening

Figure 1.4 presents the operational model for this dissertation. The adapted CSI-O model was operationalized to examine the research questions outlined in this dissertation. Measures for each variable within the operational model are described below. The full instruments are included in **Appendix A**.

Operationalization of Cervical Cancer Screening Participation (Manuscripts 1 and 3)

Cervical cancer screening participation was operationalized as past participation behavior (i.e., ever screened, or screened up to date) or intention to participate in cervical cancer screening. The systematic review (Manuscript 1) operationalized cervical cancer screening participation as any quantitative evaluation of screening, including past screening behavior and intention to participate. Consistent with the systematic review, in the descriptive study (Manuscript 3), cervical cancer screening participation was operationalized as 1) whether participants had ever screened, 2) were screened up to date, and 3) whether they intended to screen.

Ever screened was measured using two questions modeled after the cervical cancer screening questionnaire from the Behavioral Risk Factor Surveillance System (BRFSS) survey. The BRFSS survey is distributed annually across the United States.[51] **Screened up to date** was measured by using two questions from the BRFSS to assess the timing of the last cervical cancer screening. Responses were scored dichotomously to describe who had (Pap/HPV < 3y [ages 21-29]; HPV < 5y or Pap < 3y [ages 30-65]) or had not (Pap ≥ 3y [ages 21-29], or HPV ≥ 5y or Pap ≥ 3y [ages 30-65], or never screened) met recommendations for cervical cancer screening participation.[1,51] To additionally evaluate whether participants **intended to participate in future cervical cancer screening**, Manuscript 3 included one (ages 21-29) or two (ages 30-65) questions asking participants to rate from 1 (not at all likely) to 5 (very likely) “How likely are you to complete a (Pap and/or HPV test within the next 3 years? [ages 21-29]), / (Pap test within the next 3 years [ages 30-65]) 5 years? [ages 30-65]) and (HPV test within the next 5 years [ages 30-65])”.[67] Assessments of intention are often used as a proxy for observed screening behavior[75-77] and helped to ensure that state measures of mental health preceded the outcome variable.

Operationalization of Identity Disclosure (Manuscripts 2 and 3)

Identity disclosure is conceptually defined as the sharing of one’s sexual or gender identity with others. Manuscript 2 operationalized identity disclosure using 6 items adapted from the National Transgender Discrimination Survey: “How many people know or believe you are transgender" in each of the following social circles or settings: in healthcare, with friends, in public, at work, at home, or with family?[52] Consistent with the National Transgender Discrimination Survey, a definition of each setting (e.g., "in public") was not provided. Participants self-interpreted each setting;. A numeric rating scale was used (0 = none to 4 = all), with higher scores indicating greater disclosure. Items from this measure have been adapted to examine sexual or gender identity disclosure among people with stigmatized sexual identities (*r* = .73),[12,53] and stigmatized gender identities.[54] Development of the original survey items and content validity was addressed by subject matter experts across the United States.[52]

Built on Manuscript 2, in Manuscript 3, identity disclosure was operationalized as whether, or to what degree, a person disclosed their bisexual identity with people in 8 distinct social settings, and was measured using 7 items from Brownfield and Brown's (2022) version of the Nebraska Outness Scale – Disclosure,[78] which was adapted for bisexual participants. In addition to the 7 social settings addressed in Brownfield and Brown's adapted scale (immediate family, extended family, people at work/school, strangers, and heterosexual/straight, lesbian/gay, and bisexual people they socialize with), 1 new setting (people in healthcare settings) was added to measure disclosure in healthcare.[79] Participants rated disclosure level in each of the 8 social groups by answering "What percent of people in this group do you think are aware of your bisexual identity (meaning they are aware that you consider yourself bisexual)?" Each of the questions asked participants to rate their disclosure level, for a given social setting, from 0% - 100%, with response options provided in increments of 10%.Consistent with the original measure, a definition of each setting (e.g., "strangers") was not provided. For each participant, the total disclosure score was calculated as the total percentage disclosed across all social groups to which the participant responded.

The original Nebraska Outness - Disclosure scale had strong validity and internal consistency reliability (α = .82, *r* = .83 against the Outness Indicator),[79] and was content-validated for bisexual populations, with internal consistency reliability (α = .83).[78] To support a temporal link between identity disclosure and screening participation, Manuscript 3 additionally included 1 question to directly assess identity disclosure in past cervical cancer screening: “At the time of your last cervical cancer screening, was your provider aware of your bisexual identity?” with response options including yes, no, or don’t know/unsure.

Operationalization of Mental Health Symptoms (Manuscripts 2 and 3)

The assessment of mental health within the past 7-30 days (e.g., PROMIS, HADS) has been frequently used in examining the predictive relationship between mental health symptoms and preventive healthcare participation, including past cancer screening behavior (e.g., BRFSS)[35,80,81] and intention for future cancer screening.[82,83] Consistent with current research, this dissertation evaluated participants’ mental health over the past 7 days (PROMIS Anxiety/Depression) in relation to cervical cancer screening participation, including past behavior (BRFSS) and future intention. To clarify the temporality of the relationship between identity disclosure and screening participation, using trait measures gave insight into a person’s tendency towards mental health symptoms (i.e., anxiety, depressive symptoms).

Anxiety. Anxiety is conceptually defined as an adaptive fear-induced affective response to stressors. State anxiety was measured using PROMIS Anxiety (Short Form 8a; Manuscript 2, Short Form 7a; Manuscript 3).[16,55] This measure identified symptoms of anxiety (e.g., fearfulness, worry) over the past 7 days. Numeric rating responses ranged from 1 (never) to 5 (always). PROMIS scales were developed for public domain and tested in a large, representative sample of the general population.[55] The PROMIS scales have demonstrated strong internal consistency reliability (α = .94-.95),[56] and strong convergent validity with the Hospital Anxiety and Depression Scale (*r* = .835)[57] in sexual minority populations and cancer contexts. Raw scores from each item were converted to T-scores, with higher scores meaning greater anxiety (Manuscripts 2 and 3). Where a dichotomous variable was needed for statistical analysis, anxiety was reported as either high (T-Score $\geq$ 60; moderate to high) or low (T-score < 60; mild to normal) (Manuscript 2). In addition, Manuscript 3 examined trait anxiety using the State Trait Anxiety Inventory – Trait (form Y-2).[84] This legacy measure evaluates how one experiences anxiety symptoms generally. To examine one's tendency towards anxiety, participants rated how they generally feel about 20 statements on a numeric scale from 1 (almost never) to 4 (almost always). Negative statements (e.g., "I feel like a failure," "I feel nervous and restless") are scored according to the numeric scale, while positive statements (e.g., "I feel secure", "I make decisions easily") are reverse-scored. The Trait subscale of the State-Trait Anxiety Inventory has demonstrated strong internal consistency in a sample of sexual minority adults (α = .89-.92),[85] with convergent validity of (r = .75-.80) against similar measures of anxiety (e.g., Beck Anxiety Inventory, Self-rating Anxiety Scale).[86]

Depressive Symptoms. Depressive symptoms are conceptually defined as subjective affective experiences of depressed mood. State depressive symptoms were measured using PROMIS Depression measure (Short Form 8a; Manuscripts 2 and 3).[27,55] This measure identifies depressive symptoms (e.g., feeling worthless, helpless) over the past 7 days. Numeric rating responses ranged from 1 (never) to 5 (always). The PROMIS Depression measure has demonstrated strong validity with the Center for Epidemiological Studies Depression scale (r = .82-.84)[58] and strong internal consistency reliability (α = .94-.95)[56] in sexual minority populations and cancer contexts. Raw scores from each item were converted to T-scores, with higher scores meaning greater depressive symptoms (Manuscripts 2 and 3). When examined dichotomously, depressive symptoms were reported as either high (T-Score $\geq$ 60; moderate to high) or low (T-score < 60; mild to normal) (Manuscript 2). In addition, trait depressive symptoms were measured using the Maryland Trait and State Depression (trait) scale.[87] To examine one's tendency towards depression, participants rated how they generally feel about 18 statements (e.g., "I sleep more than most people when my mood is low," "I feel hopeless about my future") on a numeric scale from 0 (never) to 4 (experienced many times in a month for almost every month of my adult life). The Trait subscale of the Maryland Trait and State Depression scale has demonstrated strong internal consistency reliability in a study of sexual behaviors among Iranian American adults ($\alpha = .96$),[88] and has been validated against Brief Psychiatric Rating Scale-Depression ($r = .53$).[87]

Fear of Stigma. Fear of stigma is conceptually defined as a negative affective response to anticipated stigma and was measured in Manuscript 3 using a single-item question: "Have you ever felt afraid or avoided healthcare services because of fear that someone may learn about your sexual identity?"[89] Levels of fear were rated on numeric rating scales ranging from 1 (never) to 5 (always). This question was developed based on the Concealable Stigmatized Identities - Outcomes framework and has been used previously to examine how fear of stigma affects health-seeking behaviors.[89] The inclusion of this item provided additional stigma-related context to support the examination of the relationship between mental health and cervical cancer screening participation in individuals with stigmatized identities.

Operationalization of Personal/Demographic Characteristics (Manuscript 1)

Personal/demographic characteristics were identified in current literature, and relationships with cervical cancer screening participation were examined in a systematic review (Manuscript 1). Key personal/demographic characteristics identified in the literature and systematic review were then included in the demographic survey (Manuscripts 2 and 3) to evaluate as covariates. Personal/demographic characteristics identified in relevant literature included gender identity (select all that apply), rurality (rural, urban, suburban), partner status (partnered vs. not partnered), partner gender (gender identity same as partner vs. gender identity differs from partner), employment status (employed vs underemployed), insurance level (insured vs underinsured), education level (categorical, high school diploma or less – doctoral degree), household income (categorical, < 10k – > 100k), race/ethnicity (select all that apply), and age (years).[13-15,46-48,59-64]

Purpose and Outline

The purpose of this dissertation was to identify and investigate the relationships among key determinants of cervical cancer screening participation among bisexual adults eligible for screening. This dissertation is consisted of a systematic literature review, a secondary data analysis, and a descriptive cross-sectional study that (1) examined the state of the science to identify the determinants of health associated with sexual minorities' cervical cancer screening participation (**RQ1**); (2) assessed the association between identity disclosure and mental health symptoms (**RQ 2**); (3) examined the predictive relationship between identity disclosure and cervical cancer screening participation (**RQ 3.1**); and (4) examined the predictive relationship between mental health and cervical cancer screening participation (**RQ 3.2**). By addressing these 4 research questions, new knowledge has been developed on how each of the key stigma-related determinants influences cervical cancer screening participation among bisexual adults.

Research Questions

The following research questions were addressed in this dissertation:

RQ 1

What determinants of health (including personal/demographic characteristics) are associated with cancer screening participation (and nonparticipation) among adults with differing stigmatized sexual identities?

RQ 2

What is the predictive relationship between identity disclosure in 6 key social settings (at home, with family, with friends, at work, in public, and in healthcare) and mental health symptoms among individuals who were assigned female at birth and identify as bisexual and *transgender?*

RQ 3.1

What is the predictive relationship between identity disclosure in 8 key social settings (with family, extended family, people at work/school, strangers, healthcare settings, and heterosexual/straight, lesbian/gay, and bisexual people they socialize with), and cervical cancer screening participation among bisexual adults?

RQ 3.2

What is the predictive relationship between mental health symptoms and cervical cancer screening participation among bisexual adults?

Dissertation Format

This dissertation used a 3-manuscript format to answer the research questions outlined above. The remaining chapters of this dissertation include the following.

Chapter 2 (Manuscript 1)

Before developing Manuscript 1, a scoping review [unpublished] addressing affective cancer screening experiences among people with stigmatized sexual and gender identities was conducted. The scoping review found that (1) mental health symptoms, including anxiety and depressive symptoms, affect cancer screening experiences; (2) many factors can affect cancer screening beyond affective experiences; and (3) literature often examines all stigmatized sexual and gender identities as a singular population, and experiences that are unique to people with differing stigmatized sexual and gender identities are not widely reported.[65-67]

The results of this scoping review prompted the development of Manuscript 1 (Chapter 2) of this dissertation, which comprehensively and systematically examined existing literature to identify how determinants of health relate to cancer screening participation among differing stigmatized sexual identities. This systematic review identified gaps within existing literature and priority areas of study, including (1) cancer screening contexts (i.e., cervical vs breast cancer screening); (2) stigmatized sexual or gender identity groups (i.e., bisexual and transgender); and (3) determinants of health (including personal/demographic characteristics) affecting cancer screening participation. These priorities were then applied to the adapted CSI-O model to support the remaining chapters.

Chapter 3 (Manuscript 2)

To address the gap in knowledge regarding the relationships between key determinants of cervical cancer screening participation among bisexual adults, a secondary data analysis of a broader study examined the relationships between identity disclosure in 6 disclosure settings (in healthcare, with friends, in public, at work, at home, with family) and mental health symptoms (anxiety, depressive symptoms) among people assigned female at birth who identified as bisexual and transgender. Among individuals with stigmatized identities, those who hold 2 commonly intersecting identities (i.e., bisexual [sexual identity] and transgender [gender identity]) are at greatest risk for cancer screening nonparticipation.[47] The new knowledge gained by focusing on individuals assigned female at birth with intersecting stigmatized identities provided a deeper understanding of the relationships between identity disclosure and mental health (the key predictors of screening nonparticipation) among the most at-risk sub-group of bisexual individuals eligible for screening.

Chapter 4 (Manuscript 3)

Building on understanding of the relationships between determinants of health (including personal/demographic characteristics), mental health symptoms, and cervical cancer screening participation identified in Manuscripts 1 and 2, and supported by the CSI-O model, a descriptive cross-sectional study examined how identity disclosure and mental health predict cervical cancer screening participation among bisexual adults. Broadening the findings from the secondary data analysis (Manuscript 2), the sample for this study included bisexual adults, either cisgender or transgender. This study expanded understanding of these relationships to all bisexual adults eligible for cervical cancer screening and increased the generalizability of findings.

Chapter 5

In the final chapter of this dissertation, findings from each chapter are synthesized and discussed. Recommendations are made for future research, and implications for nursing science, practice, and policy are discussed.

Contribution to Science

This dissertation research is important because it focuses on stigma-related determinants of health to address health disparities experienced by a highly stigmatized population. The findings of this study increase knowledge of culturally relevant indicators of preventive healthcare utilization, which helps to support nurses in developing interventions to reduce health disparities in a socially disadvantaged population, who often have difficulty receiving care due to their identity.

In particular, this dissertation provides insights into the determinants of cancer screening participation among bisexual individuals. It provides 4 major contributions to science, including (1) providing the state of the science on the key determinants of health associated with cervical cancer screening participation among adults with stigmatized sexual identity; (2) supporting identity disclosure as a key determinant of cervical cancer screening participation for sexual minority adults; (3) demonstrating the relationship between 2 key determinants of cervical cancer screening (identity disclosure and mental health symptoms) among individuals with intersecting transgender and bisexual identities; (4) establishing the relationship between identity disclosure and cervical cancer screening participation; and, the relationship between mental health and cervical cancer screening participation for bisexual adults.

Together, the 4 major contributions of this study impact nursing care among bisexual people. This dissertation expands current knowledge in cancer screening and prevention, enabling nurses to anticipate the potential care needs and motivations of a stigmatized population. This provides a pathway toward improving cervical cancer screening participation among bisexual populations, reducing negative outcomes associated with late-stage cervical cancer diagnosis. Knowledge gained from this dissertation provides a framework for future studies investigating cancer screening participation for people with concealable stigmatized identities. Researchers must acknowledge unique experiences with identity disclosure, mental health, and cancer screening participation, based on a person’s stigmatized identity (e.g., bisexual identity vs lesbian identity) or intersecting identities (e.g., bisexual and transgender identities).

Tables & Figures

Figure 1.1. Intersections of gender identity and sexual identity

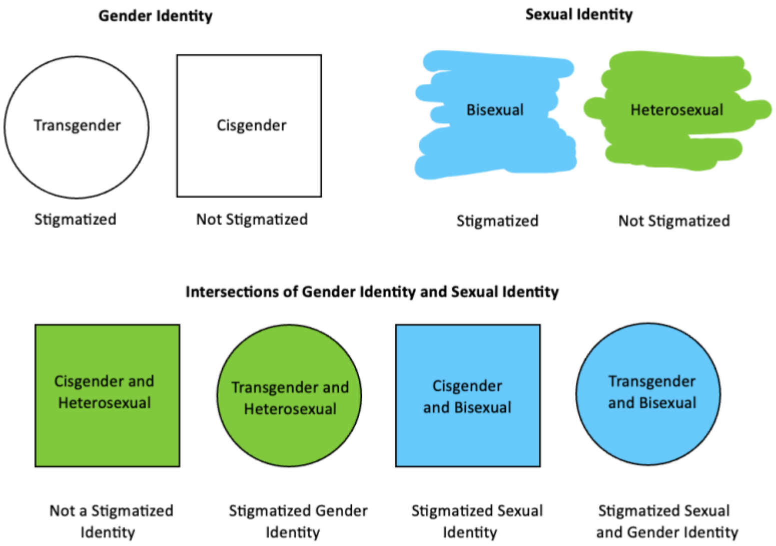


Figure 1.2. Quinn and Earnshaw Concealable Stigmatized Identity Outcomes

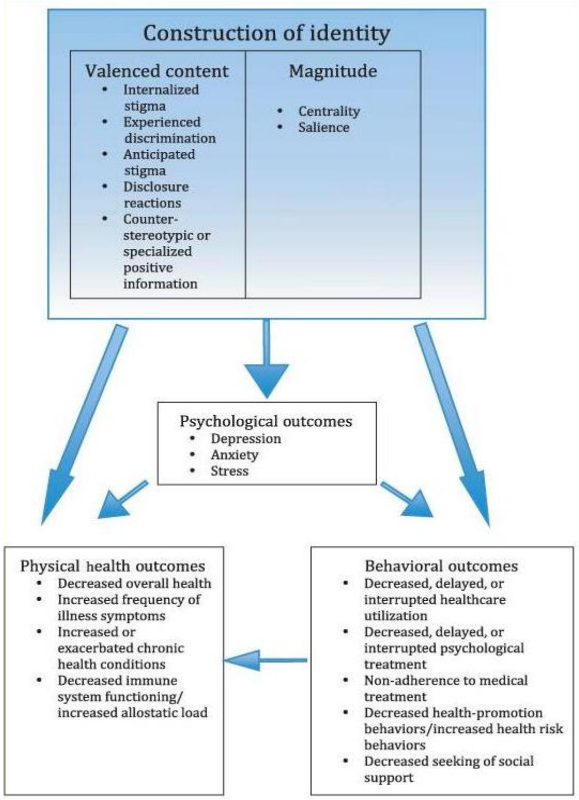


Figure 1.3. Conceptual Model: Concealable Stigmatized Identities Outcomes Model Adapted to Address Cervical Cancer Disparities and Outcomes Among Bisexual People Eligible for Screening

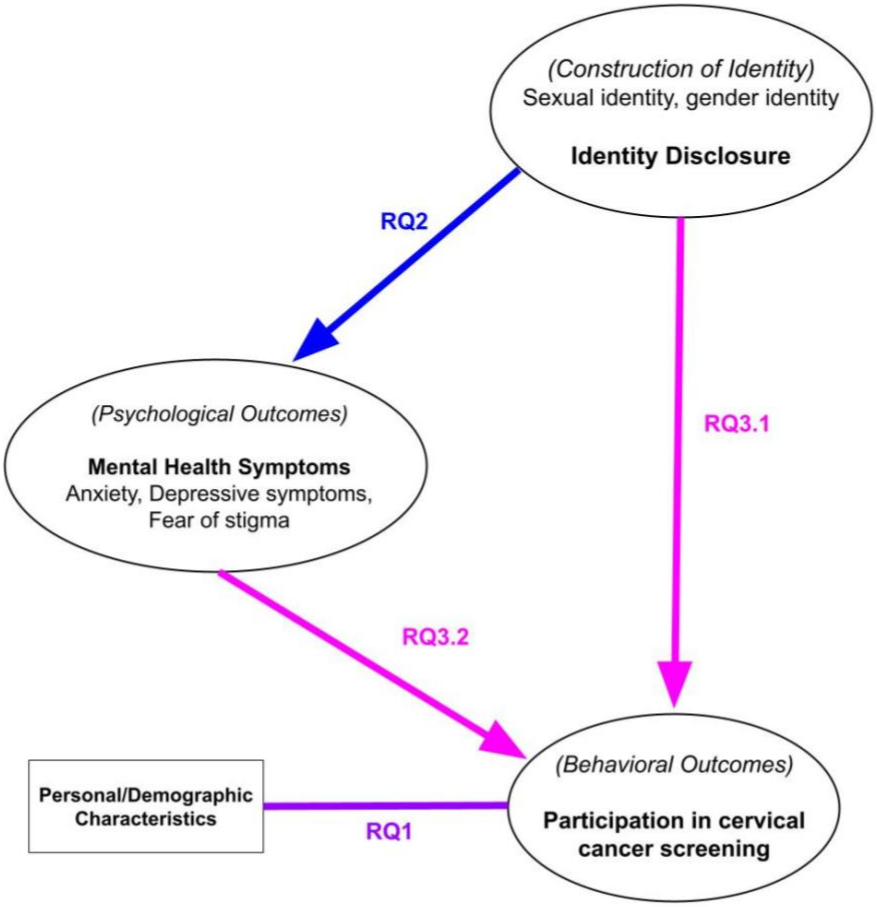
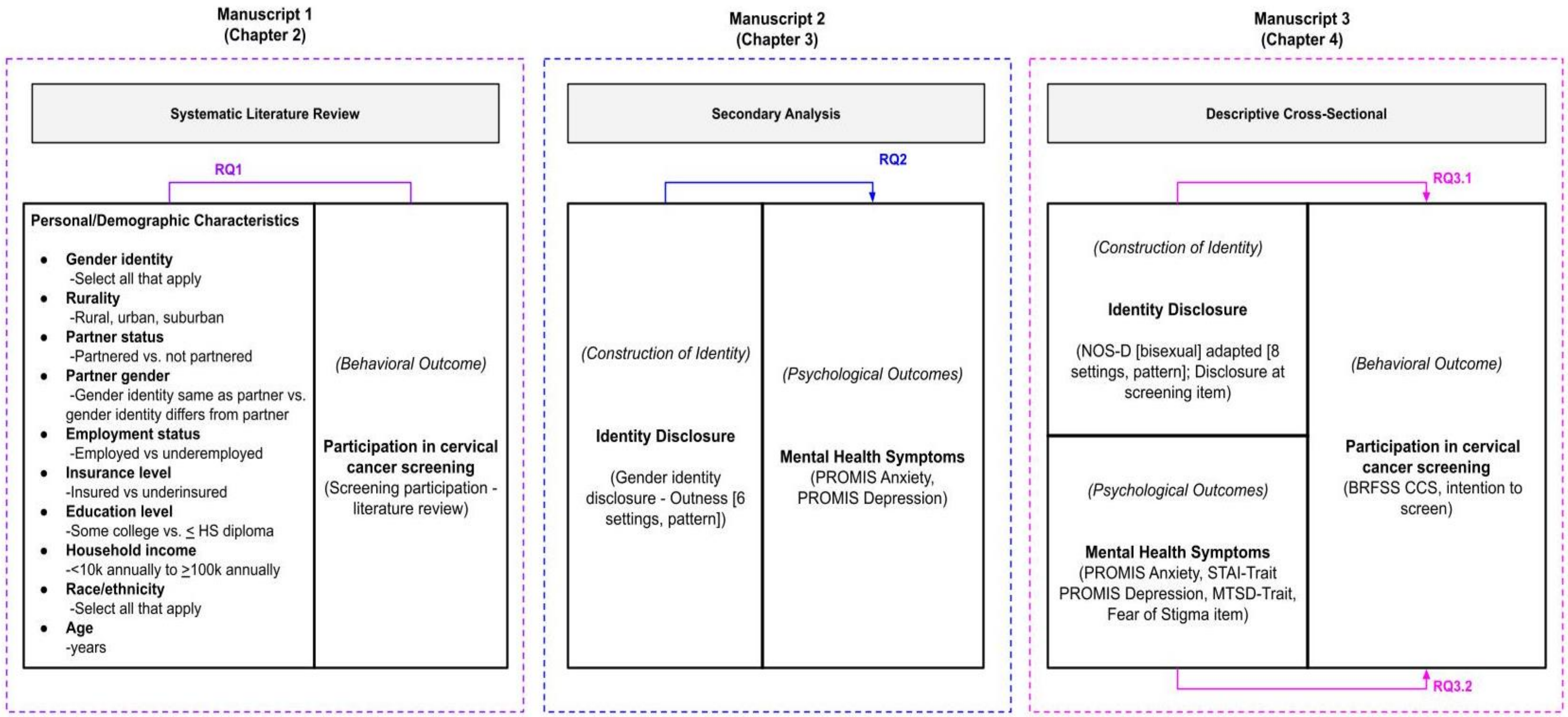


Figure 1.4. Operational Model: Concealable Stigmatized Identities Outcomes Model Adapted to Address Cervical Cancer Disparities and Outcomes Among Bisexual People Eligible for Screening via Systematic Literature Review, Secondary Analysis, and Descriptive Cross-Sectional Study in a 3 Manuscript Dissertation



REFERENCES

1. Centers for Disease Control and Prevention. *Incidence and Relative Survival by Stage at Diagnosis for Common Cancers*. U.S. Cancer Statistics; 2021. Data Briefs, No. 25. Accessed February 20, 2024. https://www.cdc.gov/cancer/uscs/about/data-briefs/no25-incidence-relative-survival-stage-diagnosis.htm

2. Nelson W, Moser RP, Gaffey A, Waldron W. Adherence to cervical cancer screening guidelines for U.S. women aged 25-64: data from the 2005 Health Information National Trends Survey (HINTS). *J Women's Health*. 2009;18(11):1759-1768. doi:10.1089%2Fjwh.2009.1430

3. Jones JM. LGBT identification in U.S. ticks up to 7.1%. *Gallup*. February 17, 2022. https://news.gallup.com/poll/389792/lgbt-identification-ticks-up.aspx

4. Herriges MJ, Pinkhasov R, Lehavot K, et al. The association of sexual orientation with prostate, breast, and cervical cancer screening and diagnosis. *Cancer Causes Control*. 2022;33(12):1421-1430. doi:10.1007/s10552-022-01624-4

5. McCune KC, Imborek KL. Clinical care of lesbian and bisexual women for the obstetrician gynecologist. *Clin Obstet Gynecol*. 2018;61(4):663-673. doi:10.1097/grf.0000000000000399

6. Robinson K, Galloway KY, Bewley S, Meads C. Lesbian and bisexual women's gynaecological conditions: a systematic review and exploratory meta-analysis. *BJOG*. 2017;124(3):381-392. doi:10.1111/1471-0528.14414

7. Health disparities among bisexual people. Human Rights Campaign Foundation. Accessed February 20, 2024. https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&ved=2ahUKEwjyzeSqhIGFAxU_FTQIHbulDKwQFnoECBEQAQ&url=https%3A%2F%2Fassets2.hrc.org%2Ffiles%2Fassets%2Fresources%2FHRC-BiHealthBrief.pdf&usg=AOvVaw2uTwoT69o_PocabiwVsCEH&opi=89978449

8. Reisner SL, Choi SK, Herman JL, Bockting W, Krueger EA, Meyer IH. Sexual orientation in transgender adults in the United States. *BMC Public Health*. 2023;23(1):1799. doi:10.1186/s12889-023-16654-z

9. Bostwick WB, Dodge B. Introduction to the special section on bisexual health: can you see us now? *Arch Sex Behav*. 2019;48(1):79-87. doi:10.1007/s10508-018-1370-9

10. Chan RCH, Operario D, Mak WWS. Bisexual individuals are at greater risk of poor mental health than lesbians and gay men: the mediating role of sexual identity stress at multiple levels. J Affect Disord. 2020;260: 292-301. doi:10.1016/j.jad.2019.09.020

11. Lee A, Kanji Z. Queering the health care system: experiences of the lesbian, gay, bisexual, transgender community. *Can J Dent Hyg*. 2017;51(2):80-89

12. Milner GE, McNally RJ. Nonadherence to breast and cervical cancer screening among sexual minority women: do stigma-related psychological barriers play a role? *Health Psychol*. 2020;39(10):891-899. doi:10.1037/hea0000887

13. Tracy JK, Schluterman NH, Greenberg DR. Understanding cervical cancer screening among lesbians: a national survey. *BMC Public Health.* 2013;13: 442-442

14. Diamant AL, Schuster MA, Lever J. Receipt of preventive health care services by lesbians. *Am J Prev Med.* 2000;19: 141-148

15. Brown A, Hassard J, Fernbach M, Szabo E, Wakefield M. Lesbians' experiences of cervical screening. *Health Promotion Journal of Australia*. 2003;14: 128-132

16. Mogg K, Bradley BP. Anxiety and rhreat-related Attention: Cognitive-motivational framework and treatment. *Trends in Cognitive Sciences.* 2018;22: 225-240

17. Julian LJ. Measures of anxiety: State-Trait Anxiety Inventory (STAI), Beck Anxiety Inventory (BAI), and Hospital Anxiety and Depression Scale-Anxiety (HADS-A). *Arthritis Care Res*. 2011;63(Suppl 11):S467-S472. doi:10.1002/acr.20561

18. Watson JB, Watson RR. Studies in infant psychology. *Scientific Monthly, New York.* 1921;13: 493-515

19. Ree MJ, French D, MacLeod C, Locke V. Distinguishing Cognitive and Somatic Dimensions of State and Trait Anxiety: Development and Validation of the State-Trait Inventory for Cognitive and Somatic Anxiety (STICSA). *Behav Cogn Psychoth*. 2008;36(3):313-332. doi:10.1017/ S1352465808004232

20. Ferguson E. Health anxiety moderates the daytime cortisol slope. *J Psychosom Res*. 2008;64(5):487-494. doi:10.1016/j.jpsychores.2008.01.011

21. Borrell-Carrió F, Suchman AL, Epstein RM. The biopsychosocial model 25 years later: principles, practice, and scientific inquiry. *Annals of Family Medicine.* 2004;2: 576-582

22. Ross LE, Salway T, Tarasoff LA, MacKay JM, Hawkins BW, Fehr CP. Prevalence of depression and anxiety among bisexual people compared to gay, lesbian, and heterosexual individuals: a systematic review and meta-analysis. *J Sex Res*. 2018;55(4):435-456. doi:10.1080/00224499.2017.1387755

23. Dhillon N, Oliffe JL, Kelly MT, Krist J. Bridging barriers to cervical cancer screening in transgender men: a scoping review. *Am J Mens Health*. 2020;14(3):1557988320925691. doi:10.1177/1557988320925691

24. Haviland KS, Swette S, Kelechi T, Mueller M. Barriers and facilitators to cancer screening among LGBTQ individuals with cancer. *Oncol Nurs Forum*. 2020;47(1):44-55. doi:10.1188/20.ONF.44-55

25. Alizaga NM. *Minority Stress, Cervical Cancer Screening Behaviors, and Gender-Affirming Health Care Among Transmasculine Individuals*. Dissertation. The George Washington University, 2018

26. Wentling T, Elliott C, London AS, Simpson N, Wang R. “Every now and then i get flagged for a pap smear”: gender transition, embodiment, and “sex-specific” cancer screenings. In: LeBlanc AJ, Perry BL, eds. *Sexual and Gender Minority Health*. Emerald Group Publishing Limited; 2021:253-275

27. Chand SP, Arif H, Kutlenios RM. Depression (Nursing). StatPearls [Internet]. Updated July 17, 2023. https://www.ncbi.nlm.nih.gov/books/NBK568733/

28. You S, Conner KR. Stressful life events and depressive symptoms: influences of gender, event severity, and depression history. *J Nerv Ment Dis*. 2009;197(11):829-833. doi:10.1097/ NMD.0b013e3181be7841

29. Cunningham S, Hudson CC, Harkness K. Social media and depression symptoms: a meta-analysis. *Res Child Adoles Psychopathol*. 2021;49(2):241-253. doi:10.1007/s10802-020-00715-7

30. Wang H, Tian X, Wang X, Wang Y. Evolution and emerging trends in depression research from 2004 to 2019: a literature visualization analysis. *Front Psychiatry*. 2021;12:705749. doi:10.3389/fpsyt.2021.705749

31. Ettman CK, Abdalla SM, Cohen GH, Sampson L, Vivier PM, Galea S. Prevalence of depression symptoms in US adults before and during the COVID-19 pandemic. *JAMA Netw Open*. 2020;3(9):e2019686. doi:10.1001/jamanetworkopen.2020.19686

32. Stacey L, Wislar W. Physical and mental health disparities at the intersection of sexual and gender minority statuses: evidence from population-level data. *Demography*. 2023;60(3):731-760. doi:10.1215/00703370-10708592

33. Bi R, Dong W, Zheng Z, Li S, Zhang D. Altered motivation of effortful decision-making for self and others in subthreshold depression. *Depress Anxiety*. 2022;39(8-9):633-645. doi:10.1002/da.23267

34. Quinn DM, Earnshaw VA. Concealable stigmatized identities and psychological well-being. *Soc Personal Psychol Compass*. 2013;7(1):40-51. doi:10.1111%2Fspc3.12005

35. Zhang X, Mkuu R, Samman E, et al. Anxiety and depressive symptoms and missing breast cancer and cervical screening: results from Brazos valley community health survey. *Psychol Health Med*. 2020;25(4):402-409. doi:10.1080/13548506.2019.1668031

36. Quinn DM, Earnshaw VA. Understanding concealable stigmatized identities: the role of identity in psychological, physical, and behavioral outcomes. *Soc Iss Policy Rev*. 2011;5(1):160-190. doi:10.1111/j.1751-2409.2011.01029.x

37. Ashing-Giwa K. Health behavior change models and their socio-cultural relevance for breast cancer screening in African American women. *Women Health*. 1999;28(4):53-71. doi:10.1300/J013v28n04_04

38. Dsouza JP, Van den Broucke S, Pattanshetty S, Dhoore W. The application of health behavior theories to promote cervical cancer screening uptake. *Public Health Nurs*. 2021;38(6): 1039-1079. doi:10.1111/phn.12944

39. Quinn DM, Weisz BM, Lawner EK. Impact of active concealment of stigmatized identities on physical and psychological quality of life. *Soc Sci Med*. 2017;192:14-17. doi:10.1016/ j.socscimed.2017.09.024

40. Hay JL, Buckley TR, Ostroff JS. The role of cancer worry in cancer screening: a theoretical and empirical review of the literature. *Psychooncology*. 2005;14(7):517-534. doi:10.1002/pon.864

41. Jones CJ, Smith HE, Frew AJ, Toit GD, Mukhopadhyay S, Llewellyn CD. Explaining adherence to self-care behaviours amongst adolescents with food allergy: a comparison of the health belief model and the common sense self-regulation model. *Br J Health Psychol*. 2014;19(1):65-82. doi:10.1111/bjhp.12033

42. Quinn DM, Earnshaw VA. Concealable stigmatized identities and psychological well-being. *Soc Personal Psychol Compass*. 2013;7(1):40-51. doi:10.1111%2Fspc3.12005

43. Quinn DM, Williams MK, Quintana F, et al. Examining effects of anticipated stigma, centrality, salience, internalization, and outness on psychological distress for people with concealable stigmatized identities. *PLoS ONE*. 2014;9(5):e96977. doi:10.1371/journal.pone.0096977

44. Weisz C, Quinn DM. Stigmatized identities, psychological distress, and physical health: intersections of homelessness and race. *Stig Health*. 2018;3(3):229-240. doi:10.1037/sah0000093

45. Quinn DM, Chaudoir SR. Living with a concealable stigmatized identity: the impact of anticipated stigma, centrality, salience, and cultural stigma on psychological distress and health. J Pers Soc Psychol. 2009;97: 634-651

46. Solazzo AL, Gorman BK, Denney JT. Cancer screening utilization among U.S. women: how mammogram and pap test use varies among heterosexual, lesbian, and bisexual women. *Popul Res Policy Rev*. 2017;36(3):357-377

47. Lombardo J, Ko K, Shimada A, et al. Perceptions of and barriers to cancer screening by the sexual and gender minority community: a glimpse into the health care disparity. *Cancer Causes Control*. 2022;33(4):559-582. doi:10.1007/s10552-021-01549-4

48. Lee M, Jenkins WD, Adjei Boakye E. Cancer screening utilization by residence and sexual orientation. *Cancer Causes Control*. 2020;31(10):951-964. doi:10.1007/s10552-020-01339-4

49. Quinn DM, Chaudoir SR. Living with a concealable stigmatized identity: The impact of anticipated stigma, centrality, salience, and cultural stigma on psychological distress and health. J Pers Soc Psychol. 2009;1: 35-59

50. Camacho G, Reinka MA, Quinn DM. Disclosure and concealment of stigmatized identities. *Curr Opin Psychol*. 2020;31:28-32

51. Centers for Disease Control and Prevention. *BRFSS Statistical Brief on Cervical Cancer Screening Questions*. Division of Cancer Prevention and Control. Centers for Disease Control and Prevention; September 2019

52. Grant JM, Lisa A. Mottet, Justin Tanis, Jack Harrison, Jody L. Herman,, Keisling M. Injustice at Every Turn: A Report of the National Transgender Discrimination Survey. Washington: National Center for Transgender Equality and National Gay and Lesbian Task Force, 2011

53. Wilkerson JM, Noor SW, Galos DL, Rosser BRS. Correlates of a single-item indicator versus a multi-item scale of outness about same-sex attraction. *Arch Sexl Behav*. 2016;45(5):1269-1277. doi:10.1007/s10508-015-0605-2

54. Puckett JA, Tornello S, Mustanski B, Newcomb ME. Gender variations, generational effects, and mental health of transgender people in relation to timing and status of gender identity milestones. *Psychol Sex Orientat Gend Divers.* 2022;9: 165-178

55. Ader DN. Developing the Patient-Reported Outcomes Measurement Information System (PROMIS). *Med Care*. 2007;45:S1-S2

56. Dyar C, Feinstein BA, Sarno EL, Pirog S, Newcomb ME, Whitton SW. Prospective associations between bi+ minority stressors and internalizing symptoms: the mediating roles of general and group-specific processes. *J Consult Clin Psychol*. 2021;89(10):845-855. doi:10.1037/ccp0000689

57. Clover K, Lambert SD, Oldmeadow C, et al. Convergent and criterion validity of PROMIS anxiety measures relative to six legacy measures and a structured diagnostic interview for anxiety in cancer patients. *J Patient Rep Outcomes*. 2022;6:80. doi:10.1186%2Fs41687-022-00477-4

58. Pilkonis PA, Yu L, Dodds NE, Johnston KL, Maihoefer CC, Lawrence SM. Validation of the depression item bank from the Patient-Reported Outcomes Measurement Information System (PROMIS ®) in a three-month observational study. *J Psychiatr Res*. 2014;56:112-119. doi:10.1016/j.jpsychires.2014.05.010

59. Wang YC, Chang SR, Miao NF. The role of butch versus femme identity in body image and breast health among lesbians in Taiwan: results of an online survey. *Journal of Nursing Scholarship.* 2020;52: 174-182

60. Tracy JK, Lydecker AD, Ireland L. Barriers to cervical cancer screening among lesbians. *Journal of Women's Health*. 2010;19: 229-237

61. Charlton BM, Kahn JA, Sarda V, et al. Maternal factors and sexual orientation-related disparities in cervical cancer prevention. *Women's Health Issues.* 2019;29: 238-244

62. Burnett CB, Steakley CS, Slack R, Roth J, Lerman C. Patterns of breast cancer screening among lesbians at increased risk for breast cancer. *Women & Health.* 1999;29: 35-55

63. Barefoot KN, Warren JC, Smalley KB. Women's health care: the experiences and behaviors of rural and urban lesbians in the USA. *Rural & Remote Health.* 2017;17: 1-16

64. Agénor M, Pérez AE, Tabaac AR, et al. Sexual orientation identity disparities in mammography among white, black, and latina U.S. women. *LGBT Health.* 2020;7: 312-320

65. Liu PL, Yeo TED. Breast health, risk factors, and cancer screening among lesbian, bisexual, and queer/questioning women in China. *Health Care Women Int.* 2021;42: 947-961

66. Johnson MJ, Mueller M, Eliason MJ, Stuart G, Nemeth LS. Quantitative and mixed analyses to identify factors that affect cervical cancer screening uptake among lesbian and bisexual women and transgender men. *J Clin Nurs.* 2016;25: 3628-3642

67. Tabaac AR, Benotsch EG, Barnes AJ. Mediation models of perceived medical heterosexism, provider-patient relationship quality, and cervical cancer screening in a community sample of sexual minority women and gender nonbinary adults. *LGBT Health.* 2019;6: 77-86

68. Benz MB, Cabrera KB, Kline N, Bishop LS, Palm Reed K. Fear of stigma mediates the relationship between internalized stigma and treatment-seeking among individuals with substance use problems. *Subst Use Misuse.* 2021;56: 808-818

69. Frost DM, Meyer IH. Minority stress theory: Application, critique, and continued relevance. *Current Opinion in Psychology*. 2023;51: 101579

70. Agenor M, Bailey Z, Krieger N, Austin SB, Gottlieb BR. Exploring the cervical cancer screening experiences of black lesbian, bisexual, and queer women: the role of patient-provider communication. *Women & Health.* 2015;55: 717-736

71. Haviland K, Burrows Walters C, Newman S. Barriers to palliative care in sexual and gender minority patients with cancer: a scoping review of the literature. *Health & Social Care in the Community.* 2020

72. Johnson M, Wakefield C, Garthe K. Qualitative socioecological factors of cervical cancer screening use among transgender men. *Prev Med Rep.* 2020;17: 101052

73. Mendelsohn DM, Omoto AM, Tannenbaum K, Lamb CS. When sexual identity and sexual behaviors do not align: the prevalence of discordance and its physical and psychological health correlates. *Stigma Health.* 2022;7: 70-79.

74. Mustanski B, Birkett M, Greene GJ, Rosario M, Bostwick W, Everett BG. The association between sexual orientation identity and behavior across race/ethnicity, sex, and age in a probability sample of high school students. *American Journal of Public Health.* 2014;104: 237-244.

75. Anderson, J., Bourne, D., Peterson, K., & Mackey, K. (2019). VA evidence-based synthesis program reports. In Evidence brief: Accuracy of self-report for cervical and breast cancer screening, U.S. Department of Veterans Affairs. https://www.ncbi.nlm.nih.gov/books/NBK539386/

76. Roncancio, A. M., Ward, K. K., & Fernandez, M. E. (2013). Understanding cervical cancer screening intentions among Latinas using an expanded theory of planned behavior model. *Behavioral Medicine*, 39(3), 66–72. doi:10.1080/08964289.2013.799452

77. Roncancio, A. M., Ward, K. K., Sanchez, I. A., Cano, M. A., Byrd, T. L., Vernon, S. W., Fernandez-Esquer, M. E., & Fernandez, M. E. (2015). Using the theory of planned behavior to understand cervical cancer screening among Latinas. *Health Education & Behavior,* 42(5), 621–626. doi:10.1177/1090198115571364

78. Brownfield, J. M., & Brown, C. (2022). The relations among outness, authenticity, and well-being for bisexual adults. *Psychology of Sexual Orientation and Gender Diversity*. 9(1), 71–80. doi:10.1037/sgd0000390

79. Meidlinger P.C. & Hope D.A., (2014.) Differentiating disclosure and concealment in measurement of outness for sexual minorities: The Nebraska Outness Scale. *Psychology of Sexual Orientation and Gender Diversity.* 1(4) 489-497. Doi:10.1037/sgd0000080

80. Nakajima M, Haji A, Sero A, Taha S, Habte H, Jama S, Hodges J, Mohamud S, Ahmed O, Hassan O, al'Absi M. Psychosocial correlates of experience and intention to receive colorectal cancer screening: a cross-sectional study among East African men in the U.S. *J Prim Prev*. 2021 Dec;42(6):603-623. doi: 10.1007/s10935-021-00648-x. Epub 2021 Oct 15. PMID: 34654996.

81. Kirsch JL, Roche AI, Bronars C, Donovan KA, Hassett LC, Ehlers SL. Emotional distress and future healthcare utilization in oncology populations: a systematic review. *Psychooncology.* 2024 Mar;33(3):e6322. doi: 10.1002/pon.6322. PMID: 38483339.

82. Jones T, Freeman K, Ackerman M, Trivedi MS, Silverman T, Shapiro P, Kukafka R, Crew KD. Mental illness and BRCA1/2 genetic testing intention among multiethnic women undergoing screening mammography. *Oncol Nurs Forum.* 2020 Jan 1;47(1):E13-E24. doi: 10.1188/20.ONF.E13-E24. PMID: 31845917; PMCID: PMC7295180.

83. Galli F, Giancamilli F, Palombi T, Vitale JA, Borghi S, De Maria A, Cavicchiolo E, Diotaiuti P, La Torre A, Zelli A, Lucidi F, Codella R, Chirico A. Anxiety, motives, and intention for physical sctivity during the Italian COVID-19 lockdown: an observational longitudinal study. *Int J Environ Res Public Health.* 2022 Apr 13;19(8):4689. doi: 10.3390/ijerph19084689. PMID: 35457555; PMCID: PMC9025152.

84. Spielberger, C. D. (1983). State-Trait Anxiety Inventory for Adults (STAI-AD) [Database record]. APA PsycTests. doi:10.1037/t06496-000

85. Donahue JM, DeBenedetto AM, Wierenga CE, Kaye WH, Brown TA. Examining day hospital treatment outcomes for sexual minority patients with eating disorders. *International Journal of Eating Disorders.* 2020;53: 1657-1666

86. Clark LA, Watson D. Tripartite model of anxiety and depression: psychometric evidence and taxonomic implications. *Journal of Abnormal Psychology.* 1991;100: 316-336

87. Chiappelli, J., Nugent, K. L., Thangavelu, K., Searcy, K., & Hong, L. E. (2014). Assessment of trait and state aspects of depression in schizophrenia. *Schizophrenia Bulletin*. 40(1), 132–142. doi:10.1093/schbul/sbt069

88. Torbati A, Ullrich HS, Cano MÀ, et al. Sociosexual domains as mediators of the relationship between trait depression and sexual risk: a serial mediation analysis in a sample of Iranian American adults. *Journal of Affective Disorders Reports.* 2022;9: 100362

89. Furukawa NW, Maksut JL, Zlotorzynska M, Sanchez TH, Smith DK, Baral SD. Sexuality disclosure in U.S. gay, bisexual, and other men who have sex with men: impact on healthcare-related stigmas and HIV pre-exposure prophylaxis denial. *Am J Prev Med.* 2020 Aug;59(2):e79-e87. doi: 10.1016/j.amepre.2020.02.010. Epub 2020 May 4. PMID: 32376144; PMCID: PMC7375915.

90. Rusch N, Angermeyer MC, Corrigan PW. Mental illness stigma: concepts, consequences, and initiatives to reduce stigma. *Eur Psuchiatry*. 2005 Dec;20(8):529-39. doi:10.1016/j.eurpsy.2005.04.004. Epub 2005 Sep 19. PMID: 16171984.

APPENDIX A: MEASURES & QUESTIONNAIRES

Measures & Questionnaires – Chapter 3

Identity disclosure items

Table A1. Identity disclosure items
How many people know or believe you are transgender/gender nonconforming in each of the following social circles or settings? Please select Not Applicable if the question does not apply to you

	None	A Few	Some	Most	All	Not Applicable
At home						
On the job						
In public social settings						
When seeking medical care						
With friends						
With family						

Mental health items

Table A2. PROMIS Emotional Distress – Anxiety Short Form 7a
Please respond to each item by marking one box per row

In the past 7 days…	Never	Rarely	Sometimes	Often	Always
I felt fearful…	1 [ ]	2 [ ]	3 [ ]	4 [ ]	5 [ ]
I felt anxious…	1 [ ]	2 [ ]	3 [ ]	4 [ ]	5 [ ]
I felt worried...					
I found it hard to focus on anything other than my anxiety…	1 [ ]	2 [ ]	3 [ ]	4 [ ]	5 [ ]
I felt nervous…	1 [ ]	2 [ ]	3 [ ]	4 [ ]	5 [ ]
I felt uneasy…	1 [ ]	2 [ ]	3 [ ]	4 [ ]	5 [ ]
I felt tense…	1 [ ]	2 [ ]	3 [ ]	4 [ ]	5 [ ]

Table A3. PROMIS Emotional Distress – Depression Short Form 8a
Please respond to each item by marking one box per row

In the past 7 days…	Never	Rarely	Sometimes	Often	Always
I felt worthless…	1 [ ]	2 [ ]	3 [ ]	4 [ ]	5 [ ]
I felt helpless…	1 [ ]	2 [ ]	3 [ ]	4 [ ]	5 [ ]
I felt depressed…	1 [ ]	2 [ ]	3 [ ]	4 [ ]	5 [ ]
I felt hopeless…	1 [ ]	2 [ ]	3 [ ]	4 [ ]	5 [ ]
I felt like a failure…	1 [ ]	2 [ ]	3 [ ]	4 [ ]	5 [ ]
I felt unhappy	1 [ ]	2 [ ]	3 [ ]	4 [ ]	5 [ ]
I felt that I had nothing to look forward to…	1 [ ]	2 [ ]	3 [ ]	4 [ ]	5 [ ]
I felt that nothing could cheer me up…	1 [ ]	2 [ ]	3 [ ]	4 [ ]	5 [ ]

Demographic Items

For each question, participants were asked to select the term or identity that best aligned with their experiences.

Which of the following best describes your gender?

a. Transman/ Trans man
b. Transwoman/ Trans woman
c. Genderqueer
d. Non-binary
e. Agender
f. Androgyne
g. Woman
h. Man
i. Bigender
j. Not listed (specify)

With which racial/ethnic group do you identify?

a. White
b. Black or African American
c. American Indian or Alaska Native
d. Asian
e. Native Hawaiian or Pacific Islander
f. Hispanic, Latino, or Spanish origin
g. From multiple races

Another race or ethnicity not listed above _____

Please enter your age

[continuous]

Are you currently in a romantic relationship?

a. No
b. Yes

What best describes your employment status? (select all that apply)

a. Employed full-time
b. Employed part-time
c. A full-time student
d. Unable to work for health reasons
e. Unemployed
f. Not listed (specify)

Which of the following best describes your living situation?

a. Living alone in an apartment, dorm, or house
b. Living with parents or family
c. Living with a roommate in an apartment, dorm, or house
d. Living with a romantic or sexual partner
e. Group home or residential treatment facility
f. No permanent home address (homeless, squatting, etc.)

What is the highest degree or level of school you have completed?

a. Elementary and/or junior high
b. Some high school to 12th grade
c. High school graduate – high school diploma or equivalent
d. Some college credit, but less than 1 year

e. Technical school degree
f. One or more years of college, no degree
g. Associate degree
h. Bachelor’s degree
i. Master’s degree
j. Doctorate or professional degree (e.g., PhD, MD, JD, DDS)

What is your current annual income (before taxes)?

a. Less than 10,000
b. 10,000-19,999
c. 20,000-29,999
d. 30,000-39,999
e. 40,000-49,999
f. 50,000-69,999
g. 70,000-99,999
h. More than 100,000

I have had difficulty getting medical or mental health treatment (transition -related or other) because of my gender identity or expression. (select all that apply)

a. Never
b. Yes, before age 18
c. Yes, after age 18
d. Yes, in the past year

Instrument Psychometric Properties – Chapter 4

Table A4. Instrument psychometric properties

Outcome		Measurement	Item Details	Scoring	Validity	Reliability (prior studies)	Components
Cervical cancer screening participation	**Past Behavior**	Behavioral Risk Factor Surveillance System; Cervical cancer screening questions (CDC, 2019)	3 items 2 min	Dichotomous (participates/ does not participate)	*r* = .652	N/A	Past pap screening participation (ever [1 question]; per age guidelines [2 questions])
	Intention	Intention to Screen (self-reported likelihood) (Tabaac, Benotsch, & Barnes, 2019)	1 item 5-pt numeric 1 min	↑ score = ↑ intention	N/A	N/A	Future cervical cancer screening participation
Identity disclosure		Nebraska Outness Scale – [bisexual disclosure] (Brownfield et al., 2022) – adapted to include healthcare	8 items 0-100%, increments of 10 5 min	Total % across all settings where an answer was provided	*Original scale r* = .83 (Against the Outness Indicator; Meidlinger, 2014). Adaptations validated by panel of experts	α = .83 internal consistency reliability, bisexual adults (Brownfield et al., 2022) α = .82 original scale	Disclosure with: healthcare; immediate family; extended family; heterosexual/straight, gay/lesbian, and bisexual people you socialize with; people at your work/school; strangers
Mental Health	**State Anxiety**	PROMIS, emotional distress anxiety form 8a	8 items 5-pt numeric 1 min	↑ score = ↑ anxiety	*r* = .835 (Against the Hospital Anxiety and Depression Scale; Clover et al., 2022)	α = .94–.95 sexual and gender minority adults (Dyar et al., 2021)	Emotional distress, anxiety
	Trait Anxiety	State and Trait Anxiety Inventory – Trait (Y-2)	20 items 4-pt numeric 5 min	↑ score = ↑ anxiety	*r = .75 - .80 (Against similar Beck Anxiety Inventory, Self-rating Anxiety Scale; Clark & Watson, 1991)*	α = .89-.92; sexual minority adults (Donahue et al., 2020),	Tendency towards anxiety
	State Depressive symptoms	PROMIS, emotional distress depression form 8a	8 items 5-pt numeric 1 min	↑ score = ↑ depressive symptoms	AUC = .82 (Against PHQ9; (Clover et al., 2022)	α = .94–.95 sexual and gender minority adults (Dyar et al., 2021)	Emotional distress, depression
	Trait Depressive Symptoms	Maryland Trait and Strait Depression Scale - Trait	18 items 5-pt numeric 5 min	↑ score = ↑ depressive symptoms	*r* = .53 (Against Brief Psychiatric Rating Scale-Depression; Chiappelli et al., 2014)	α = .96 Iranian American adults (Torbati et al., 2022)	Tendency towards depression
	Fear of stigma	Ever experienced (Furukawa et al., 2020)	1 item 5-pt numeric 1 min	↑ score = ↑ fear	NA	NA	Ever experienced fear of stigma
Personal/ Demographic Characteristics		Developed with key demographic variables identified in (Kluitenberg et al., 2024)	10 items Varies 5 min	N/A	N/A	N/A	• Age • Gender identity • Partner status • Partner gender • Insurance status • Income level • Employment • Education level • Race/Ethnicity • Rurality
Total:			77 items 26 min				

Measures & Questionnaires – Chapter 4

Study Questionnaire 1: Eligibility Screening

For each question, please select the option that **most correctly** applies to you

1. Do you consider yourself to be (select all that apply):
   For the purposes of this study, "bisexual" refers to anyone who is sexually and/or romantically attracted to more than one gender.
    a. Straight
    b. Lesbian or gay
    c. Bisexual
    d. Asexual

2. What is your age?
[dropdown list 16 or younger, 17... 69, 70 or older]

3. What sex were you assigned at birth on your original birth certificate?
    a. Female
    b. Male
    c. Intersex, assigned female
    d. Intersex, assigned male
    e. Intersex, assigned intersex
    f. Unsure

3a. Have you had a hysterectomy?
    a. Yes
    b. No
    c. Don't know/ Not sure
    d. Refused

3b. Have you ever been diagnosed with cancer?
    a. Yes, I am currently receiving treatment
    b. Yes, I am currently in remission
    c. No
    d. Unsure

4. Do you speak a language other than English at home?
    a. Yes
    b. No [skip question 6]

5. How well do you understand English?
    a. Very well
    b. Well
    c. Not well
    d. Not at all

6. In which country do you currently reside?
    [dropdown list A–Z]

[Participant may be eligible IF: Q1 includes c; Q2 = b, c, d, e, f, or g; Q3 = a, c, or e; Q4=c; Q5=b OR (Q5=a AND Q6=a or b); and Q7= United States]

So that we may contact you for possible participation and enrollment, please provide your **full name** and **email** on the following form.
Please note you must provide a valid email address to be considered for study inclusion.

[link to participant contact form]

My Full Name is: ________

My email address is: ___________

Thank you for your interest in participating. Study personnel will review your responses for eligibility. Once eligibility determination is made, you will be contacted at the email address you provided.

Study Questionnaire 2: Data Collection

PART 1: INFORMED CONSENT

Consent Form for Online Survey

Examination of Bisexual Identity Disclosure and Mental Health as Predictors of Cervical Cancer Screening Participation

You are being asked to participate in a research study. The purpose of the study is to identify factors contributing to cervical cancer screening participation among bisexual people. You will be asked to answer questions about yourself in an online questionnaire, which should take about 20 minutes. Your participation is voluntary. You can skip any question you do not wish to answer. You may withdraw at any time prior to submitting the completed survey**.** Once you have successfully completed the survey, you will be compensated for your time with a $10 Amazon gift card code. You must be 18 or older to participate. If you have any questions please contact ***Callie Harris***, at ***517-XXX-XXXX***. You indicate that you voluntarily agree to participate in this research study by submitting the survey.

Study contact:
Callie Harris
Ph: 517-XXX-XXXX
Email: kluitenb@msu.edu
1355 Bogue St.
East Lansing, MI 48824

PART 2: PARTICIPANT PICTURE IDENTIFICATION

Please select your unique photograph (included in your email with the link to this survey)
[6 unique stock photos provided for options a – f]

Please select your unique icon (included in your email with the link to this survey)
[6 unique stock photos provided for options a – f]

Participant identification is important to verify that you are an eligible participant. It also allows us to locate your contact information for compensation following study completion. As a reminder, to protect your anonymity, study data will be associated with your unique picture identifiers only. Identifying information (name and contact) are kept separate from all study data.

PART 3: CERVICAL CANCER SCREENING PARTICIPATION

We are interested in learning about your past and future cervical cancer screening participation. For each question in this section, please select the option that most correctly applies to you. As people are very different, there is no correct answer for these questions.

1. What is your age (in years)
    [continuous]

2. Have you ever had a Pap and/or HPV test?
    a. Yes
    b. No [go to Q4]
    c. Don’t know/Unsure [go to Q4]
    d. Refused [go to Q4]

3. How long has it been since you had your last Pap and/or HPV test?
    a. Within the past year (anytime less than 12 months)
    b. Within the past 2 years (1 year, but less than 2 years)
    c. Within the past 3 years (2 years, but less than 3 years)
    d. Within the past 5 years (3 years, but less than 5 years)
    e. 5 or more years
    f. Don’t know/Unsure
    g. Refused

    [scoring note: If age 21 – 29, options a,b,c are participated; if age 30-65, options a,b,c,d,e are participated]

4a. [if age 21 - 29] How likely are you to complete a Pap and/or HPV test for cervical cancer screening within the next 3 years?
    a. Not at all likely
    b. Somewhat unlikely
    c. Neither likely nor unlikely
    d. Somewhat likely
    e. Very likely

4b. [if age 30 - 65] How likely are you to complete a Pap and/or HPV test for cervical cancer screening within the next 5 years?
    a. Not at all likely
    b. Somewhat unlikely
    c. Neither likely nor unlikely
    d. Somewhat likely
    e. Very likely

PART 4: IDENTITY DISCLOSURE

Table A5. Disclosure level
Please note that "bisexual identity" here includes a sexual identity where there is sexual and/or romantic attraction to more than one gender

What percent of people in this group do you think are aware of your **bisexual identity** (meaning they are aware that you consider yourself bisexual)?

What percent of people in each group do you think are aware of your **bisexual identity** (meaning they are aware that you consider yourself bisexual)?											
	0%	10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
1. Members of your immediate family (e.g., parents and siblings)											
2. Members of your extended family (e.g., aunts, uncles, grandparents, cousins)											
3. Heterosexual/straight people you socialize with (e.g., friends and acquaintances)											
4. Lesbian/gay people you socialize with (e.g., friends and acquaintances)											
5. Bisexual people you socialize with (e.g., friends and acquaintances)											
6. People at your work/school (e.g., coworkers, supervisors, instructors, students)											
7. Strangers (e.g., someone you have a casual conversation with in line at the store)											
8. People in healthcare settings (e.g., doctors, nurses, receptionists in a hospital or clinic)											

Disclosure in Cervical Cancer Screening

[IF participant has screened for cervical cancer, answer question 9:]

9. At the time of your last cervical cancer screening, was your provider aware of your **bisexual identity**?
   a. Yes
   b. No
   c. Don't know/Unsure

PART 5: MENTAL HEALTH SYMPTOMS

Table A6. Anxiety symptoms
For each question in this section, please select the option that most correctly applies to you. As people are very different, there is no correct answer for these questions. If you are not comfortable answering a question, you may skip and proceed to the next

In the past 7 days…	Never	Rarely	Sometimes	Often	Always
I felt fearful…	1 [ ]	2 [ ]	3 [ ]	4 [ ]	5 [ ]
I found it hard to focus on anything other than my anxiety…	1 [ ]	2 [ ]	3 [ ]	4 [ ]	5 [ ]
My worries overwhelmed me…	1 [ ]	2 [ ]	3 [ ]	4 [ ]	5 [ ]
I felt uneasy…	1 [ ]	2 [ ]	3 [ ]	4 [ ]	5 [ ]
I felt nervous…	1 [ ]	2 [ ]	3 [ ]	4 [ ]	5 [ ]
I felt like I needed help for my anxiety…	1 [ ]	2 [ ]	3 [ ]	4 [ ]	5 [ ]
I felt anxious…	1 [ ]	2 [ ]	3 [ ]	4 [ ]	5 [ ]
I felt tense…	1 [ ]	2 [ ]	3 [ ]	4 [ ]	5 [ ]

Table A7. Depressive symptoms
For each question in this section, please select the option that most correctly applies to you. As people are very different, there is no correct answer for these questions. If you are not comfortable answering a question, you may skip and proceed to the next

In the past 7 days…	Never	Rarely	Sometimes	Often	Always
I felt worthless…	1 [ ]	2 [ ]	3 [ ]	4 [ ]	5 [ ]
I felt helpless…	1 [ ]	2 [ ]	3 [ ]	4 [ ]	5 [ ]
I felt depressed…	1 [ ]	2 [ ]	3 [ ]	4 [ ]	5 [ ]
I felt hopeless…	1 [ ]	2 [ ]	3 [ ]	4 [ ]	5 [ ]
I felt like a failure…	1 [ ]	2 [ ]	3 [ ]	4 [ ]	5 [ ]
I felt unhappy	1 [ ]	2 [ ]	3 [ ]	4 [ ]	5 [ ]
I felt that I had nothing to look forward to…	1 [ ]	2 [ ]	3 [ ]	4 [ ]	5 [ ]
I felt that nothing could cheer me up…	1 [ ]	2 [ ]	3 [ ]	4 [ ]	5 [ ]

Fear of Stigma

For each question in this section, please select the option that most correctly applies to you. As people are very different, there is no correct answer for these questions. If you are not comfortable answering a question, you may skip and proceed to the next

Have you *ever* felt afraid or avoided healthcare services because of fear that someone may learn about your sexual identity?

a. Never
b. Rarely
c. Sometimes
d. Often
e. Always

PART 6: PERSONAL/DEMOGRAPHIC CHARACTERISTICS

In this section, we will ask you to provide additional details about yourself. This section provides valuable information about the characteristics of those participating in this study. If you are not comfortable answering a question, you may skip and proceed to the next

For the following questions, you will be asked to select the option that ***best*** *describes you*

1. What is your age
    [dropdown, options from 21 - 65]

2. With which racial/ethnic group do you identify?
    h. White
    i. Black or African American
    j. American Indian or Alaska Native
    k. Asian
    l. Middle Eastern or North African
    m. Native Hawaiian or Pacific Islander
    n. Hispanic, Latino, or Spanish origin
    o. From multiple races
    p. Another race or ethnicity not listed above _____

3. How would you describe the setting in which you live?
    a. Rural
    b. Suburban
    c. Urban

4. What is your current gender identity?
    a. Woman
    b. Man
    c. Non-binary
    d. Genderqueer *or* Gender non-conforming
    e. Agender
    f. Another answer not listed here ______

5. How would you describe your current partner status?
    a. Single
    b. Legally married
    c. Formalized partnership
    d. In a relationship, cohabitating
    e. In a relationship, non-cohabitating
    f. Divorced/Separated
    g. Widowed

(If question 5 answered b, c, d, or e):
6. How does your partner currently identify their gender? (Select all that apply)

    a. Woman
    b. Man
    c. Non-binary
    d. Genderqueer

   e. Gender non-conforming
   f. Agender
   g. Another answer not listed here _____

7. Do you currently have health insurance?
   a. Yes – Public plan (such as Medicare, Medicaid, Affordable Care Act)
   b. Yes – Private plan (such as through an employer, COBRA)
   c. No

8. What is your current employment status?
   a. Full-time employment
   b. Part-time employment
   c. Self-employed
   d. Unemployed
   e. Unable to work / Disabled
   f. Retired
   g. Full-time student

9. What is your highest level of education completed?
   a. Less than high school diploma
   b. High school diploma or equivalent
   c. Some college/vocational
   d. Associate degree
   e. Bachelor’s degree
   f. Master’s degree
   g. Doctoral or professional degree

10. What is your household income?
   a. Less than $20,000
   b. $20,000 to $75,000
   c. More than $75,000

CHAPTER 2: RELATIONSHIPS AMONG DETERMINANTS OF HEALTH, CANCER SCREENING PARTICIPATION, AND SEXUAL MINORITY IDENTITY: A SYSTEMATIC REVIEW

This is the accepted version of the following article:

> *Kluitenberg Harris, C., Wu, H. S., Lehto, R., Wyatt, G., & Given, B. (2025). Relationships among determinants of health, cancer screening participation, and sexual minority identity: A systematic review. LGBT Health, 12(1) 3-19. Copyright © [2025] Mary Ann Liebert, Inc.*

which has now been formally published in final form at LGBT Health. This original submission version of the article may be used for non-commercial purposes in accordance with the Mary Ann Liebert, Inc., publishers' self-archiving terms and conditions. Final publication is available from Mary Ann Liebert, Inc: https://doi.org/10.1089/lgbt.2023.0097.

Abstract

Purpose: To address cancer screening disparities and reduce cancer risk among sexual minority (SM) groups, this review identifies individual, interpersonal, and community/societal determinants of cancer screening (non)participation among differing SM identities.

Methods: Seven scientific databases were searched. Inclusion criteria included: (a)used quantitative methods; (b)English language; (c)cancer screening focus; (d)at least one SM group identified. Articles were excluded if: 1)analysis not disaggregated by SM identity (*n*=29); 2)quantitative analysis excluded determinants of cancer screening (*n*=19). The Sexual and Gender Minority Health Disparities Research Framework guided literature synthesis.

Results: Twelve studies addressed cervical (*n*=4), breast (*n*=3), breast/cervical (*n*=3), or multiple cancers (*n*=2). Other cancers were excluded due to inclusion/exclusion criteria. Total sample was 20,622 (mean 1,525), including lesbian (*n*=13,409), bisexual (*n*=4,442), gay (*n*=1,386), mostly-heterosexual (*n*=1,302), and queer (*n*=83) identities. Studies analyzing individual-level determinants (*n*=8) found socioeconomic status affected cervical, not breast cancer screening among lesbian and bisexual participants (*n*=2). At interpersonal-level (*n*=7), provider-patient relationship was a determinant of cervical cancer screening among lesbian participants (*n*=4); a relationship not studied for other groups. Studies analyzing community/societal determinants (*n*=5) found rurality potentially affected cervical cancer screening among lesbian, not bisexual people (*n*=3).

Conclusions: This review identified socioeconomic status, provider-patient relationship, and rurality as determinants affecting cancer screening among SM people. While literature addresses diverse SM groups, inclusion/exclusion criteria identified studies addressing cisgender women. Addressing disparities in the identified determinants of cervical cancer screening may improve participation among SM women. Further research is needed to understand determinants of cancer screening unique to other SM groups.

Introduction

Cancers that are diagnosed at late-stages account for 48% of 5-year cancer mortality, despite comprising only 18% of overall cancer diagnoses.[1] For example, when considering the most commonly diagnosed cancers, 5-year late-stage survival or prostate, breast, cervical, colorectal, and lung cancers are approximately 32%, 30%, 19%, 16%, and 7%, respectively in the United States.[2] When detected at early stages, the 5- year survival of prostate, breast, cervical, colorectal, and lung cancers are radically improved to 99%, 98%, 90.5%, 88%, and 57%, respectively.[2]

Routine cancer screening increases early detection and treatment, and is highly effective in reducing cancer mortality. In line with these advances, cervical cancer mortality in the general population continues to improve following the establishment of routine cervical cancer screening in the 1960s.[3] This practice dramatically reduced the U.S. cervical cancer mortality from 23.1 to 14.6 per 100,000 in less than 10 years.[3] Similar reductions in mortality are observed when screening is implemented for breast (20% reduction),[4] colorectal (28% reduction),[5] and lung cancers (33% reduction).[6] Despite the reductions in cancer mortality, overdiagnosis can occur if some cancer screenings are completed too frequently.

Differences in cancer screening participation are in part due to the screening guidelines that differ across cancer types and targeted populations. To avoid overdiagnosis, prostate cancer screening is recommended between approximately 55-69 years of age, using shared decision-making to determine individual patient needs for routine and follow-up testing.[7] Similarly, frequency of recommended cervical cancer screening has been reduced from every 1–2 years to every 3–5 years among low-risk individuals.[8] Guidelines for some cancer screenings, such as anal and lung cancer screenings, exclusively target at-risk individuals.[9-10] Cancer screening recommendations also differ with respect to age. Cervical cancer screening guidelines for low-risk individuals suggest that screening should begin at age 21.[8] This differs significantly from screening guidelines for other cancers (e.g., breast, colorectal, prostate) which begin approximately 20–30 years later in life.[7-8,11-12]

Although participation in routine recommended cancer screening is key to increasing early detection, overall participation among minoritized populations is significantly and persistently lower than that of non-minoritized populations.[13-14] In particular, sexual minority women are 25% less likely than heterosexual women to participate in cervical cancer screening.[14] Additionally, only 39%–42% of sexual minority women participated in colorectal cancer screening,[14] compared to 63% participation among women in general.[15] Due to higher smoking incidence rates, sexual minority men are nearly 4 times more likely to be eligible for lung cancer screening than heterosexual men, but do not screen at rates commensurate with their risk.[17] Disparities in cancer screening and subsequent late-stage diagnosis among sexual minority groups mut be addressed to reduce risk for cancer mortality among these vulnerable groups.[13-14,17]

Determinants of health (DoH), including sexual minority-specific determinants, contribute to cancer screening disparities among sexual minority people.[18-19] The Sexual and Gender Minority Health Disparities (SGMHD) Research Framework, developed by the National Institute on Minority Health and Health Disparities, employs an ecological model to organize the social and ecological factors that determine health and health disparities.[20] This framework helps to identify common themes, yet many DoH have complex mechanisms that can span multiple ecological levels.[20] For example, holding an intersecting minoritized racial identity is an individual-level factor contributing to health disparities in the SGMHD Framework.[20] Yet the root cause of these disparities is the racism and oppression experienced by racially minoritized individuals at the interpersonal, community, and societal levels.[20,21]

Some DoH directly affect participation in healthcare. Studies show that at least 1 in 6 sexual minority adults avoid health care contact due to anticipated stigma from providers related to their sexual minority status.19[,21-23] Further, the disproportionately lower health insurance coverage among sexual minority people also contributes to cancer screening nonparticipation.[25] Conversely, having an affirming nonjudgmental provider who is knowledgeable regarding sexual identity promotes screening participation among sexual minority people overall.[19,24]

Sexual Minority Identities

While existing literature often focuses on the experiences of gay or lesbian groups, other sexual minority identities (e.g., asexual, bisexual, pansexual, queer) may experience unique cancer screening disparities not yet fully documented in the literature. Individuals with a sexual minority identity may approach sexual and romantic relationships differently and have varying DoH effects, which could impact health care experiences and ultimately contribute to cancer screening nonparticipation.[26-28] For example, gay and lesbian identities are generally more visible in heteronormative environments; this creates heightened vulnerability to health care provider discrimination and could lessen participation in routine cancer screening.[29]-[30]

Asexual and bisexual individuals may not consistently have same-sex/gender partners, and are therefore less visible than people with gay or lesbian identities.[31-32] At least two studies found that lowered sexual minority visibility contributes to *erasure*, which is defined as being overlooked or discounted.[31-32] While erasure among asexual and bisexual individuals is prominent societally, [31-32] any sexual minority identity may experience erasure in healthcare settings, where treatment plans often center on heterosexual experiences. For example, education on sexual health after prostate and anal cancer treatment is often exclusive to heterosexual sex experiences, erasing the sexual health needs and experiences of sexual minority individuals. [33] Heteronormative assumptions can also lead to exclusion of partners from important health discussions. [33] If sexual identity erasure is experienced in healthcare settings, it can lead to impaired trust in providers; this could be a possible contributing factor to cancer screening avoidance.[33] Both visible and invisible sexual minority identity may contribute to cancer screening nonparticipation.

Individuals with diverse sexual minority identities may experience DoH and healthcare encounters differently. However, quantitative evaluation in current cancer screening literature often addresses sexual minority people as a homogenous group; the data analysis is rarely disaggregated by different sexual minority identities. More research is needed to determine the way in which DoH influence cancer screening differentially among diverse sexual minority populations. This systematic review seeks to address this gap and answer the following question:

> *What are the individual, interpersonal, community, and societal determinants of health associated with cancer screening participation (and nonparticipation) among adults of differing sexual minority identities?*

This review's assessment can point to needs for further research and guide development of tailored interventions to increase cancer screening participation, thus reducing risk for cancer mortality across sexual minority groups.

Methods

Study Identification

A scoping review revealed scant literature analyzing factors of cancer screening participation disaggregated by sexual minority groups. Thus, a systematic review guided by the 2020 Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines and checklist was conducted.[34] This review method is exhaustive and reproducible, which is important because of the continuous expansion of research in this field.

An institutional review board review was not conducted, as no human or animal subjects or supporting data were utilized for this manuscript. In collaboration with a master's-prepared health sciences librarian, a comprehensive search was conducted of five relevant scientific electronic databases (Cumulative Index to Nursing and Allied Health Literature [CINAHL], PubMed, Cochrane, PsycInfo, and Sociological Abstracts). Hand searching bibliographies for relevant reviews and a gray literature search (ClinicalTrials.gov, ProQuest Dissertations & Theses), was also conducted (see **Table 2.1** for key terms).

The initial literature search produced 2,399 publications. The search yielded 1,790 articles after duplicate removal (*n* = 614). Utilizing Covidence online software, an independent title and abstract review was then conducted by the first author and validated by a doctoral-level researcher. To answer the study research question, pre-established inclusion criteria included: (a) quantitative studies; (b) articles available in the English language; (c) studies focused on cancer screening; and (d) identification of at least one sexual minority identity. "Sexual minority identity" was defined for this review as a distinct self-identified group of individuals with minoritized sexual and/or romantic attraction to others (e.g., gay, bisexual).

Following title and abstract review of 1,790 articles, 62 met all inclusion criteria. They were then independently read in their entirety and excluded if at least one sexual minority identity group was not independently analyzed (*n* = 29), or quantitative analysis did not include relationships between DoH and cancer screening participation for sexual minority identity group(s) (*n* = 19). To allow for analysis disaggregated by sexual minority identity, a "sexual minority identity group" was defined as any sexual minority identity individually examined in the literature (e.g., "gay" *or* "bisexual") but not combinations of identities (e.g., "gay *and* bisexual"). Twelve studies remained for review; all sources were finalized in July 2023.

Data Extraction

Data from the 12 studies were extracted, including strength of evidence (recruitment, generalizability, study design, data analysis), specific samples and cancer screening variables (sample size and proportion of sexual identities studied, cancer screening type and method), and DoH (individual, interpersonal, community, societal). All quantitatively analyzed relationships between DoH and cancer screening participation among a given sexual minority group were reported for each study in the review. Each DoH was reported as having a statistically significant positive or negative effect, or no significant effect on cancer screening participation. (a) socioeconomic level, (b) DoH, (c) cancer screening context, and (d) sexual minority group. Data extraction and quality appraisal were conducted independently by the first author using Covidence online software and confirmed by a doctoral-level researcher.

Results

Sample Characteristics

A diagram of the full PRISMA review process can be found in **Figure 2.1**.[34] Some potentially relevant studies were excluded from review for not distinguishing between sexual minority groups in quantitative analysis,[35-36] or for not analyzing the effects of DoH on cancer screening participation by sexual minority group.[37-38] For this reason, some sexual minority groups (e.g., bisexual men) and cancer screening contexts (e.g., prostate, anal, colorectal), which are prevalent in current cancer screening literature, were not represented in this review.

Table 2.2 details the characteristics and findings for each study. Of the 12 studies reviewed,[39-50] the majority were descriptive cross-sectional (*n* = 11),[39-47,49-50] with one longitudinal cohort (*n* = 1)[48] design. Studies included in this review address screening for cervical cancer (*n* = 4),[41,45-46,48] breast cancer (*n* = 3),[39,42,47] both breast and cervical cancers (*n* = 3),40[,44,50] or breast, cervical, and other cancers (*n* = 2).[43,49] Of the studies reporting mean age (*n* = 6),[39,44-47,50] only one study reported a mean age under 30,[47] while three studies reported a mean age over 40.[39,45,46]

Study sample sizes ranged from 139,[39] to 6,935,[40] with mean sample size of 1,525 and a total sample of 20,622 sexual minority-identifying people across the 12 studies. Of this total sample, sexual minority identities included lesbian (*n* = 13,409),[39-50] bisexual (*n* = 4,442),[42-44,48-49] gay (*n* = 1,386),[43,49] mostly heterosexual (*n* = 1,302),[48] and queer (*n* = 83).[43] Most of the studies reviewed evaluated only lesbian individuals (*n* = 7, 58%)[39-41,45-47,50]; few studies included samples of gay or bisexual men (*n* = 2, 17%).[43,49] Two of the seven studies recruited both lesbian and bisexual-identifying people, but excluded bisexual identities from analysis due to insufficient sample size.[40-41]

Studies varied in acknowledgements of participant gender identity (e.g., man, woman, nonbinary), gender modality (e.g. transgender, cisgender), sex assigned at birth (e.g., male, female), and anatomical inventory (e.g., cervix, uterus). Participants were identified in study samples as "cisgender women,"[50] "cisgender male," [43,49] "cisgender female," [43,49] "transgender male-to-female," [43,49] "transgender female-to-male,"[43,49] "women with intact cervixes,"[45-46] "women,"[39-42,44,47] or "female."[48]

Quality of Included Studies

Quality appraisal revealed low-medium risk for bias in nine studies, and medium-high risk for bias in two studies.[39,43,50] Common threats to validity included the use of self-report to measure the primary outcome,[39-50] small sample size for outcome analysis,[39,43],[47,48,50] and outdated or improper screening criteria used to determine participation level.[39-41,45,50] Due to limited research, all reviewed studies were included for data extraction.

Sexual and Gender Minority Health Disparities Research Framework

Synopses of the individual, interpersonal, community, and societal DoH identified are provided in **Tables 2.3**, **2.4**, and **2.5**, respectively. The number of citations following each finding indicates location and frequency of the data. **Figure 2.2** depicts how the DoH identified by this review are applied to the SGMHD Research Framework.[20]

Individual DoH

The majority of studies (67%) addressed individual DoH.[39]-[40,42-47] Individual DoH include socioeconomic status (income, employment, insurance, education), identity (race/ethnicity, gender), coping behaviors (tobacco/alcohol use), and cancer screening knowledge (sexual identity-specific knowledge). The most identified individual-level factor was low socioeconomic status.[39-40,44-45]

Socioeconomic status (income, employment, insurance, education): In the studies reviewed, low socioeconomic status typically coincided with lower cancer screening participation, while high socioeconomic status was associated with greater participation.[39-40,44]

Among both lesbian and bisexual identities, level of income, education, employment status (employed vs. unemployed), or insurance (insured vs. underinsured) were significantly associated with cervical, but not breast cancer screening participation.[39-40,44]

Among lesbian people, low income, low education, unemployment, and underinsurance, were associated with cervical cancer screening nonparticipation.[40,44] One study determined that, among lesbian individuals, having a college-level education was associated with increased cervical cancer screening participation.[45] Another study found that a household income greater than $50,000, having employment, and maintaining insurance facilitated breast cancer screening participation among lesbian people.[39] Conversely, two studies concluded that low income or limited education, unemployment or underinsurance did not affect breast cancer screening participation among lesbian people.[40,44] Similarly, among bisexual people, low education, unemployment, and underinsurance were associated with nonparticipation in cervical, but not breast cancer screening.[44]

Identity (race/ethnicity, gender): Disparities in health related to an individual's identity (race/ethnicity, gender) are rooted in oppressive power structures that span all ecological levels.[20] While the SGMHD research framework recognizes the complex systems that contribute to health disparities, it depicts "intersecting identities" as an indvidual-level factor.[20] Thus, consistent with the guiding framework, this review categorizes racial/ethnic and gender identities as individual-level DoH.

In the 12 studies reviewed, racial/ethnic minority identity had mixed associations with cancer screening participation overall;[40,42,44] however one study revealed that identifying as bisexual among Black individuals was positively associated with breast cancer screening participation.[42] Black bisexual participants in the study were 3.62 times more likely to participate in breast cancer screening than Black heterosexual people.[42] Conversely, another study reported racially minoritized bisexual participants had lower cervical cancer screening participation than White bisexual participants.[44]

Two studies found no significant differences in breast or cervical cancer screening participation between White lesbian participants and racially minoritized lesbian participants.[40,44] Another study found that, unlike bisexual people, Black lesbian individuals did not differ from heterosexual counterparts in breast cancer screening participation.[42]

In one study, lesbian, gay, queer, and bisexual people with intersecting transgender or nonbinary gender identities were less likely to participate in any routine recommended cancer screening than cisgender people.[43] Of these intersecting groups, lesbian and queer participants who also identified as transgender reported the greatest perceived barriers to routine cancer screening.[43] Another study uniquely identified that among lesbian people with negative views of their own breasts, self-identifying as butch was related to lower participation in self-breast examination, but had no effect on mammogram participation.[47]

Knowledge and behaviors (coping, knowledge): In two studies reviewed, lesbian identifying people who used substance coping behaviors (tobacco and alcohol use) participated in cervical cancer screening less often than those who did not use substances;[40,44] however substance use had little to no effect on breast cancer screening participation.[39-40,44] Substance use coping behaviors did not affect either cervical or breast cancer screening participation rates among bisexual participants in two studies.[40,44] Knowledge regarding cervical cancer screening guidelines was identified as a predictor for cervical cancer screening participation.[45-46] Specifically, two studies reported lesbian people who knew they were eligible for cervical cancer screening were more likely to participate.[45-46]

Interpersonal DoH

Four interpersonal DoH were identified, including provider relationship (disclosure, provider gender),[39-41,45-46] parental relationship (strength, communication, acceptance),[48] partner relationship (partner status),[39,44-45] and experiences with discrimination (context, timeline).[45-46]

Relationships (provider, parental, or partner): Disclosure and acceptance of sexual minority identity within both provider and parental relationships was frequently associated with cervical cancer screening participation among lesbian people, but not well studied among bisexual people.[40-41,45-46,48] Studies consistently showed that lesbian participants who have disclosed their identity to a health care provider were more likely to screen for cervical cancer;[40-41,45-46] this relationship was not studied among bisexual people.

In one study, parental relationship had some effect among lesbian participants, but was less relevant among bisexual participants.[38] Greater parental communication, stronger self-reported relationship, and greater identity acceptance were associated with greater cervical cancer screening participation among lesbian individuals.[48] However, among bisexual people, greater parental communication, but not parental acceptance (nor strength of parental relationship), was associated with cervical cancer screening participation.[48] Partner status did not consistently affect cervical cancer screening participation among lesbian people and had no effect on breast cancer screening among lesbian or bisexual people.[39,44-45]

History of discrimination (context, timeline): In one study, lesbian individuals were less likely to screen for cervical cancer if they had a history of discrimination in healthcare contexts or feared discrimination from their health care provider.[45] Discrimination experiences outside of healthcare contexts did not affect cervical cancer screening participation among lesbian participants.[45]

Community and societal DoH

Societal and community factors identified in this review include healthcare access and geographical location (including population density).[40,44-46,49]

Healthcare system factors (primary care provider): In two studies, lesbian identifying people were more likely to participate in cervical cancer screening if they had access to a regular primary care provider, but provider access did not affect breast cancer screening participation.[40,44]

Geographic location (population density, census region): While geographic location had mixed effects on cancer screening participation overall, one study found that living in rural areas reduced cervical cancer screening participation among lesbian people, but not among bisexual identifying people, when compared with urban-residing heterosexual participants.[49]

Among lesbian individuals, two studies concluded that census region was not associated with cervical cancer screening participation.[45-46] Whether or not rural residence is associated with breast and cervical cancer screening nonparticipation among lesbian people was inconclusive in three studies.[40,49-50] In one study, when compared with heterosexual people in urban settings, the odds of participating in breast or cervical cancer screening did not differ significantly from bisexual people living in a rural setting.[49] The same study reported that gay and bisexual people living in an urban setting were 1.5–2 times more likely to participate in colorectal cancer screening than urban-residing heterosexual individuals.[49]

While only 12 studies met the criteria and most were cross-sectional, several trends did emerge across the four socioeconomic levels of the research framework. The strongest trends were reported from two socioeconomic levels: individual and interpersonal.

Eight individual (*n* = 8)[39-40,42-47] articles were identified, of which four (*n* = 4)[39-40,44-45] related to socioeconomic DoH. Individual DoH addressed lesbian and/or bisexual samples in cervical and/or breast cancer screening settings (*n* = 7).[39-40,42,44-47] Seven interpersonal (*n* = 7)[39-41,44-46,48] articles were identified, of which five (*n* = 5)[39-41,45-46] related to provider relationship. Interpersonal DoH addressed lesbian and/or bisexual samples in cervical and/or breast cancer screening settings (*n* = 6).[39-41,44-46] Finally, five community and societal (*n* = 5)[40,44-45,49-50] articles were identified, of which three (*n* = 3)[40,49-50] related to rural residence. Community and societal DoH addressed lesbian and/or bisexual samples in cervical and/or breast cancer screening settings (*n* = 5). [40,44-45,49-50]

Discussion

This review determined that DoH affect cancer screening participation among sexual minority people. Some DoH (e.g., racial identity, parental identity acceptance) may affect cancer screening participation differently across sexual minority groups.

Individual DoH

Findings consistently support that among the sexual minority groups identified, having low socioeconomic status (e.g., low income or education, unemployment, underinsurance) or a minority gender identity (e.g., transgender, nonbinary) is associated with cancer screening nonparticipation.[43,45,47] These findings indicate that individuals who hold multiple minoritized identities within society, including sexual identity, gender identity, and socioeconomic class, experience health inequity. [51-52] However, having a minority racial/ethnic identity affected lesbian and bisexual people differently in one study, with bisexual people participating in cancer screening at higher rates than lesbian people.[42] Future research is needed to understand how and why the intersection of sexual identity and racial/ethnic identity may affect cancer screening participation.

Some individual-level DoH (e.g., substance use coping, employment, income, education level) were found to be influential with cervical, but not breast cancer screening participation.[39-40,44-45] This is perhaps because, compared with mammography, cervical cancer screening begins at an earlier age and involves more frequent testing, greater physical vulnerability, and sensitive discussions about sexual activity.[53-55] Another significant finding was that lesbian people who use tobacco were less likely to screen for cervical cancer than those who did not use tobacco,[40,44] which is of particular concern as tobacco use is a risk factor for cervical cancer.[53]

Interpersonal DoH

The effects of some interpersonal relationships on cervical cancer screening participation among lesbian people were found to be important in the studies reviewed.[40-41,45-46,48] Specifically, lesbian people were more likely to participate in cervical cancer screening if they disclosed their identity in a provider relationship,[40-41,45-46] supporting the need to foster healthcare environments that are affirming and safe for lesbian people to disclose their identities. However, the effects of provider relationship on cervical cancer screening have only been studied individually among lesbian groups; how they influence cancer screening in other sexual minority groups, including bisexual individuals, is currently unknown.

While identity nondisclosure in provider relationships is generally associated with worse health outcomes among lesbian individuals, bisexual people may find nondisclosure to be a protective behavior.[56-57] It is unknown whether encouraging bisexual identity disclosure to health providers has positive effects on cancer screening participation. It is similarly unknown whether avoiding disclosure of one's bisexual identity in cancer screening contexts has physical or mental health consequences such as a higher incidence of anxiety or emotional distress, as experienced by lesbian individuals.[58] It is important that future research address this gap in the literature, as bisexual people are the largest sexual minority group (comprising 57% of all sexual minorities).[59]

In one study, parental relationship, including acceptance of disclosed identity, was positively associated with screening participation among lesbian but not bisexual people. This suggests that identity rejection may be less influential for bisexual people in parental relationships.[48] However, although more prevalent and accepted among the youngest generations, bisexual identity rejection often occurs among adults both within and outside of the sexual minority community due to common misperceptions that bisexual people are promiscuous or confused.[56-57] Additionally, bisexual individuals who are in different-gender relationships can choose to avoid disclosing their identity to meet societal expectations of heterosexuality as the cultural norm.[56-57] These factors can affect bisexual partner and provide relationships;[56-57] however the impact of bisexual partner and provider relationships on cervical cancer screening participation are not known.

Community and Societal DoH

This review revealed that the impact of community and societal DoH on cancer screening participation has not been well-observed.[40,44-45,49-50] This is likely due to the common mischaracterization of community and societal factors as non-modifiable, despite such factors being essential in studying health equity.[60]

Some DoH which are present at all ecological levels can provide insight into societal-level contributions to cancer screening disparities. Individuals with minoritized gender or racial/ethnic identities were consistently less likely to participate in cancer screening than non-minoritized individuals, which is reflective of the often prohibitive barriers society placed upon minoritized groups.[21] Other key individual and interpersonal factors that could further describe the scope of societal stigma, such as perceived importance of one's sexual minority identity, partner gender identity, disclosure of sexual minority identity outside of healthcare contexts (e.g., in public, with family), and perceived healthcare stigma[43,56] are not well represented in this review. Future studies should consider how these factors affect cancer screening participation across and among sexual minority groups, especially in bisexual groups.

This review evaluated cancer screening participation among sexual minorities from a multi-level ecological perspective, allowing for an examination of participation barriers and facilitators which has not previously been achieved. Guidance by the SGMHD Framework allows for identification of factors, such as identity disclosure within provider, parental, and partner relationships, that might otherwise be minimized or unreported.[20]

Limitations

Approximately 65% of the total sample identified in this review as lesbian, while the largest sample for comparison was bisexual people at 21.5%. In contrast, 57% of sexual minority people identify as bisexual in the United States, while gay and lesbian identities make up 21% and 14%, respectively.[59] The discrepancy between population estimates of sexual minority groups and sample characteristics limits our interpretation of findings and comparison between groups. The low proportion of bisexual-identifying participants could be related to generational trends in sexual minority identity among sample participants, whose mean reported age was between 30-40 years. Additionally, quality assessment found that 3 of the 12 included studies may have risk for bias, potentially affecting validity of study findings. Considering the rapidly changing landscape of policy and culture that impact sexual minority population size, characteristics, and health behaviors, new research is needed to confirm the findings of this review.

Current literature among sexual minority populations includes a more diverse array of cancer screening contexts than those included in this review. This systematic review only included studies analyzing DoH not disaggregated by sexual minority identity groups, significantly reducing the extent of the available literature. Most notably, anal or prostate cancers are typically discussed in the literature with respect to “gay and bisexual men,” or “men who have sex with men.” However, these studies were excluded from this review as they did not provide independent analysis of sexual minority groups. While exclusion of these articles allowed for more precise group-specific analysis, these criteria limited the results of this review to factors affecting cervical and breast cancer screening participation. To facilitate deeper discussion of the differing effects of DoH across sexual minority identities, future studies of prostate and anal cancer screening should consider disaggregating analysis by sexual minority identity.

Conclusion

This study used a multi-level minority health perspective to examine the individual, interpersonal, community, and societal factors affecting cancer screening participation across differing sexual minority groups. DoH at all ecological levels, such as gender identity, socioeconomic status, parental and provider relationships, and rural living environments are differentially associated with breast and cervical cancer screening participation among lesbian and bisexual people. Some individual and interpersonal DoH, such as race/ethnicity and identity disclosure in parental relationships, may affect bisexual people differently from other sexual minority groups; however further investigation is needed.

Though current research disaggregating analysis of DoH effects by sexual minority identity is limited, this review supports that DoH affect cancer screening participation differently across varying sexual minority groups. However, what contributes to these differences remains unknown. With a better understanding of cancer screening among sexual minority people, the probability of finding a cancer early is greatly enhanced, and ultimately reduces the risk of death from a late-stage diagnosis.

Acknowledgements: The authors would like to extend our sincerest thanks to Jessica Sender, librarian for the College of Nursing. Her unwavering patience and support through each iteration of this literature search was invaluable. Additionally, we would like to thank Dr. Jae Puckett for sharing their expertise in working with the LGBTQ community. Their continued support has been instrumental to the development of this important research.

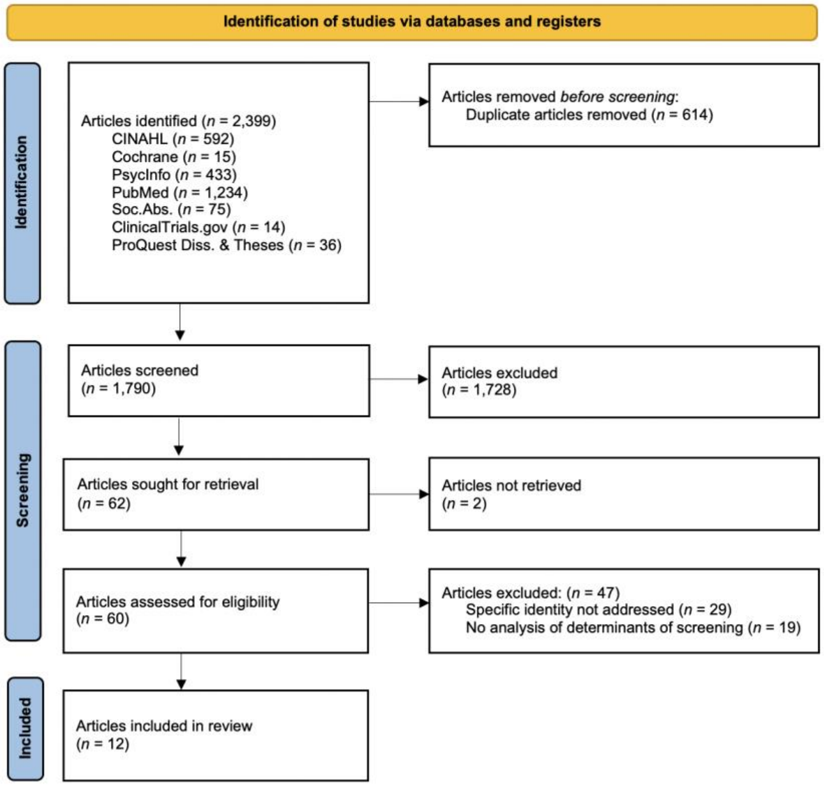
Author Contributions: For all authors, all criteria are met for authorship as defined by International Committee of Medical Journal Editors. **Kluitenberg Harris, C. (corresponding author):** writing-original draft (lead), conceptualization (lead), methodology (lead), investigation (lead), visualization (lead), writing-review & editing (equal). **Wu, HS.:** writing-original draft (supporting), supervision (supporting), writing-review & editing (supporting). **Lehto, R.:** writing-original draft (supporting), supervision (supporting), writing-review & editing (supporting). **Wyatt, G.:** supervision (equal), writing-review & editing (equal). **Given, B.:** supervision (equal), writing-review & editing (equal).

Author Disclosure Statement: The authors have no conflicting interests, personal financial interests, funding, employment, or other competing interests that may inappropriately influence or affect the integrity of the submission.

Funding Information: No funding was received for this article

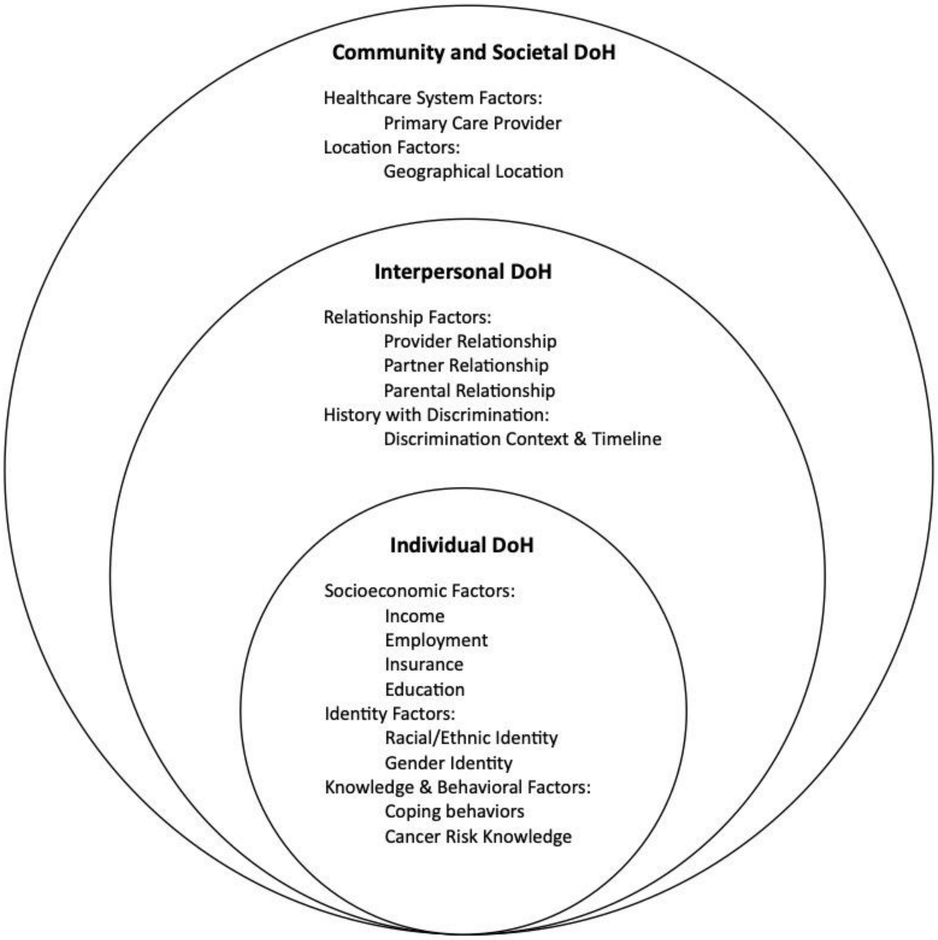
Tables and Figures

Figure 2.1. Preferred Reporting Items for Systematic Reviews and Meta-Analyses Framework[34]



CINAHL, Cumulative Index for Nursing and Allied Health Literature; Soc.Abs., Sociological Abstracts; Diss., Dissertations

Figure 2.2. Application of the Sexual and Gender Minority Health Disparities Research Framework[20]



DoH = Determinants of Health

Table 2.1. Search strategies

Search location	*Keyword and subject heading search strategy*	*Articles returned*
General search strategy	(LGBT OR LGBTQ OR LGB OR LBQ OR lesbian* OR gay OR bisexual* OR asexual* OR pansexual* OR queer* OR “men who have sex with men” OR “women who have sex with women” OR “sexual minority” OR “sexual minorities” OR “sexual orientation” OR sexuality) AND (“cancer screening” OR “cancer screen” OR (cancer AND screen*))	Sociological Abstracts: 75 PsycInfo: 433 Cochrane: 15 ClinicalTrials.gov 14 ProQuest Dissertations & Theses Global 36
PubMed	("Sexual and Gender Minorities"[Mesh] OR LGBT OR LGBTQ OR LGB OR LBQ OR lesbian* OR gay OR bisexual* OR asexual* OR pansexual* OR queer* OR “men who have sex with men” OR “women who have sex with women” OR “sexual minority” OR “sexual minorities” OR “sexual orientation” OR sexuality) AND (“cancer screening” OR “cancer screen” OR (cancer AND screen*) OR "Early Detection of Cancer"[Mesh])	1,234
CINAHL[a]	((MH "Sexual and Gender Minorities") OR LGBT OR LGBTQ OR LGB OR LBQ OR lesbian* OR gay OR bisexual* OR asexual* OR pansexual* OR queer* OR “men who have sex with men” OR “women who have sex with women” OR “sexual minority” OR “sexual minorities” OR “sexual orientation” OR sexuality) AND (“cancer screening” OR “cancer screen” OR (cancer AND screen*) OR (MH “Cancer screening”))	592

CINAHL, Cumulative Index for Nursing and Allied Health Literature

Table 2.2. Article characteristics and findings

Citation & location	*Recruitment & methods*	*Sample & screening type*	*Nonsignificant findings*	*Significant findings*	*Limitations*
Burnett, 1999[39] USA	Local and national LGBT groups, media and online ads, specially designed printed materials Structured interview with cross-sectional survey	139 lesbian cisgender women, aged 35-75y Breast (mammogram)	No significant relationship between mammogram and smoking, alcohol, education, partner status, or sex of provider	More likely to adhere to mammography if annual household income >$50,000, were insured, or were employed	94% White, 78% college graduate+, dated study
Diamant, 2000[40] USA	Survey printed in LGBT magazine with return mailer Cross-sectional survey	6,935 lesbian cisgender women (excluded bisexual or other from analysis) Cervical (pap) Breast (mammogram)	Race, community size not related to cervical screening No variables associated with mammography use, though smaller sample ($n = 403$)	More likely to adhere to cervical cancer screening if they had a regular provider ($p < .001$); disclosed sexual orientation to provider ($p < .001$); had annual income greater than $20,000 ($p < .001$) Less likely to adhere to cervical cancer screening if they used tobacco ($p < .01$), had/span> some college education or less ($p < .001$)	Dated; not probability sampled, not representative of lesbian population; sample limited by who reads magazine. No guiding theoretical framework
Brown, 2003[41] Victoria, Australia	Approached at LGBT event Cross-sectional survey	384 lesbian cisgender women (excluded bisexual and other from analysis) Cervical (pap)	None	More likely to screen if providers knew of their sexuality (OR 3.7)	Doesn't discuss limitations. No guiding theoretical framework
Agénor, 2020[42] USA	From 2013-2017 annual National Health Interview Survey Cross-sectional survey	252 lesbian and 652 bisexual cisgender women, aged 40-75y (total 904) Breast (mammogram)	Race nonsignificant relationship with mammogram for lesbian women No significant differences across sexual identities among Latina women	Black women were more likely to have mammogram if bisexual, OR 3.62 (1.58-8.29)	Low sampling of White bisexual vs lesbian, low sampling of Black bisexual & lesbian women. No guiding theoretical framework.

Table 2.2. (cont'd)

Citation & location	*Recruitment & methods*	*Sample & screening type*	*Nonsignificant findings*	*Significant findings*	*Limitations*
Lombardo, 2022[43] USA	Social media of a hospital, online social media LGBT groups Cross-sectional survey	79 lesbian, 106 gay, 85 bisexual, 83 queer cisgender or transgender people, aged 18y+ (total 353) Cancer screening overall (including mammogram, pap, and colonoscopy)	*Mean scores 1-5, 5 means greater barrier* Nonadherence among cisgender (2.5) or nonbinary (2.8) bisexual people is not strongly related to emotional distress Nonadherence among cisgender gay people is not strongly related to related to emotional distress (2.9) Nonadherence is not strongly related to emotional distress for cisgender queer people (2.7) Nonadherence among nonbinary people is somewhat related to emotional distress for queer people (mean 3.0) than for bisexual (2.8) people Nonadherence among nonbinary people is not strongly related to emotional distress for bisexual people (2.8)	*Mean scores 1-5, 5 means greater barrier* Nonadherence among transgender bisexual people is somewhat (mean 3.2) related to emotional distress than for cisgender (2.5) or nonbinary (2.8) bisexual people. Nonadherence among transgender gay people is somewhat (3.1) related to emotional distress Nonadherence among transgender lesbian people is more strongly (mean 3.5) related to emotional distress than for cisgender (3.1) lesbian people Nonadherence among transgender queer people is more strongly (mean 3.4) related to emotional distress than for nonbinary (3.0) queer people Nonadherence among transgender people is more strongly related to emotional distress for lesbian people (mean 3.5) than for queer (3.4), bisexual (3.2), or gay (3.1) people Nonadherence among nonbinary people is somewhat related to emotional distress for queer people (3.0)	Very small, unequal sample sizes for sub-categories (specifically non-binary people). Used means only, vague question ("concern about emotional distress") Very long survey without compensation. No guiding theoretical framework

Table 2.2. (cont'd)

Citation & location	*Citation & location*	*Citation & location*	*Citation & location*	*Citation & location*	*Citation & location*
Solazzo, 2017[44] USA	Sample from the behavioral risk factor surveillance system, 2000 & 2010 Cross-sectional secondary analysis	2,273 lesbian, 1,689 bisexual cisgender women, aged 21y+ (total 3,962) Cervical (pap) Breast (mammogram)	Lesbian women not less likely to have mammogram if low SES Bisexual women not less likely to have mammogram if low SES Lesbian women not less likely to have mammogram if poor social networks Bisexual women not less likely to have mammogram if poor social networks Lesbian women not less likely to have mammogram if uses substance coping Bisexual women not less likely to have mammogram if uses substance coping	Lesbian (OR.60, $p < .001$) and bisexual (OR .66, $p < .05$) women are less likely than heterosexual women to receive timely pap testing if they have low SES. Lesbian women are less likely than heterosexual women to receive timely pap testing if they are underinsured (OR .65 $p < .001$), have poor health behaviors (OR .67 $p < .001$), or have poor social networks (OR .75, $p < .05$)	Change in recommendation for cancer screening occurred in the timeframe of the study. Limited by what was included in dataset
Tracy, 2010[45] USA	Newspaper advertisements, lesbian magazine and gay newspaper advertisements Cross-sectional survey	225 lesbian cisgender women, aged 18-70y Cervical (pap)	Relationship status does not relate to screening Census region doesn't relate to screening Insurance type doesn't relate to screening	More likely to be routine screeners if they disclose sexual orientation to providers, and are college educated ($p < .01$) More likely to be nonroutine screeners if they fear provider discrimination ($p < .01$) History of sexual discrimination in hospital, public health clinic, community-based clinic, or other healthcare setting is related to lower screening	Somewhat dated; no comparison group

Table 2.2. (cont'd)

Citation & location	*Citation & location*	*Citation & location*	*Citation & location*	*Citation & location*	*Citation & location*
Tracy, 2013[46] USA	From Harris Interactive LGB specialty panel, purposive sampling to yield representative sample of US lesbians based on age and race. All 50 states represented Cross-sectional survey	1,006 lesbian cisgender women, aged 21–70y Cervical (pap)	Discrimination (every day and lifetime events) had no association with screening	More likely to be non-routine screeners if they have disclosed their sexual orientation to providers. OR 2.84 primary provider; OR 2.30 obstetrician/gynecologist ($p < .01$)	Somewhat dated; Study findings are supposedly specific to lesbians but include self-reported sexual orientation of lesbian or gay. No guiding theoretical framework
Wang, 2020[47] Taiwan	Purposive snowball sampling from LGBT organizations, Facebook groups Cross-sectional survey	208 lesbian women with binary gender identity, aged 20y+ Breast (self-exam, mammogram)	No association with mammogram for femme or butch-identified lesbians who feel negatively towards breasts No association with breast self-exam for femme-identified lesbians who feel negatively towards breasts	Butch-identified lesbians are less likely to do breast self-exam if they have a negative feeling towards their own breasts. Mammogram intention is statistically different between butch, and femme identified lesbians	Cross-sectional with non-random sampling. All data derived from self-report measures
Charlton, 2019[48] USA	Eligible participants from the Growing Up Today study Longitudinal cohort study of mother-daughter dyads	106 Lesbian, 173 bisexual, and 1,302 mostly heterosexual cisgender women, aged 21y+ (total 1,581) Cervical (pap)	Relationship quality and mother's acceptance of diverse sexual orientation is not significantly related to screening for bisexual women	Lesbian women were statistically more likely to complete pap test (p < =.05) if their mothers communicated with them about pap, accepted diverse sexual orientations, had strong relationship with daughter Bisexual women were statistically more likely to complete pap test (p < =.05) if they communicated with daughters about pap tests Mostly heterosexual women were statistically more likely to complete pap test (p < =.001) if their mothers communicated with them about pap, accepted diverse sexual orientations, had strong relationship with daughter	Only measure of *ever* had pap test, daughters all children of nurses, predominantly White. No guiding theoretical framework

Table 2.2. (cont'd)

Citation & location	*Citation & location*	*Citation & location*	*Citation & location*	*Citation & location*	*Citation & location*
Lee, 2020[49] USA	Data from 2014 and 2016 Behavioral Risk Factor Surveillance System, from 20 (2014) and 26 (2016) states which had the sexual orientation and gender identity module Cross-sectional secondary analysis	1,280 gay, 711 bisexual transgender or cisgender men 907 lesbian, 1,132 bisexual transgender or cisgender women, aged 18+ (total 4,030) Colorectal (fecal occult blood test, colonoscopy, or sigmoidoscopy) Cervical (pap) Breast (mammogram)	Size of community has no significant association with bisexual women's cervical cancer screening Size of community has no significant association with bisexual women's breast cancer screening Size of community has no significant association with lesbian women's breast cancer screening	(Significance *p* < .05): Gay (OR 1.54) and bisexual (OR 2.01) men are significantly more likely to receive colorectal screening if living in urban settings. Lesbian women are significantly less likely (OR 0.41) to complete cervical cancer screening if living in rural settings.	Analysis limited to 20–26 states, low sample size of sexual minority populations (3.1% of male sample, 2% of female sample). Based on self-report of adherence. No guiding theoretical framework.
Barefoot, 2017[50] USA	Email LGBT organizations and online ads Cross-sectional survey	895 lesbian cisgender women, aged 18y+ Cervical (pap) Breast (mammogram)	No significant differences between rural and urban lesbians regarding cervical (pap) (*p* = .466).	Rural lesbians statistically less likely to have mammogram in past 3y (OR 2.87, *p* = .004)	Rural participants skewed older, only 31% total sample, and skewed White compared with total sample. Viewed as nonparticipating if pap >3 years. Women 30+ may have been incorrectly marked as nonparticipants based on guidelines, possibly falsely elevating the nonparticipation rate among older lesbian participants, who were statistically more likely to be rural. No guiding theoretical framework.

LGBT, lesbian, gay, bisexual, and transgender; OR, odds ratio; SES, socioeconomic status (including education, employment, insurance, and income)

Table 2.3. Individual determinants of health

	Income	***Cancer screening context***	***Sexual identity***	***Association***	***Study***
Socioeconomic factors	Household income >50k	Breast (mammogram)	Lesbian	↑	Burnett, 1999[39]
	Household income <20k	Breast (mammogram)	Lesbian	∅	Diamant, 2000[40]
		Cervical (pap)	Lesbian	↓	Diamant, 2000[40]
	Employment	***Cancer screening context***	***Sexual identity***	***Association***	***Study***
	Employed	Breast (mammogram)	Lesbian	↑	Burnett, 1999[39]
	Unemployed	Breast (mammogram)	Lesbian	∅	Solazzo, 2017[44]
			Bisexual		
		Cervical (pap)	Lesbian	↓	Solazzo, 2017[44]
			Bisexual		
	Insurance	***Cancer screening context***	***Sexual identity***	***Association***	***Study***
	Insured	Breast (mammogram)	Lesbian	↑	Burnett, 1999[39]
	Insurance level	Cervical (pap)	Lesbian	∅	Tracy, 2010[45]
	Underinsured	Breast (mammogram)	Lesbian	∅	Solazzo, 2017[44]
			Bisexual		
		Cervical (pap)	Lesbian	↓	Solazzo, 2017[44]
			Bisexual		
	Education	***Cancer screening context***	***Sexual identity***	***Association***	***Study***
	Education level	Breast (mammogram)	Lesbian	∅	Burnett, 1999[39]
	Some college or less	Breast (mammogram)	Lesbian	∅	Diamant, 2000[40] Solazzo, 2017[44]
			Bisexual	∅	Solazzo, 2017[44]
		Cervical (pap)	Lesbian	↓	Diamant, 2000[40] Solazzo, 2017[44]
			Bisexual		
	College educated	Cervical (pap)	Lesbian	↑	Tracy, 2010[45]

Table 2.3. (cont’d)

	Racial/Ethnic identity	***Cancer screening context***	***Sexual identity***	***Association***	***Study***
Identity factors	Black	Breast (mammogram)	Lesbian	∅	Agénor, 2020[42]
			Bisexual	↑	
	Latinx	Breast (mammogram)	Lesbian	∅	Agénor, 2020[42]
			Bisexual	∅	
	Racial/ethnic minority	Breast (mammogram)	Lesbian	↓	Diamant, 2000[40]
				∅	Solazzo, 2017[44]
			Bisexual	∅	Solazzo, 2017[44]
		Cervical (pap)	Lesbian	↓	Solazzo, 2017[44]
				∅	Diamant, 2000[40]
			Bisexual	↓	Solazzo, 2017[44]
	Gender identity	***Cancer screening context***	***Sexual identity***	***Association***	***Study***
	Gender minority identity	Cervical (pap)	Lesbian	↓	Tracy, 2010[45]
	Transgender	Any (nonspecific)	Bisexual (men & women)	↓	Lombardo, 2022[43]
			Gay (men)		
			Lesbian		
			Queer (men & women)		
	Nonbinary	Any (nonspecific)	Queer (men & women)	↓	Lombardo, 2022[43]
	Butch identifying	Breast (self-breast exam)	Lesbian	↓	Wang, 2020[47]
		Breast (mammogram)	Lesbian	∅	Wang, 2020[47]

Table 2.3. (cont'd)

	Coping behaviors	***Cancer screening context***	***Sexual identity***	***Association***	***Study***
Knowledge & Behavioral Factors	Uses tobacco	Breast (mammogram)	Lesbian	∅	Diamant, 2000[40] Burnett, 1999[39] Solazzo, 2017[44]
			Bisexual	∅	Solazzo, 2017[44]
		Cervical (pap)	Lesbian	↓	Diamant, 2000[40] Solazzo, 2017[44]
	Uses alcohol	Breast (mammogram)	Lesbian	∅	Burnett, 1999[39] Solazzo, 2017[44]
			Bisexual	∅	Solazzo, 2017[44]
		Cervical (pap)	Lesbian	↓	Solazzo, 2017[44]

	Cancer risk knowledge	***Cancer screening context***	***Sexual identity***	***Association***	***Study***
Knowledge & Behavioral Factors, cont.	Knows lesbian women are at risk for cervical cancer	Cervical (pap)	Lesbian	↑	Tracy, 2013[46]

Unless noted otherwise, all study populations are cisgender women. See Table 2 for detailed report of findings.
↑ = Improved cancer screening participation; ∅ = No change in cancer screening participation; ↓ = Reduced cancer screening participation

Table 2.4. Interpersonal determinants of health

	Provider relationship	***Cancer screening context***	***Sexual identity***	***Association***	***Study***
Relationship factors	Disclosed identity to provider (nonspecific)	Breast (mammogram)	Lesbian	∅	Diamant, 2000[40]
		Cervical (pap)	Lesbian	↑	Brown, 2003[41] Diamant, 2000[40] Tracy, 2010[45]
	Disclosed identity to primary care provider	Cervical (pap)	Lesbian	↑	Tracy, 2013[46]
	Disclosed identity to gynecologist	Cervical (pap)	Lesbian	↑	Tracy, 2013[46]
	Sex/gender of provider	Breast (mammogram)	Lesbian	∅	Burnett, 1999[39]
	Partner relationship	***Cancer screening context***	***Sexual identity***	***Association***	***Study***
	Partner status	Breast (mammogram)	Lesbian	∅	Burnett, 1999[39]
		Cervical (pap)	Lesbian	∅	Tracy, 2010[45]
	Not partnered	Breast (mammogram)	Lesbian	∅	Solazzo, 2017[44]
			Bisexual		
		Cervical (pap)	Lesbian	↓	Solazzo, 2017[44]
	Parental relationship	***Cancer screening context***	***Sexual identity***	***Association***	***Study***
	Communicates about screening	Cervical (pap)	Lesbian	↑	Charlton, 2019[48]
			Mostly Heterosexual		
			Bisexual		
	Accepts sexual identity	Cervical (pap)	Lesbian	↑	Charlton, 2019[48]
			Mostly Heterosexual		
			Bisexual	∅	
	Strong self-reported relationship	Cervical (pap)	Lesbian	↑	Charlton, 2019[48]
			Mostly Heterosexual		
			Bisexual	∅	

Table 2.4. (cont'd)

	Context and timeline	*Cancer screening context*	*Sexual identity*	*Association*	*Study*
History with discrimination	Events in healthcare (not cancer screening)	Cervical (pap)	Lesbian	∅	Tracy, 2010[45]
	Events in healthcare (cancer screening)	Cervical (pap)	Lesbian	↓	Tracy, 2010[45]
	Everyday discrimination	Cervical (pap)	Lesbian	∅	Tracy, 2013[46]
	Lifetime events	Cervical (pap)	Lesbian	∅	Tracy, 2013[46]

Unless noted otherwise, all study populations are cisgender women. See Table 2 for detailed report of findings
↑ = Improved cancer screening participation; ∅ = No change in cancer screening participation; ↓ = Reduced cancer screening participation

Table 2.5. Community and societal determinants of health

	Primary care provider	***Cancer screening context***	***Sexual identity***	***Association***	***Study***
Healthcare system factors (community)	Has a regular provider	Breast (mammogram)	Lesbian	∅	Diamant, 2000[40]
		Cervical (pap)	Lesbian	↑	Diamant, 2000[40] Solazzo, 2017[44]
Location factors (societal)	***Geographical location***	***Cancer screening context***	***Sexual identity***	***Association***	***Study***
	Rural residence	Breast (physical exam)	Lesbian	∅	Barefoot, 2017[50]
		Breast (mammogram)	Lesbian	↓	Barefoot, 2017[50]
				∅	Diamant, 2000[40] Lee, 2020[49]
			Bisexual	∅	Lee, 2020[49]
		Cervical (pap)	Lesbian	∅	Barefoot, 2017[50] Diamant, 2000[40]
				↓	Lee, 2020[49]
			Bisexual	∅	Lee, 2020[49]
	Urban residence	Colorectal (fecal occult) or Colorectal (colonoscopy)	Gay (men)	↑	Lee, 2020[49]
			Bisexual (men & women)		
	Census region	Cervical (pap)	Lesbian	∅	Tracy, 2010[45]

Unless noted otherwise, all study populations are cisgender women. See Table 2 for detailed report of findings
↑ = Improved cancer screening participation; ∅ = No change in cancer screening participation; ↓ = Reduced cancer screening participation

REFERENCES

1. Hubbell E, Clarke CA, Aravanis AM, et al. Modeled reductions in late-stage cancer with a multi-cancer early detection test. Cancer Epidemiol Biomarkers Prev 2021;30(3):460-468; doi:10.1158/1055-9965.EPI-20-1134

2. Centers for Disease Control and Prevention. US Cancer Statistics Data Briefs: NO 25. US Department of Health and Human Services. Atlanta, GA; 2021. Available from: https://www.cdc.gov/cancer/uscs/about/data-briefs/no25-incidence-relative-survival-stage-diagnosis.htm [Last accessed: July 11, 2023]

3. Eddy DM. Screening for cervical cancer. Ann Intern Med 1990;113(3):214-226; doi:10.7326/0003-4819-113-3-214

4. Coleman C. Early Detection and screening for breast cancer. Semin Oncol Nurs 2017;33(2):141-155; doi:10.1016/j.soncn.2017.02.009

5. Maida M, Macaluso FS, Ianiro G, et al. Screening of colorectal cancer: Present and future. Expert Rev Anticancer Ther 2017;17(12):1131-1146; doi:10.1080/14737140.2017.1392243

6. Duffy SW, Field JK. Mortality reduction with low-dose CT screening for lung cancer. N Engl J Med 2020;382(6):572-573; doi: 10.1056/NEJMe1916361

7. Centers for Disease Control and Prevention. US Cancer Statistics Data Briefs: NO 34. US Department of Health and Human Services. Atlanta, GA; 2023. Available from: https://www.cdc.gov/cancer/uscs/about/data-briefs/no34-prostate-cancer-incidence-2001-2019.htm [Last accessed: July 11, 2023]

8. U.S. Preventive Services Task Force. Cervical cancer: Screening. Rockville, MD; 2018. Available from: https://www.uspreventiveservicestaskforce.org/uspstf/recommendation/cervical-cancer-screening [Last accessed: July 11, 2023]

9. U.S. Preventive Services Task Force. Lung cancer: Screening. Rockville, MD; 2021. Available from: https://www.uspreventiveservicestaskforce.org/uspstf/recommendation/lung-cancer-screening [Last accessed: July 11, 2023]

10. U.S. Preventive Services Task Force. Anal cancer: Screening. Rockville, MD; 2022 [Draft research plan]. Available from: https://www.uspreventiveservicestaskforce.org/uspstf/document/draft-research-plan/anal-cancer-screening [Last accessed: July 11, 2023]

11. U.S. Preventive Services Task Force. Colorectal cancer: Screening. Rockville, MD; 2021. Available from: https://www.uspreventiveservicestaskforce.org/uspstf/recommendation/colorectal-cancer-screening [Last accessed: July 11, 2023]

12. U.S. Preventive Services Task Force. Breast cancer: Screening. Rockville, MD; 2021. Available from: https://www.uspreventiveservicestaskforce.org/uspstf/recommendation/breast-cancer-screening [Last accessed: July 11, 2023]

13. Sauer AG, Siegel RL, Jemal A, et al. Updated review of prevalence of major risk factors and use of screening tests for cancer in the United States. Cancer Epidemiol Biomarkers Prev 2017;26(8):1192-1208; doi:10.1158/1055-9965.EPI-17-0219

14. McCune KC, Imborek KL. Clinical care of lesbian and bisexual women for the obstetrician gynecologist. Clin Obstet Gynecol 2018;61(4):663-673; doi:10.1097/GRF.0000000000000399

15. Hall IJ, Tangka FKL, Sabatino SA, et al. Patterns and trends in cancer screening in the United States. Prev Chronic Dis 2018;15:E97; doi:10.5888/pcd15.170465

16. Tan ASL, Potter J. How the expansion of the U.S. Preventive Services Task Force lung cancer screening eligibility may improve health equity among diverse sexual and gender minority populations. LGBT Health 2021;8(8):503-506; doi:10.1089/lgbt.2021.0188

17. Zorogastua K, Erwin D, Thelemaque L, et al. Intrinsic factors of non-adherence to breast and cervical cancer screenings among Latinas. J Racial Ethn Health Disparities 2016;3(4):658-666; doi:10.1007/s40615-015-0184-x

18. Milner GE, McNally RJ. Nonadherence to breast and cervical cancer screening among sexual minority women: Do stigma- related psychological barriers play a role? Health Psychol 2020;39(10):891-899; doi:10.1037/hea0000887

19. Haviland KS, Swette S, Kelechi T, et al. Barriers and facilitators to cancer screening among LGBTQ individuals with cancer. Onc Nurs Forum 2020;47(1):44-55; doi:10.1188/20.ONF.44-55

20. National Institute on Minority Health and Health Disparities. Sexual & Gender Minority Health Disparities Research Framework. Bethesda, MD; 2021. Available from: https://dpcpsi.nih.gov/sites/default/files/NIH-SGM-Health-Disparities-Research-Framework-FINAL_508c.pdf [Last accessed: July 10, 2023]

21. Casey LS, Reisner SL, Findling MG, et al. Discrimination in the United States: Experiences of lesbian, gay, bisexual, transgender, and queer Americans. Health Serv Res 2019;54 Suppl 2(Suppl 2):1454-1466; doi:10.1111/1475-6773.13229

22. Peterson CE, Silva A, Goben AH, et al. Stigma and cervical cancer prevention: A scoping review of the U.S. literature. Prev Med 2021;153:106849; doi:10.1016/j.ypmed.2021.106849

23. Luft H, Perzan M, Mitchell R, et al. An integrative literature review of barriers and facilitators to cervical cancer screening among refugee women in the United States. Health Care Women Int 2021;42(7-9):992-1012; doi:10.1080/07399332.2020.1803872

24. Maragh-Bass AC, Torain M, Adler R, et al. Risks, benefits, and importance of collecting sexual orientation and gender identity data in healthcare settings: A multi-method analysis of patient and provider perspectives. LGBT Health 2017;4(2):141-152; doi:10.1089/lgbt.2016.0107

25. Bustamante G, Reiter PL, McRee AL. Cervical cancer screening among sexual minority women: Findings from a national survey. Cancer Causes Control 2021;32(8):911-917; doi:10.1007/s10552-021-01442-0

26. Rentería R, Feinstein BA, Dyar C, et al. Does outness function the same for all sexual minority youth? Testing its associations with different aspects of well-being in a sample of youth with diverse sexual identities. Psychol Sex Orientat Gend Divers 2022; doi:10.1037/sgd0000547

27. Herbitter C. Assessing mental health provider bias toward clients with understudied marginalized sexual identities and practices [Ph.D. Dissertation]. Ann Arbor, MI: University of Massachusetts Boston; 2021

28. Barger BT, Obedin-Maliver J, Capriotti MR, et al. Characterization of substance use among underrepresented sexual and gender minority participants in the Population Research in Identity and Disparities for Equality (PRIDE) study. Subst Abus 2020;42(1):104-115 doi:10.1080/08897077.2019.1702610

29. Mills CE. Gay Visibility and disorganized and strained communities: A community-level analysis of anti-gay hate crime in New York City. J Interpers Violence 2021;36(17-18):8070-8091; doi:10.1177/0886260519848784.

30. Jones C. Balancing Safety and Visibility: Lesbian community building strategies in South Korea. J Lesbian Stud 2020;24(3):272-285; doi:10.1080/10894160.2019.1678335

31. Davila J, Jabbour J, Dyar C, et al. Bi+ visibility: Characteristics of those who attempt to make their bisexual+ identity visible and the strategies they use. Arch Sex Behav 2019;48(1):199-211; doi:10.1007/s10508-018-1284-6

32. MacNeela P, Murphy A. Freedom, Invisibility, and Community: A qualitative study of self-identification with asexuality. Arch Sex Behav 2015;44(3):799-812; doi:10.1007/s10508-014-0458-0

33. Webster R, Drury-Smith H. How can we meet the support needs of LGBT cancer patients in oncology? A Systematic Review. Radiography (Lond) 2021;27(2):633-644; doi:10.1016/j.radi.2020.07.009

34. Page MJ, McKenzie JE, Bossuyt PM, et al. The PRISMA 2020 Statement: An updated guideline for reporting systematic reviews. BMJ 2021;372:n71; doi:10.1136/bmj.n71

35. Tabaac AR, Benotsch EG, Barnes AJ. Mediation models of perceived medical heterosexism, provider-patient relationship quality, and cervical cancer screening in a community sample of sexual minority women and gender nonbinary adults. LGBT Health 2019;6(2):77-86. doi:10.1089/lgbt.2018.0203

36. Acree ME, McNulty M, Blocker O, et al. Shared decision-making around anal cancer screening among Black bisexual and gay men in the USA. Cult Health Sex 2020:22(2):201-216; doi:10.1080/13691058.2019.1581897

37. Ma SJ, Oladeru OT, Wang K, et al. Prostate cancer screening patterns among sexual and gender minority individuals. Eur Urol 2021;79(5):588-592; doi:10.1016/j.eururo.2020.11.009

38. Matthews AK, Brandenburg DL, Johnson TP, et al. Correlates of underutilization of gynecological cancer screening among lesbian and heterosexual women. Prev Med 2004;38(1):105-113; doi:10.1016/j.ypmed.2003.09.034

39. Burnett CB, Steakley CS, Slack R, et al. Patterns of breast cancer screening among lesbians at increased risk for breast cancer. Women Health 1999;29(4):35-55; doi:10.1300/J013v29n04_03

40. Diamant AL, Schuster MA, Lever J. Receipt of preventive health care services by lesbians. Am J Prev Med 2000;19(3):141-148; doi:10.1016/s0749-3797(00)00192-6

41. Brown A, Hassard J, Fernbach M, et al. Lesbians' experiences of cervical screening. Health Promot J Austr 2003;14(2):128-132; doi:10.1071/HE03128

42. Agénor M, Pérez AE, Tabaac AR, et al. Sexual orientation identity disparities in mammography among White, Black, and Latina U.S. women. LGBT Health 2020;7(6):312-320; doi:10.1089/lgbt.2020.003

43. Lombardo J, Ko K, Shimada A, et al. Perceptions of and barriers to cancer screening by the sexual and gender minority community: A glimpse into the health care disparity. Cancer Causes Control 2022;33(4):559-582; doi:10.1007/s10552-021-01549-4

44. Solazzo AL, Gorman BK, Denney JT. Cancer screening utilization among U.S. women: How mammogram and pap test use varies among heterosexual, lesbian, and bisexual women. Popul Res Policy Rev 2017;36(3):357-377; doi:10.1007/s11113-017-9425-5

45. Tracy JK, Lydecker AD, Ireland L. Barriers to cervical cancer screening among lesbians. J Womens Health (Larchmt) 2010;19(2):229-237; doi:10.1089/jwh.2009.1393

46. Tracy JK, Schluterman NH, Greenberg DR. Understanding cervical cancer screening among lesbians: A national survey. BMC Public Health 2013;13(1):442; doi:10.1186/1471-2458-13-442

47. Wang YC, Chang SR, Miao NF. The role of butch versus femme identity in body image and breast health among lesbians in Taiwan: Results of an online survey. J Nursing Scholarsh 2020;52(2):174-182; doi:10.1111/jnu.12544

48. Charlton BM, Kahn JA, Sarda V, et al. Maternal factors and sexual orientation-related disparities in cervical cancer prevention. Womens Health Issues 2019;29(3):238-244; doi:10.1016/j.whi.2018.12.001

49. Lee M, Jenkins WD, Adjei Boakye E. Cancer screening utilization by residence and sexual orientation. Cancer Causes Control 2020;31(10):951-964; doi:10.1007/s10552-020-01339-4

50. Barefoot KN, Warren JC, Smalley KB. Women's health care: The experiences and behaviors of rural and urban lesbians in the USA. Rural Remote Health 2017;17(1):3875; doi:10.22605/rrh3875

51. Lett E, Dowshen NL, Baker KE. Intersectionality and health inequities for gender minority Blacks in the U.S. Am J Prev Med 2020;59(5):639-647; doi:10.1016/j.amepre.2020.04.013

52. Ruiz AM, Luebke J, Klein K, et al. An integrative literature review and critical reflection of intersectionality theory. Nurs Inq 2021;28(4):e12414; doi:10.1111/nin.12414

53. American Cancer Society. American Cancer Society guidelines for the early detection of cancer. Kennesaw, GA; 2022. Available from: https://www.cancer.org/healthy/find-cancer-early/american-cancer-society-guidelines-for-the-early-detection-of-cancer.html# [Last accessed: March15, 2023]

54. O'Laughlin DJ, Strelow B, Fellows N, et al. Addressing anxiety and fear during the female pelvic examination. J Prim Care Community Health 2021;12:2150132721992195; doi:10.1177/2150132721992195

55. Brookmeyer KA, Coor A, Kachur RE, et al. Sexual history taking in clinical settings: A narrative review. Sex Transm Dis 2021;48(6):393-402; doi:10.1097/OLQ.0000000000001319

56. Smith CP, George DR. Bisexual women's invisibility in health care. AMA J Ethics 2021;23(7):E563-568; doi:10.1001/amajethics.2021.563

57. Bostwick WB, Dodge B. Introduction to the special section on bisexual health: Can you see us now? Arch Sex Behav 2019;48(1):79-87; doi:10.1007/s10508-018-1370-9

58. Mereish EH, Katz-Wise SL, Woulfe J. Bisexual-specific minority stressors, psychological distress, and suicidality in bisexual individuals: The mediating role of loneliness. Prev Sci 2017;18(6):716-725; doi:10.1007/s11121-017-0804-2

59. Jones J. Gallup: LGBT identification in U.S. ticks Up to 7.1%. Washington, DC; 2022. Available from: https://news.gallup.com/poll/389792/lgbt-identification-ticks-up.aspx [Last accessed: March15, 2023]

60. Fornili KS. Expanded conceptual framework for ethical action by nurses on the "further upstream and farther downstream" determinants of health equity. J Addict Nurs 2022;33(3):203-214; doi:10.1097/JAN.0000000000000484

61. Charlton BM, Kahn JA, Sarda V, et al. Maternal Factors and Sexual Orientation-Related Disparities in Cervical Cancer Prevention. Women's Health Issues. 2019;29: 238-244.

62. Burnett CB, Steakley CS, Slack R, Roth J, Lerman C. Patterns of breast cancer screening among lesbians at increased risk for breast cancer. Women & Health. 1999;29: 35-55

63. Barefoot KN, Warren JC, Smalley KB. Women's health care: the experiences and behaviors of rural and urban lesbians in the USA. Rural & Remote Health. 2017;17: 1-16

64. Agénor M, Pérez AE, Tabaac AR, et al. Sexual Orientation Identity Disparities in Mammography Among White, Black, and Latina U.S. Women. LGBT Health. 2020;7: 312-320

65. Liu PL, Yeo TED. Breast health, risk factors, and cancer screening among lesbian, bisexual, and queer/questioning women in China. Health Care Women Int. 2021;42: 947-961

66. Johnson MJ, Mueller M, Eliason MJ, Stuart G, Nemeth LS. Quantitative and mixed analyses to identify factors that affect cervical cancer screening uptake among lesbian and bisexual women and transgender men. J Clin Nurs. 2016;25: 3628-3642

67. Tabaac AR, Benotsch EG, Barnes AJ. Mediation Models of Perceived Medical Heterosexism, Provider-Patient Relationship Quality, and Cervical Cancer Screening in a Community Sample of Sexual Minority Women and Gender Nonbinary Adults. LGBT Health. 2019;6: 77-86

68. Benz MB, Cabrera KB, Kline N, Bishop LS, Palm Reed K. Fear of Stigma Mediates the Relationship between Internalized Stigma and Treatment-Seeking among Individuals with Substance Use Problems. Subst Use Misuse. 2021;56: 808-818

69. Frost DM, Meyer IH. Minority stress theory: Application, critique, and continued relevance. Current Opinion in Psychology. 2023;51: 101579

70. Agenor M, Bailey Z, Krieger N, Austin SB, Gottlieb BR. Exploring the cervical cancer screening experiences of black lesbian, bisexual, and queer women: The role of patient-provider communication. Women & Health. 2015;55: 717-736

71. Haviland K, Burrows Walters C, Newman S. Barriers to palliative care in sexual and gender minority patients with cancer: A scoping review of the literature. Health & Social Care in the Community. 2020

72. Johnson M, Wakefield C, Garthe K. Qualitative socioecological factors of cervical cancer screening use among transgender men. Prev Med Rep. 2020;17: 101052

73. Mendelsohn DM, Omoto AM, Tannenbaum K, Lamb CS. When Sexual Identity and Sexual Behaviors Do Not Align: The Prevalence of Discordance and its Physical and Psychological Health Correlates. Stigma Health. 2022;7: 70-79

74. Mustanski B, Birkett M, Greene GJ, Rosario M, Bostwick W, Everett BG. The association between sexual orientation identity and behavior across race/ethnicity, sex, and age in a probability sample of high school students. American journal of public health. 2014;104: 237-244

75. Anderson, J., Bourne, D., Peterson, K., & Mackey, K. (2019). VA evidence-based synthesis program reports. In Evidence brief: Accuracy of self-report for cervical and breast cancer screening, U.S. Department of Veterans Affairs. https://www.ncbi.nlm.nih.gov/books/NBK539386/

76. Roncancio, A. M., Ward, K. K., & Fernandez, M. E. (2013). Understanding cervical cancer screening intentions among Latinas using an expanded theory of planned behavior model. Behavioral Medicine, 39(3), 66–72. doi:10.1080/08964289.2013.799452

77. Roncancio, A. M., Ward, K. K., Sanchez, I. A., Cano, M. A., Byrd, T. L., Vernon, S. W., Fernandez-Esquer, M. E., & Fernandez, M. E. (2015). Using the Theory of Planned

Behavior to understand cervical cancer screening among Latinas. Health Education & Behavior, 42(5), 621–626. doi:10.1177/1090198115571364

78. Brownfield, J. M., & Brown, C. (2022). The relations among outness, authenticity, and well-being for bisexual adults. Psychology of Sexual Orientation and Gender Diversity, 9(1), 71–80. doi:10.1037/sgd0000390

79. Meidlinger P.C. & Hope D.A., (2014.) Differentiating disclosure and concealment in measurement of outness for sexual minorities: The Nebraska Outness Scale. Psychology of Sexual Orientation and Gender Diversity, 1(4) 489-497. doi:10.1037/sgd0000080

80. Nakajima M, Haji A, Sero A, Taha S, Habte H, Jama S, Hodges J, Mohamud S, Ahmed O, Hassan O, al'Absi M. Psychosocial Correlates of Experience and Intention to Receive Colorectal Cancer Screening: A Cross-Sectional Study Among East African Men in the U.S. J Prim Prev. 2021 Dec;42(6):603-623. doi:10.1007/s10935-021-00648-x. Epub 2021 Oct 15. PMID: 34654996

81. Kirsch JL, Roche AI, Bronars C, Donovan KA, Hassett LC, Ehlers SL. Emotional distress and future healthcare utilization in oncology populations: A systematic review. Psychooncology. 2024 Mar;33(3):e6322. doi:10.1002/pon.6322. PMID: 38483339

82. Jones T, Freeman K, Ackerman M, Trivedi MS, Silverman T, Shapiro P, Kukafka R, Crew KD. Mental Illness and BRCA1/2 Genetic Testing Intention Among Multiethnic Women Undergoing Screening Mammography. Oncol Nurs Forum. 2020 Jan 1;47(1):E13-E24. doi:10.1188/20.ONF.E13-E24. PMID: 31845917; PMCID: PMC7295180

83. Galli F, Giancamilli F, Palombi T, Vitale JA, Borghi S, De Maria A, Cavicchiolo E, Diotaiuti P, La Torre A, Zelli A, Lucidi F, Codella R, Chirico A. Anxiety, Motives, and Intention for Physical Activity during the Italian COVID-19 Lockdown: An Observational Longitudinal Study. Int J Environ Res Public Health. 2022 Apr 13;19(8):4689. doi:10.3390/ijerph19084689. PMID: 35457555; PMCID: PMC9025152

84. Spielberger, C. D. (1983). State-Trait Anxiety Inventory for Adults (STAI-AD) [Database record]. APA PsycTests. doi:10.1037/t06496-000

85. Donahue JM, DeBenedetto AM, Wierenga CE, Kaye WH, Brown TA. Examining day hospital treatment outcomes for sexual minority patients with eating disorders. International Journal of Eating Disorders. 2020;53: 1657-1666

86. Clark LA, Watson D. Tripartite model of anxiety and depression: Psychometric evidence and taxonomic implications. Journal of Abnormal Psychology. 1991;100: 316-336

87. Chiappelli, J., Nugent, K. L., Thangavelu, K., Searcy, K., & Hong, L. E. (2014). Assessment of trait and state aspects of depression in schizophrenia. Schizophrenia bulletin, 40(1), 132–142. doi:10.1093/schbul/sbt069

88. Torbati A, Ullrich HS, Cano MÀ, et al. Sociosexual domains as mediators of the relationship between trait depression and sexual risk: A serial mediation analysis in a sample of Iranian American adults. Journal of Affective Disorders Reports. 2022;9: 100362

89. Furukawa NW, Maksut JL, Zlotorzynska M, Sanchez TH, Smith DK, Baral SD. Sexuality Disclosure in U.S. Gay, Bisexual, and Other Men Who Have Sex With Men: Impact on Healthcare-Related Stigmas and HIV Pre-Exposure Prophylaxis Denial. Am J Prev Med. 2020 Aug;59(2):e79-e87. doi:10.1016/j.amepre.2020.02.010. Epub 2020 May 4.

90. Rusch N, Angermeyer MC, Corrigan PW. Mental illness stigma: concepts, consequences, and initiatives to reduce stigma. Eur Psuchiatry. 2005 Dec;20(8):529-39. doi:10.1016/j.eurpsy.2005.04.004. Epub 2005 Sep 19. PMID: 16171984

CHAPTER 3: MENTAL HEALTH AND IDENTITY DISCLOSURE FOR BISEXUAL TRANSGENDER IDENTITY: EVALUATING RISK FOR PEOPLE WITH COMMONLY INTERSECTING IDENTITIES

Introduction

Current societal norms in the United States support false presumptions that all people are heterosexual and cisgender.[1,2] In contrast to heterosexual or cisgender (non-stigmatized) identities, minority sexual and gender identities (i.e., bisexual, transgender) are often stigmatized or rejected.[1] **Table 3.1** defines common stigmatized and non-stigmatized sexual and gender identities.[3] Because identity disclosure exposes individuals who have stigmatized sexual or gender identities to rejection and subsequently heightened anxiety and depressive symptoms, they must make conscious decisions whether and to whom to disclose their sexual and/or gender identity.[2]

Individuals with stigmatized sexual or gender identities have poorer mental health than individuals with non-stigmatized (i.e., heterosexual or cisgender) identities.[4,5] Bisexual individuals (i.e., people with a stigmatized sexual identity) are approximately 10% and 20% more likely than heterosexual people to report anxiety and depressive symptoms, respectively.[4] A 2022 systematic review revealed that transgender individuals (i.e., people with a stigmatized gender identity) are approximately 200% more likely than cisgender individuals to be diagnosed with mood or anxiety disorders.[5] In addition, studies show that people who identify as bisexual or transgender experience poorer mental health than those with other stigmatized sexual and gender identities.[6-8] Further, people with bisexual or transgender identity who were assigned female at birth experience poorer mental health than those assigned male at birth (**Table 3.1**).[7-8]

Bisexual and transgender individuals who have disclosed their sexual or gender identity may face unique experiences with rejection. For example, bisexual people often face misplaced presumptions of promiscuity, and transgender people are at greater risk for gender-related violence.[5-6] Bisexual and transgender identities commonly intersect (i.e., co-occur). For example, 25 - 50% of people with transgender identity who were assigned female at birth also identify themselves as bisexual.[9] People with intersecting stigmatized identities, such as bisexual and transgender identities, may experience rejection related to the disclosure of either identity, which compounds their vulnerability to mental health issues. Rejection of stigmatized identities can be distressing,[2] but it is unknown how identity disclosure relates to mental health for people with intersecting stigmatized identities.

People with commonly intersecting bisexual and transgender identities must choose whether and in which settings to disclose each stigmatized identity, resulting in many possible patterns of disclosure across settings.[10] A person's disclosure level in each social setting may depend on anticipated rejection and consequences of rejection upon disclosing in a given setting. The level of rejection and distress from disclosure may vary across social settings (i.e., in healthcare, with friends, in public, at work, at home, with family), depending on the perceived or observed consequences of disclosing in a given setting.[2,11] For example, people who disclosed a stigmatized sexual identity at work experienced greater rejection and stress than those nondisclosed,[10] Conversely, disclosure with friends has been associated with increased social support and well-being.[10] Despite the unique and compounding disclosure risks among people with intersecting bisexual and transgender identities, how their identity disclosure experience in different social settings affects mental health is not known.[9]

Therefore, the purpose of this study was to examine the effects of identity disclosure on mental health (levels of anxiety and depressive symptoms) in 6 key social settings (in healthcare, with friends, in public, at work, at home, with family) among individuals with intersecting bisexual and transgender identities who were assigned female at birth.

Methods

Study Sample & Design

This study was a secondary data analysis using data from a broader study.[12] The parent study consisted of a primary study and a secondary study component. The primary study was a daily diary study examining minority stress, substance use, and sexual risk behaviors in transgender individuals. Inclusion criteria for the primary study included: (1) aged 16-40, (2) identified as transgender men, transgender women, genderqueer, or non-binary, (3) lived in the United States, (4) had sex in the past 30 days, and (5) either binge drank or used substances in the past 30 days. The secondary study component was a 1-time cross-sectional survey addressing mental health and coping, which was available to those who were 16 or older and identified as transgender but did not meet eligibility criteria for the primary study. The data presented in this secondary data analysis are from participants who completed the 1-time cross-sectional survey only.

Eligibility criteria for this secondary data analysis included participants who (1) met the study's definition of bisexual, indicated by self-identification as bisexual, pansexual, or queer, based on the parent study's response options, (2) were assigned female at birth, and (3) completed all items from PROMIS Anxiety, PROMIS Depression, and National Transgender Discrimination Survey identity disclosure items.[11,13-14] Of the 695 participants who completed the 1-time web-based survey, 313 participants were assigned female at birth and met the study definition of bisexual identity. Among those, 301 completed the PROMIS Anxiety, PROMIS Depression, and National Transgender Discrimination Survey identity disclosure items and were included in this analysis.

Measures

Major study variables include identity disclosure, anxiety, and depressive symptoms. Study measures are included in supplementary materials (**Appendix A**).

Identity Disclosure

Identity disclosure was measured by 6 items adopted from the National Transgender Discrimination Survey (**Appendix A, Part 1**).[11] The 6-item measure asked participants to denote “How many people know or believe you are transgender/gender nonconforming in each of the following social circles or settings?” in healthcare, with friends, in public, at work, at home, or with family. Participants rated from 1 (none) to 5 (all) on how many people knew about their gender identity, with a higher rating meaning more disclosure. Development and content validity of the survey items were provided by individuals with subject matter expertise across the United States.[11] The internal consistency reliability for the present study was supported by a Cronbach's alpha 0.828.

Anxiety

Anxiety was measured using a short form of PROMIS Anxiety (7a), which uses 7 items to examine symptoms of anxiety (e.g., worry, fear) experienced in the past 7 days on a numeric scale ranging from 1 (never) to 5 (always) (**Appendix A, Part 2**).[15-16] Raw scores were transformed into T-scores for analysis, and higher T-scores meant higher anxiety. The PROMIS Anxiety was validated in large nationally representative samples against the legacy measure, Mood and Anxiety Symptom Questionnaire (r = 0.80), and supported by strong internal consistency reliability in the parent study (α = .94), and the present study (α = .94).

Depressive Symptoms

A short form of the PROMIS Depression (8a) was used to measure depressive symptoms (**Appendix A**, **Part 2**).[15-16] This 8-item measure assessed depressive symptoms (e.g., feelings of worthlessness) experienced in the past 7 days on a numeric scale from 1 (never) to 5 (always). Raw scores were transformed into T-scores for analysis. Higher T-scores meant greater depressive symptoms. The validity of the PROMIS Depression (8a) measure was supported by strong correlations with legacy depression measures (i.e., Center for Epidemiological Studies Depression Scale) in large nationally representative samples (r = 0.83). Internal consistency reliability of its application in the parent study (α = .95) and the present study (α = .95) was supported.

Participant Characteristics and Demographics

Nine items from the demographic survey (**Appendix A, Part 3**) pertaining to this analysis included (1) gender identity (select all that apply; woman, man, transgender woman, transgender man, genderqueer, non-binary, agender, androgyne, bigender, option not listed), (2) age (years), (3) relationship status (in a romantic relationship, not in a romantic relationship), (4) race/ethnicity (White, Black/African American, American Indian or Alaska native, native Hawaiian or other pacific islander, Asian, Latino/a, option not listed, multiracial/multiethnic), (5) living situation (alone, with parents or family, with a roommate, with a romantic or sexual partner, group home or residential care facility, no permanent home address), (6) employment status (full time, part time, full-time student, unable to work for health reasons, unemployed, another answer), (7) education level (select all that apply; less than high school diploma, high school graduate or equivalent, some college education but have not graduated, associate degree or technical school degree, bachelor's degree, master's degree, doctorate or professional degree) (8) income (less than $10,000, $10-19,999, $20-29,999, $30-39,999, $40-49,999, $50-69,999, $70-99,999, over $100,000), and (9) history of difficulty receiving care due to one's gender identity (never experienced, experienced before age 18, experienced after age 18, experienced within past year).[17]

Data Analysis

Statistical analyses were conducted using SPSS Version 29. Descriptive statistics included percentages or means and standard deviations for each demographic variable and identity disclosure level in each setting. Additional descriptive statistics included means and standard deviations for Anxiety and Depression T-scores, and subgroup analysis of means and standard deviations for participants with high (PROMIS T-score $\geq$ 60; moderate to severe) anxiety or depressive symptoms.[18]

K-means cluster analysis was used to identify common patterns of gender identity disclosure levels in all 6 settings (with family, at home, with friends, at work, in public, and in healthcare). A series of cluster analyses were conducted to identify the greatest number of distinct clusters (i.e., disclosure patterns), with cluster center convergence within 10 iterations, and with cluster sample sizes large enough for interpretation. To verify cluster selection, ANOVAs and Tukey's post-hoc tests were used to determine significant between-cluster differences in mean disclosure level for each setting. Differences in anxiety and depressive symptoms between identity disclosure patterns were assessed using ANOVAs.

All main study variables (anxiety, depressive symptoms, identity disclosure level) were analyzed on a continuous scale. To determine whether identity disclosure (independent variable) is predictive of mental health, i.e., anxiety or depressive symptoms (primary outcome variables), multiple linear regression models were conducted for each of the 6 identity disclosure settings (with family, at home, with friends, at work, in public, and in healthcare). One additional model was conducted for disclosure in all settings (average). Chi-square analyses were used to identify any significant relationships between demographic variables and independent (identity disclosure) and dependent (mental health) variables. Those demographic variables significantly related to identity disclosure and mental health were then added to each linear regression model one at a time. Findings were considered significant if the *p* value was less than 0.05. Missing data were addressed using mean substitution.

Results

Sample Characteristics

Of the 301 participants included in this secondary data analysis, the majority were white (*n* = 222, 74.2%), and identified as transgender men (*n* = 90, 29.9%), genderqueer (*n* = 60, 19.9%), and/or non-binary (*n* = 76, 25.2%). Mean age was 24.24 (±7.45), with most participants being between ages 16-20 (*n* = 112, 37.2%), or 21-30 (*n* = 138, 45.8%). Most participants were employed (*n* = 159, 52.9%) and/or a full-time student (*n* = 140, 46.5%), with some college education (*n* = 85, 28.2%) or a Bachelor's degree (*n* = 71, 23.6%). Participants typically earned less than $20,000 annually (*n* = 203, 68.2%) and lived with parents or family (*n* = 103, 34.2%), a roommate (*n* = 84, 27.9%), or a partner (*n* = 74, 24.6%). Over half of participants were in a romantic relationship (*n* = 156, 51.8%), and most reported no history of difficulty receiving care related to their gender identity (*n* = 163, 54.2%). Additional demographic findings are in **Table 3.2.**

Identity Disclosure

On average, on a 1 to 5 rating scale with 5 meaning highest, participants had highest levels of disclosure with friends (4.0 ± 1.1), at home (3.9 ± 1.6), and with family (3.0 ± 1.5), and disclosed the least in public (2.3 ± 1.0), at work (2.5 ± 1.4), and in healthcare (2.8 ± 1.5). K-means cluster analysis resulted in 4 unique identity disclosure patterns: (1) ‘mostly not disclosed’, (2) ‘mostly disclosed’, (3) ‘low disclosure in public or work settings’, and (4) ‘low disclosure in familial or healthcare settings.’ The 4 cluster centers converged within 9 iterations, and ANOVAs confirmed that the 4 patterns represented the largest number of clusters with significant between-cluster differences in mean disclosure level for the 6 settings, with Tukey’s post-hoc test confirming each cluster pairing had significant differences in over half of the settings. **Figure 3.1** depicts identity disclosure in 6 social settings for the 4 identity disclosure patterns. The most common identity disclosure pattern was ‘mostly disclosed’ (*n* = 74, 35.4%), while the least common pattern was ‘low disclosure in familial or healthcare settings’ (*n* = 23, 11%). Disclosure with friends was high across all 4 identity disclosure patterns.

Participants disclosed their identities differently in some settings based on their demographic characteristics, including history of difficulty receiving care due to gender identity, and relationship status. Identity disclosure levels were significantly higher in all 6 settings among individuals who have ever experienced difficulty receiving care due to their gender identity (**Appendix A, Table A3.4**). The largest such difference was in healthcare settings [F (1, 293) = 22.17, *p* < .001]. In particular, disclosure in healthcare settings was significantly higher for those who had experienced difficulty receiving care due to their gender identity (3.2 ± 1.4), compared to those who never experienced difficulty receiving care (2.4 ± 1.5). Levels of disclosure with family [*F* (1, 306) = 8.74, *p* = .003], and at home [*F* (1, 276) = 13.84, *p* < .001] significantly differed by relationship status (in a relationship vs. not in a relationship). Compared with participants not in a relationship, those in a relationship reported higher disclosure levels with family (2.8 ± 1.5 vs. 3.3 ± 1.5), and at home (3.5 ± 1.7 vs. 4.2 ± 1.4; **Appendix A, Table A3.3**).

When comparing the 9 participant characteristics among the 4 identity disclosure patterns, there were no significant differences between participants ‘mostly not disclosed’ and ‘low disclosure in familial or healthcare settings.’ However, compared to those ‘mostly disclosed’ and ‘low disclosure in public or work settings’, participants ‘mostly not disclosed’ were significantly younger (*p* < .001, *p* = .005), and had a lower education level (*p* < .001, *p* = .008), respectively.

Anxiety

The average PROMIS Anxiety score was 63.2 ± 9.6. Nearly 3 quarters (72.4%) of the participants reported high anxiety (PROMIS Anxiety T-score $\geq$60). High anxiety was most commonly reported among participants who were non-binary (84.2%, mean T-score 65.6 ± 8.9), age 20 or younger (79.5%, mean T-score 64.7 ± 9.3), multiracial/multiethnic or another race/ethnicity not listed (80%, mean T-score 64.7 ± 8.9), living with parents or family (76.7%, mean T-score 64.2 ± 10.9), not employed full-time (74.7%, mean T-score 63.8 ± 8.7), had a high school education or less (83.1%, mean T-score 64.9 ± 10), and income less than $10,000 (75.9%, mean T-score 64.6 ± 9.4). Conversely, high anxiety was reported least among participants 31 or older (52.9%, mean T-score 58.8 ± 9.6). **Table 3.3** provides additional detail about participant characteristics and anxiety. There was no significant difference in average PROMIS Anxiety T-score between participants with and without a romantic relationship ([*F* (1, 299) = .96, *p* = .329], **Table 3.4).** However, anxiety level significantly differed based on history of difficulty receiving care ([*F* (1, 297) = 7.12, *p* = .008], **Table 3.4**). Compared to those who never had difficulty receiving care due to their gender identity, anxiety T-scores were higher among those who ever had difficulty receiving care due to their gender identity (64.86 ± 8.11).

Depressive Symptoms

Over half (50.2%) of participants reported having high depressive symptoms (PROMIS Depression $\geq$ 60), with a mean PROMIS Depression T-score of 60.2 ± 9.1. High depressive symptoms were most commonly reported by participants who were age 16-20 (63.4%, mean T-score 63 ± 9.5), living with parents or family (64.1%, mean T-score 63.7 ± 9.0), or had high school education or less (68.7%, mean T-score 64 ± 8.5). Conversely, high depressive symptoms were reported least among participants who were genderqueer (33.3%, mean T-score 57.9 ± 9.6), age 31 or older (25.5%, mean T-score 55.7 ± 8.1), living alone (31.4%, mean T-score 57.3 ± 9.1), employed full-time (35.9%, mean T-score 56.8 ± 8.6), had Bachelor's degree or higher (34.5%, mean T-score 56.9 ± 7.9), or annual income $40,000 or higher (35.6%, mean T-score 56.9 ± 7.8). **Table 3.3** provides additional detail about participant characteristics and depressive symptoms. Compared to participants with a romantic relationship, participants who were not in a romantic relationship reported significantly higher PROMIS Depression T-Scores ([*F* (1, 299) = 9.52, *p* = .002], **Table 3.4**). Participants who had ever experienced difficulty receiving care due to their gender identity reported significantly higher depressive symptoms compared to those who had never had difficulty ([*F* (1,297) = 3.93, *p* = .048], **Table 3.4**.

Identity Disclosure and Mental Health

Among those with high anxiety, mean level of identity disclosure was highest with friends (4.1 ± 1.1) and at home (3.7 ± 1.6), and lowest in public (2.2 ± 1.0) and at work (2.5 ± 1.4). There were significant differences in anxiety levels among the 4 identity disclosure patterns ([F (3, 205) = 7.175, *p* < .001], **Table 3.4**). Tukey post-hoc comparisons found that participants 'mostly not disclosed' (mean T-score 68.3 ± 7.7) had significantly higher anxiety T-scores than the other 3 disclosure patterns (**Appendix A, Table A3.1**). Regression analysis determined that disclosure levels in some settings were related to anxiety. Lower identity disclosure at home (β = -.153, *p* = .016) and with family (β = -.143, *p* = .016) was significantly associated with higher anxiety when controlling for age, education, and income (**Table 3.5**).

Among those with high depressive symptoms, mean level of identity disclosure was highest with friends (4.0 ± 1.1) and at home (3.5 ± 1.7), and lowest in public (2.2 ± 1.0) and at work (2.4 ± 1.5). There were significant differences in depression levels among the 4 identity disclosure patterns ([$F(3, 205) = 8.245$, $p < .001$], **Table 3.4**). Tukey post-hoc tests revealed that participants 'mostly not disclosed' (mean T-score 64.9 ± 10.7) had significantly higher depressive symptom T-scores than those 'mostly disclosed' (57.3 ± 6.9, $p < .001$) and 'low disclosure in public or work settings' (58.0 ± 8.6, $p < .001$; **Appendix A3, Table A3.2**). Regression analysis identified that lower disclosure at home was significantly associated with greater depressive symptoms when controlling for age, education, and income ($\beta = -.152$, $p = .012$; **Table 3.5**).

Discussion

The findings of this study supported that identity disclosure was associated with mental health among people with intersecting bisexual and transgender identities who were assigned female at birth. However, associations were only significant in 2 out of the 6 disclosure settings, including at home and with family. Lower levels of identity disclosure at home and with family were associated with higher anxiety levels. Additionally, lower levels of identity disclosure at home were associated with greater depressive symptoms. In addition, this study also identified 4 patterns of disclosure, including 'mostly not disclosed', 'mostly disclosed', 'low disclosure in public or work settings', and 'low disclosure in familial or healthcare settings' that show how people may disclose across the 6 settings. Significant associations were identified between the identity disclosure patterns and anxiety and depressive symptoms.

This study identified a significant difference in mental health among the 4 identity disclosure patterns. Specifically, participants 'mostly not disclosed' reported significantly higher anxiety and depressive symptoms than those who were 'mostly disclosed' or 'low disclosure in public or work settings.' However, levels of anxiety and depressive symptoms did not differ between those who were ‘mostly not disclosed’ and those who were ‘low disclosure in familial or healthcare settings.’ While prior studies support that high disclosure (‘mostly disclosed’) is associated with less anxiety and depressive symptoms, those who had high disclosure except with family or in healthcare (‘low disclosure in familial or healthcare settings’) had greater anxiety and depressive symptoms. Disclosure in both familial and healthcare settings can have traumatic results if there is rejection (e.g., loss of housing, denial of healthcare services), and relationships may be compulsory or difficult to avoid (e.g., parents, emergency care provider). Thus, despite high disclosure in other settings, higher anxiety and depressive symptoms among those with ‘low disclosure in familial or healthcare settings’ may be related to the perceived consequences of rejection in these 2 particular settings.

A person’s disclosure pattern may describe the settings where they are most comfortable disclosing (e.g., among accepting friends), where disclosure is most essential (e.g., in gynecologic care settings), or where disclosure may be unavoidable (e.g., a new job, if one’s name or gender do not match legal identification). Thus, by capturing comparative levels of disclosure across different settings, disclosure pattern measures identity disclosure more comprehensively than disclosure level in a single setting. Despite the benefits of measuring disclosure patterns, current literature often examines identity disclosure in a single setting and does not provide the bigger picture of how a person discloses across settings. Thus, future studies should consider measuring patterns of disclosure and examining potential factors that inform common disclosure patterns (e.g., motivations, past experiences) to better understand why some disclosure patterns are at greater risk for anxiety and depressive symptoms.

This study found that those who were not in a relationship disclosed the least at home. When compared to those in a relationship, people who were not in a relationship had significantly higher depressive symptoms. These findings may be related to sample characteristics. In this study, a large proportion of the sample were students, aged 16-30, and living with parents or family. Youth and young adults who do not cohabitate with a partner often depend on parents for housing. This dependence could explain why participants who were not in a relationship had low disclosure at home and reported high depressive symptoms, especially when disclosure at home could potentially lead to loss of housing support. Healthcare providers should be alert to the risk for high depressive symptoms among youth and young adults with intersecting bisexual and transgender identity, particularly those who are not partnered, and live at home with parents or family.

This study found high anxiety and depressive symptoms in those who had ever experienced difficulty receiving care due to their gender identity. People who had experienced difficulty receiving care due to their gender identity were also more likely to have disclosed in healthcare. The finding supports existing research that gender identity disclosure, which may be unavoidable in certain healthcare settings (e.g., gynecology), can result in difficulty receiving care, and subsequently distress.[19] To reduce risk for distress in healthcare settings, providers should seek educational opportunities centered on maintaining healthcare settings that are safe and affirming for people with stigmatized sexual and gender identities.

Limitations

This study is strengthened by a sample size (*n* = 301) large enough to support statistical analyses, and measures that allowed for the examination of identity disclosure level in different setting. However, because participants in the parent study who were eligible for this secondary data analysis were overwhelmingly Millennials or Generation Z, a high proportion of our sample were young adults and self-identified as "full-time students." Thus, study findings may be most applicable to younger individuals (ages 16-30), and not representative of people over age 30 who are less likely to live with parents.

In addition, as the study sample included a high percentage of white participants (74.2%), it does little to explain the experiences of those with minoritized racial identities. Considering the high rates of harassment and violence towards transgender people of color in particular,[20] future studies should seek to implement robust recruitment strategies to include these populations. Furthermore, the K-means cluster analysis included 4 distinguishable identity disclosure patterns, however fewer (only 23) participants were ‘low disclosure in familial or healthcare settings.’ Interpretation for this group should be considered with caution as it contributes to nonhomogeneous clusters.

To identify the bisexual study sample, we included anyone who identified their sexual orientation as bisexual, pansexual, or queer in the parent study. While each of these identities is unique, they may also encompass attraction to more than one gender. Thus, while the study sample maximized inclusion of those with attraction to more than one gender, the broad inclusion criteria may limit applicability of findings to those who explicitly identify as bisexual. In addition, due to the limitation of available data, this study examined disclosure of gender identity, but not sexual identity. Therefore, relationships between bisexual identity disclosure and mental health are not examined in this study. Disclosure of bisexual identity can have unique consequences that do not occur as a result of gender identity disclosure (e.g., assumption that a bisexual person is promiscuous or indecisive). Because disclosure of both transgender identity and bisexual identity can result in rejection experiences,[5-6] future studies should additionally consider examining relationships between mental health and bisexual identity disclosure.

Conclusion/ Implication for Practice

The results of this study illustrate how identity disclosure can be associated with increased anxiety and depressive symptoms for individuals with intersecting stigmatized sexual and gender identities. The findings that bisexual people with ‘mostly not disclosed’ transgender identity are at greatest risk for anxiety and depressive symptoms suggests that disclosure outside of a single setting (i.e., with friends) is necessary to support mental health. Although this study identified relationships between mental health and transgender identity disclosure, additional research is needed to understand the mental health effects of bisexual identity disclosure across the 6 social settings.

This study found that a person’s disclosure level in healthcare was not independently associated with mental health. However, participants with high disclosure in healthcare who had prior experience with stigma and discrimination in healthcare settings (i.e., history of difficulty receiving care) reported increased anxiety and depressive symptoms. Thus, level of identity disclosure may affect mental health further in settings where someone had previously experienced stigma or discrimination. This suggests a greater risk for people who are more likely to have experienced discrimination in healthcare, such as those with multiple stigmatized identities (e.g., sexual, gender, race/ethnicity). To reduce risk for anxiety and depressive symptoms related to identity disclosure in healthcare settings, healthcare providers should seek provide safe and accessible healthcare settings for people with bisexual and transgender identities.

Tables and Figures

Table 3.1. Glossary of sexual and gender identities

Identity Term	Identity Type	Identity Stigma	Definition
Heterosexual	Sexual identity	Not stigmatized	Women who are primarily attracted to men, or men who are primarily attracted to women
Bisexual	Sexual identity	Stigmatized	An overarching term, used to describe anyone attracted to people of more than 1 gender. People who fit this definition might use different identity terms to describe themselves (i.e., pansexual, queer).
Cisgender	Gender identity	Not stigmatized	Sex assigned at birth matches the gender with which they identify
Transgender	Gender identity	Stigmatized	Gender identity does not match sex assigned at birth. Often used as an overarching term: **Transgender man** identifies as a man, and was assigned female at birth **Transgender woman** identifies as a woman, and was assigned male at birth **Non-binary** identity is outside of the gender binary. Sometimes used as an overarching term for identities beyond the gender binary, including **genderqueer**
Assigned Female at Birth (AFAB)	Sex	Although not an identity, people may experience stigma related to this characteristic	Person who is designated female sex at birth, usually based on physical sex characteristics, including appearance of genitalia
Assigned Male at Birth (AMAB)	Sex	Although not an identity, people are not likely to experience stigma related to this characteristic	Person who is designated male sex at birth, usually based on physical sex characteristics, including appearance of genitalia

(National LGBTQIA+ Health Education Center, 2024)[3]

Figure 3.1. Common patterns of identity disclosure across each setting

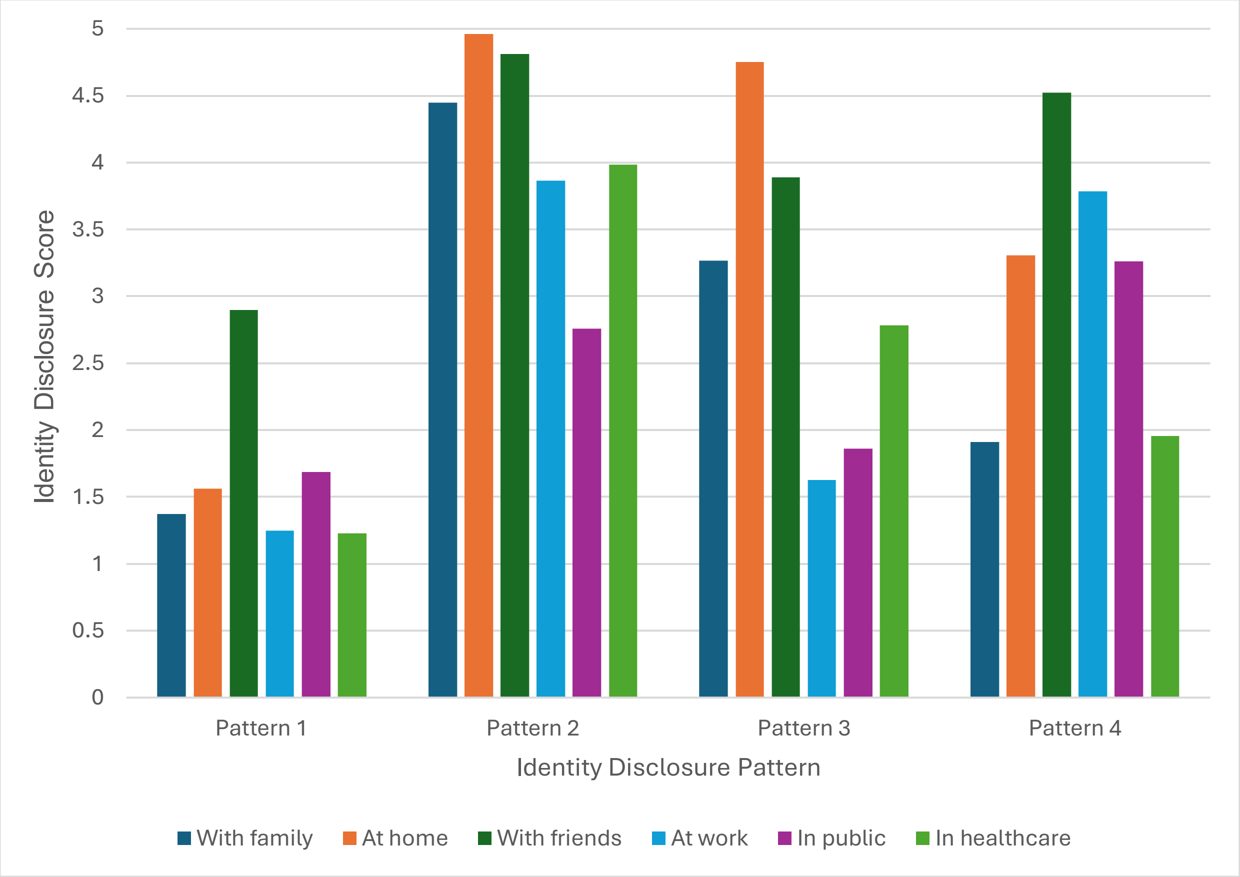


Table 3.2. Participant characteristics

			Total *n* = 301
Characteristic	***n***	**(valid%)**	**Mean (SD)**
[†]Gender Identity			
Transgender man	90	(29.9)	
Man	13	(4.3)	
Genderqueer	60	(19.9)	
Non-binary	76	(25.2)	
Agender	24	(8)	
Androgyne	2	(0.7)	
Bigender	13	(4.3)	
Option not listed	23	(7.6)	
Age (years)			24.24 (7.45)
16–20	112	(37.2)	
21–30	138	(45.8)	
31–40	41	(13.6)	
41–50	6	(2)	
51–60	4	(1.3)	
Relationship status			
In a romantic relationship	156	(51.8)	
Not in a romantic relationship	145	(48.2)	
Race			
White	222	(74.2)	
Black/ African American	7	(2.3)	
American Indian/ Alaskan Native	0	(0)	
Native Hawaiian/ Pacific Islander	0	(0)	
Asian	8	(2.7)	
Latino/a	14	(4.7)	
Option not listed	2	(0.7)	
Multiracial/ multiethnic	46	(15.4)	
Living situation			
Alone	35	(11.6)	
With parents or family	103	(34.2)	
With a roommate	84	(27.9)	
With a romantic or sexual partner	74	(24.6)	
Group home or residential facility	1	(0.3)	
No permanent home address	4	(1.3)	
[‡]Employment status			
Employed full-time	64	(21.3)	
Employed part-time	95	(31.6)	
Full-time student	140	(46.5)	
Unable to work for health reasons	23	(7.6)	
Unemployed	27	(9)	
Another answer not listed	20	(6.6)	
Education			
Less than high school diploma	42	(14)	
High school graduate or equivalent	41	(13.6)	
Some college education	85	(28.2)	
Associate or technical degree	23	(7.6)	
Bachelor’s degree	71	(23.6)	
Master’s degree	34	(11.3)	
Doctorate or professional degree	5	(1.7)	
Income			
Less than $10,000	145	(48.7)	
$10–19,999	58	(19.5)	
$20–29,999	32	(10.7)	
$30–39,999	18	(6)	
$40–49,999	18	(6)	
$50–69,999	11	(3.7)	
$70–99,999	14	(4.7)	
Over $100,000	2	(0.7)	
[‡]History of difficulty getting healthcare			
No difficulty	163	(54.2)	
Difficulty, but not after age 18	20	(6.6)	
Difficulty after age 18, but not in past year	36	(12)	
Difficulty in past, including in past year	82	(27.2)	

[†] For reporting purposes, original survey items combined, condensed or omitted as applicable

[‡] Survey questions allowed participants to select all that apply; may not total 100%

Table 3.3. Average anxiety/depressive symptoms, and percent with high anxiety/depressive symptoms for major sample characteristic subgroups

		Anxiety		Depression	
Sample Characteristic	[§]**Sample characteristic subgroup *(n)***	PROMIS T-Score Mean (SD)	Valid % of subgroup with High Anxiety[†]	PROMIS T-Score Mean (SD)	Valid % of subgroup with High Depression[‡]
Gender Identity	Transgender man *(90)*	63.7 (7.5)	*70.0*	60.6 (7.7)	*48.9*
	Genderqueer *(60)*	62.4 (9.4)	*66.7*	57.9 (9.6)	*33.3*
	Non-binary *(76)*	65.6 (8.9)	*84.2*	62.8 (9.4)	*67.1*
	Another response *(75)*	60.9 (12.0)	*68.0*	59.0 (9.6)	*48.0*
Age (years)	16–20 *(112)*	64.7 (9.3)	*79.5*	63.0 (9.5)	*63.4*
	21–30 *(138)*	63.7 (9.5)	*73.9*	59.6 (8.5)	*48.6*
	31 or older *(51)*	58.8 (9.6)	*52.9*	55.7 (8.1)	*25.5*
Relationship status	In a romantic relationship *(156)*	62.7 (8.8)	*69.9*	58.7 (8.7)	*42.9*
	Not in a romantic relationship *(145)*	63.8 (10.5)	*75.2*	61.9 (9.3)	*57.9*
Race/ethnicity	White *(222)*	63.0 (9.8)	*70.3*	60.2 (8.6)	*47.7*
	Black/African American, Asian, or Latino/a *(29)*	62.8 (9.8)	*75.9*	59.4 (11.3)	*51.7*
	Multiracial/ multiethnic or option not listed *(50)*	64.7 (8.9)	*80.0*	60.8 (10.2)	*60.0*
Living situation	Alone *(35)*	60.9 (12.5)	*57.1*	57.3 (9.1)	*31.4*
	With parents or family *(103)*	64.2 (10.9)	*76.7*	63.7 (9.0)	*64.1*
	With a roommate *(84)*	63.1 (8.1)	*70.2*	59.3 (8.4)	*51.2*
	With a romantic or sexual partner *(74)*	62.7 (7.5)	*74.3*	57.6 (8.6)	*37.8*
	Group home, residential facility, or no address *(5)*	69.6 (8.7)	*100*	63.8 (12.3)	*60.0*
Employment status	Employed full-time *(64)*	61.2 (8.3)	*64.1*	56.8 (8.6)	*35.9*
	Not employed full-time *(237)*	63.8 (9.9)	*74.7*	61.2 (9.1)	*54.0*
Education	High school graduate or less *(83)*	64.9 (10.0)	*83.1*	64.0 (8.5)	*68.7*
	Some college, or technical or associate degree *(108)*	63.6 (10.2)	*73.1*	60.7 (9.7)	*51.9*
	Bachelor’s degree or higher *(110)*	61.6 (8.5)	*63.6*	56.9 (7.8)	*34.5*
Income	Less than $10,000 *(145)*	64.6 (9.4)	*75.9*	61.8 (8.8)	*56.6*
	$10–39,999 *(108)*	62.3 (10.3)	*71.3*	59.4 (8.9)	*48.1*
	$40,000 or more *(45)*	62.1 (6.5)	*64.4*	56.9 (9.9)	*35.6*
History of difficulty receiving healthcare due to gender identity	No difficulty*(163)*	61.9 (10.6)	*68.1*	59.3 (9.6)	*45.4*
	Difficulty, but not after age 18 *(20)*	65.2 (7.6)	*75.0*	62.2 (9.3)	*60.0*
	Difficulty after age 18, but not in past year *(36)*	62.6 (7.9)	*75.0*	58.4 (9.2)	*41.7*
	Difficulty in past, including in past year *(82)*	65.7 (8.2)	*79.3*	62.3 (7.7)	*61.0*

[†] High Anxiety = PROMIS T-Score ≥ 60 [‡] High Depression = PROMIS T-Score ≥ 60

[§] Categories combined, condensed or omitted as applicable based on number of responses

Table 3.4. Differences in anxiety and depressive symptoms between identity disclosure patterns

			N	Mean	Std. Deviation	Deg. Freedom	F	Sig.
PROMIS Anxiety T-score	**Identity disclosure patterns**	Pattern 1	48	68.35	7.734			
		Pattern 2	74	61.69	7.68			
		Pattern 3	64	62.14	8.99			
		Pattern 4	23	62.85	9.69			
						3, 205	7.175***	<.001[‡]
	History of difficulty receiving care due to gender identity	Never experienced	161	61.89	10.64			
		Experienced at least once	138	64.86	8.11			
						1, 297	7.12**	.008
	Relationship status	Not in a relationship	145	63.81	10.497			
		In a relationship	156	62.72	8.76			
						1, 299	.96	.329
PROMIS Depression T-score	**Identity disclosure patterns**	Pattern 1	48	64.94	10.72			
		Pattern 2	74	57.35	6.88			
		Pattern 3	64	57.95	8.56			
		Pattern 4	23	59.88	10.53			
						3, 205	8.245***	<.001[§]
	History of difficulty receiving care due to gender identity	Never experienced	161	59.21	9.59			
		Experienced at least once	138	61.299	8.476			
						1, 297	3.93*	.048
	Relationship status	Not in a relationship	145	61.89	9.34			
		In a relationship	156	58.68	8.73			
						1, 299	9.52**	.002

* = $p<0.05$; ** = $p<0.01$; *** = $p<.001$

[†] Pattern 1: Mostly not disclosed; Pattern 2: Mostly disclosed; Pattern 3: Low disclosure in public or work settings; Pattern 4: Low disclosure in familial or healthcare settings

[‡] Tukey post-hoc tests found ‘mostly not disclosed’ (Pattern 1) significantly higher Anxiety T-scores than the other 3 disclosure patterns

[§] Tukey post-hoc tests found ‘mostly not disclosed’ (Pattern 1) had significantly higher Depression T-scores than those ‘mostly disclosed’ (Pattern 2) and ‘low disclosure in public or work settings’ (Pattern 3)

Table 3.5. Effects of identity disclosure on mental health (multiple linear regression)

	†Anxiety		†Depressive Symptoms	
Identity Disclosure Setting	β	***p value***	β	***p value***
In Healthcare	-.049	.416	.017	.771
With Friends	-.032	.584	-.017	.765
In Public	-.061	.298	.036	.526
At Work	-.030	.660	-.041	.526
At Home	-.153*	.016	-.152*	.012
With Family	-.143*	.016	-.108	.060
Average across all settings	-.106	.076	-.050	.389

* = $p<0.05$; ** = $p<0.01$; †Adjusted for age (step 2), education, income (step 3)

REFERENCES

1. Layland, E. K., Carter, J. A., Perry, N. S., Cienfuegos-Szalay, J., Nelson, K. M., Peasant Bonner, C., & Rendina, H. J. (2020). A systematic review of stigma in sexual and gender minority health interventions. *Translational Behavioral Medicine*, *10*(5), 1200–1210. doi:10.1093/tbm/ibz200

2. Quinn, D. M., & Earnshaw, V. A. (2013). Concealable stigmatized identities and psychological well-being. *Social and Personality Psychology Compass*, *7*(1), 40–51. doi:10.1111%2Fspc3.12005

3. National LGBTQIA+ Health Education Center. (2024, February). *LGBTQIA+ glossary of terms for health care teams*. A Program of the Fenway Institute. Retrieved from: https://www.lgbtqiahealtheducation.org/publication/glossary/

4. Feinstein, B. A., & Dyar, C. (2017). Bisexuality, minority stress, and health. *Current Sexual Health Reports*, *9*(1), 42–49. doi:10.1007%2Fs11930-017-0096-3

5. Pinna, F., Paribello, P., Somaini, G., Corona, A., Ventriglio, A., Corrias, C., Frau, I., Murgia, R., El Kacemi, S., Galeazzi, G. M., Mirandola, M., Amaddeo, F., Crapanzano, A., Converti, M., Piras, P., Suprani, F., Manchia, M., Fiorillo, A., Carpiniello, B., & Italian Working Group on LGBTQI Mental Health. (2022). Mental health in transgender individuals: A systematic review. *International Review of Psychiatry*, *34*(3–4), 292–359. doi:10.1080/09540261.2022.2093629

6. Bostwick, W. B., & Dodge, B. (2019). Introduction to the special section on bisexual health: Can you see us now? *Archives of Sexual Behavior*, *48*(1), 79–87. doi:10.1007/s10508-018-1370-9

7. Chan, R. C. H., Operario, D., & Mak, W. W. S. (2020). Bisexual individuals are at greater risk of poor mental health than lesbians and gay men: The mediating role of sexual identity stress at multiple levels. *Journal of Affective Disorders*, *260*, 292–301. doi:10.1016/j.jad.2019.09.020

8. Sarno, E. L., Dyar, C., Newcomb, M. E., & Whitton, S. W. (2022). Relationship quality and mental health among sexual and gender minorities. *Journal of Family Psychology*, 36(5), 770–779. doi:10.1037/fam0000944

9. Reisner, S. L., Choi, S. K., Herman, J. L., Bockting, W., Krueger, E. A., & Meyer, I. H. (2023). Sexual orientation in transgender adults in the United States. *BMC Public Health*, *23*, 1799

10. Camacho, G., Reinka, M. A., & Quinn, D. M. (2020). Disclosure and concealment of stigmatized identities. *Current opinion in psychology, 31*, 28–32. doi:10.1016/j.copsyc.2019.07.031

11. Grant, M. J., Mottet, A. L., & Tanis, J. (2011). *Injustice at every turn: A report of the national transgender discrimination survey*. National Center for Transgender Equality and National Gay and Lesbian Taskforce. Retrieved from https://transequality.org/sites/default/files/docs/resources/NTDS_Report.pdf

12. Puckett, J. A., Tornello, S., Mustanski, B., & Newcomb, M. E. (2022). Gender variations, generational effects, and mental health of transgender people in relation to timing and status of gender identity milestones. *Psychology of Sexual Orientation and Gender Diversity*, *9*(2), 165–178. doi:10.1037/sgd0000391

13. HealthMeasures. (2021, July 30). *Depression scoring manual: A brief guide to scoring the PROMIS depression instruments2023*. Retrieved from https://www.healthmeasures.net/images/PROMIS/manuals/Scoring_Manuals_/PROMIS_Depression_Scoring_Manual.pdf

14. HealthMeasures. (2022, September 8). *Anxiety scoring manual: A brief guide to scoring the PROMIS anxiety instruments*. Retrieved from https://www.healthmeasures.net/administrator/components/com_instruments/uploads/PROMIS%20Anxiety%20Scoring%20Manual_08Sept2023.pdf

15. Ader, D. N. (2007). Developing the Patient-Reported Outcomes Measurement Information System (PROMIS). *Medical Care, 45*(5). Retrieved from https://journals.lww.com/lww-medicalcare/fulltext/2007/05001/developing_the_patient_reported_outcomes.1.aspx

16. Cella D, Riley W, Stone A, Rothrock N, Reeve B, Yount S, Amtmann D, Bode R, Buysse D, Choi S, Cook K, Devellis R, DeWalt D, Fries JF, Gershon R, Hahn EA, Lai JS, Pilkonis P, Revicki D, Rose M, Weinfurt K, Hays R; PROMIS Cooperative Group (2010). The Patient-Reported Outcomes Measurement Information System (PROMIS) developed and tested its first wave of adult self-reported health outcome item banks: 2005-2008. *J Clin Epidemiol, 63*(11), 1179-1194. doi:10.1016/j.jclinepi.2010.04.011

17. Testa, R. J., Habarth, J., Peta, J., Balsam, K., & Bockting, W. (2015). Development of the Gender Minority Stress and Resilience Measure. *Psychology of Sexual Orientation and Gender Diversity,* 2(1), 65–77. doi:10.1037/sgd0000081

18. Health Measures. (2023). *PROMIS Score Cut Points.* Retrieved from https://www.healthmeasures.net/score-and-interpret/interpret-scores/promis/promis-score-cut-points

19. Sterling, J., & Garcia, M. M. (2020). Cancer screening in the transgender population: a review of current guidelines, best practices, and a proposed care model. *Translational andrology and urology, 9*(6), 2771–2785. doi:10.21037/tau-20-954

20. Human Rights Campaign Foundation (November, 2024). *The Epidemic of Violence Against the Transgender & Gender-Expansive Community in the U.S.* Retrieved from https://www.hrc.org/press-releases/hrcs-2024-epidemic-of-violence-report-fatal-violence-against-transgender-and-gender-non-conforming-people-continues-with-black-trans-women-comprising-nearly-half-of-the-deaths

APPENDIX A: CHAPTER 3 SUPPLEMENTAL MATERIALS

Table A3.1. Post-hoc testing for ANOVAS comparing identity disclosure patterns with anxiety T-Scores

Anxiety Tukey	**Dependent** (direction of mean difference opposite for flipped indep/dep) Mean diff, pvalue (95%CI)			
Independent	Pattern 1	Pattern 2	Pattern 3	Pattern 4
Pattern 1	.	.	.	.
Pattern 2	-1.16, .938 (-6.3, 4)	.	.	.
Pattern 3	-.71, .985 (-5.96, 4.55)	.45, .989 (-3.24, 4.14)	.	.
Pattern 4	**5.5, .049 (.0204, 10.98)**	**6.66, <.001 (2.65, 10.66)**	**6.2, <.001 (2.08, 10.33)**	.

Table A3.2. Post-hoc testing for ANOVAS comparing identity disclosure patterns with depression T-Scores

Depression Tukey	**Dependent** (direction of mean difference opposite for flipped indep/dep) Mean diff, pvalue (95%CI)			
Independent	Pattern 1	Pattern 2	Pattern 3	Pattern 4
Pattern 1	.	.	.	.
Pattern 2	-2.53, .626 (-7.97, 2.9)	.	.	.
Pattern 3	-1.93, .804 (-7.48, 3.62)		.	.
Pattern 4	**5.06, .109 (-.7244, 10.85)**	**7.59, <.001 (3.36, 11.82)**	**6.99, <.001 (2.64, 11.35)**	.

Table A3.3. Differences in identity disclosure by relationship status

Disclosure		N	Mean	SD	Deg. Freedom	F	Sig
With family	Not in a relationship	145	2.79	1.53			
	In a relationship	163	3.29	1.48			
					1,306	8.738**	.003
At home	Not in a relationship	142	3.51	1.69			
	In a relationship	161	4.18	1.41			
					1,276	13.836***	<.001
With friends	Not in a relationship	147	3.97	1.14			
	In a relationship	164	4.13	1.05			
					1, 309	1.831	.177
At work	Not in a relationship	102	2.37	1.46			
	In a relationship	129	2.75	1.37			
					1, 229	4.1*	.044
In public	Not in a relationship	147	2.18	1.02			
	In a relationship	161	2.38	1.04			
					1, 306	2.78	.098
In healthcare	Not in a relationship	132	2.57	1.529			
	In a relationship	156	2.92	1.439			
					1, 278	3.918*	.049
Average all settings	Not in a relationship	149	2.94	1.06			
	In a relationship	164	3.3	.966			
					1, 311	10.03**	.002

* = p<0.05; ** = p<0.01; *** = p<.001

Table A3.4. Identity disclosure and difficulty getting healthcare treatment

Disclosure		**N**	**Mean**	**Std. Deviation**	**Deg. Freedom**	**F**	**Sig.**
With family	Never experienced	163	2.74	1.519			
	Experienced at least once	141	3.43	1.450			
					1, 302	16.238***	<.001
†At home	Never experienced	158	3.59	1.716			
	Experienced at least once	140	4.19	1.381			
					1, 293	11.05***	<.001
With friends	Never experienced	164	3.88	1.164			
	Experienced at least once	143	4.25	.982			
					1, 305	8.801**	.003
At work	Never experienced	121	2.35	1.327			
	Experienced at least once	108	2.83	1.482			
					1, 227	6.860**	.009
In public	Never experienced	162	2.13	.992			
	Experienced at least once	141	2.45	1.058			
					1, 301	7.244**	.008
In healthcare	Never experienced	156	2.41	1.498			
	Experienced at least once	139	3.20	1.374			
					1, 293	22.170***	<.001
Average all settings	Never experienced	164	2.87	1.006			
	Experienced at least once	144	3.42	.968			
					1, 306	23.047***	<.001

* = $p<0.05$; ** = $p<0.01$; *** = $p<.001$
† Welch Anova used for unequal variance

Figure A3.1. Intersections of sexual and gender identity

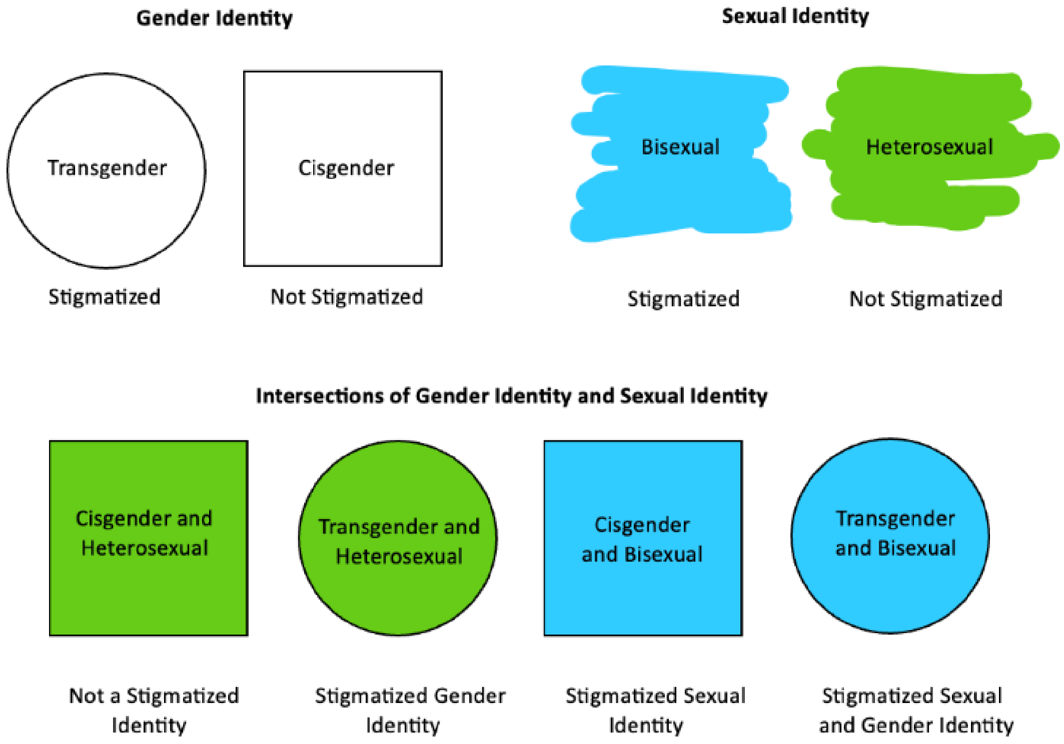
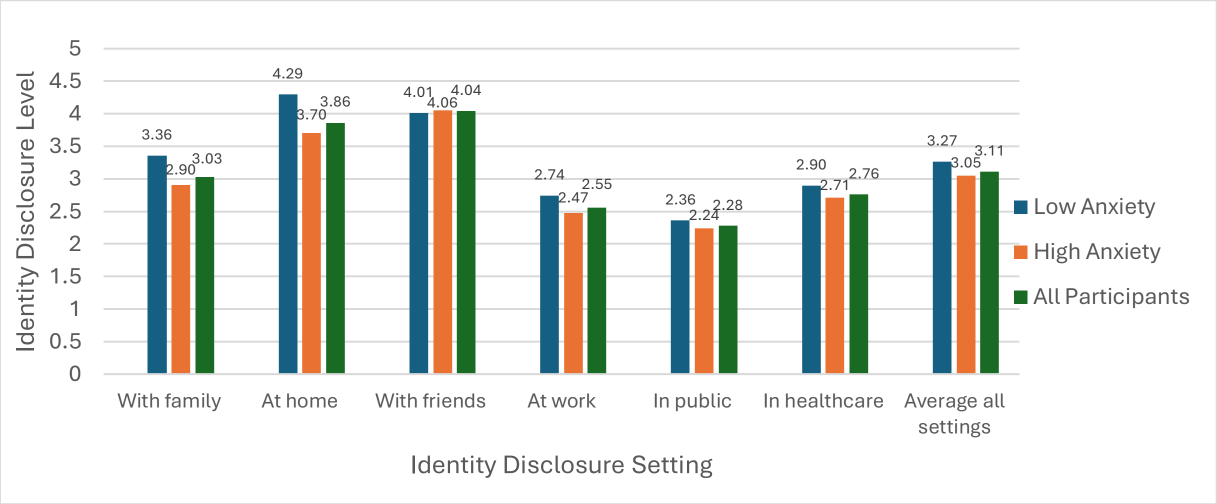
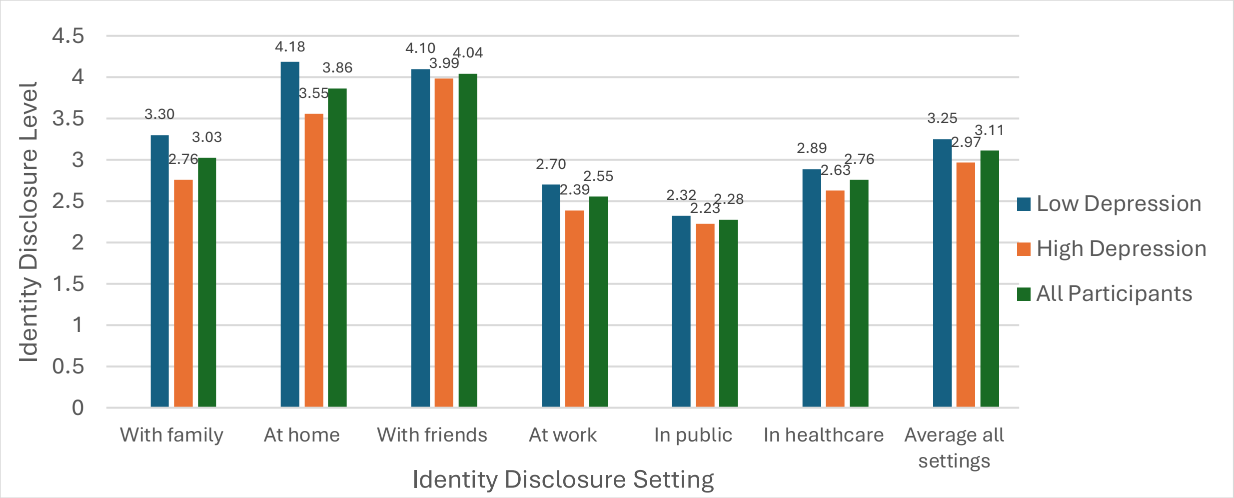


Figure A3.2. Anxiety by identity disclosure level in each setting



High anxiety = PROMIS Anxiety T-Score > 60
Low anxiety = PROMIS Anxiety T-Score < 60

Figure A3.3. Depression by identity disclosure level in each setting



High depression = PROMIS Anxiety T-Score > 60
Low depression = PROMIS Anxiety T-Score < 60

Table A3.5. STROBE Statement—Checklist for cross-sectional studies

	Item No	Recommendation	Page No
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	1
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	(1)
Introduction			
Background/rationale	2	Explain the scientific background and rationale for the investigation being reported	2
Objectives	3	State specific objectives, including any prespecified hypotheses	4
Methods			
Study design	4	Present key elements of study design early in the paper	4
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	4
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants	4
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	4-5
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	*5*
Bias	9	Describe any efforts to address potential sources of bias	13-14
Study size	10	Explain how the study size was arrived at	8
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	7
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	7
		(*b*) Describe any methods used to examine subgroups and interactions	7
		(*c*) Explain how missing data were addressed	7
		(*d*) If applicable, describe analytical methods taking account of sampling strategy	7
		(*e*) Describe any sensitivity analyses	7
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	4
		(b) Give reasons for non-participation at each stage	
		(c) Consider use of a flow diagram	

Table A3.5. (cont'd)

Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	8
		(b) Indicate number of participants with missing data for each variable of interest	8
Outcome data	15*	Report numbers of outcome events or summary measures	8
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	8-11
		(*b*) Report category boundaries when continuous variables were categorized	
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	8-11
Discussion			
Key results	18	Summarise key results with reference to study objectives	12-13
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	13-14
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	12-13
Generalisability	21	Discuss the generalisability (external validity) of the study results	13-14
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	(to add w/ disclosures)

Measures & Questionnaires

PART 1: Identity disclosure items

Table A3.6. Identity disclosure items
How many people know or believe you are transgender/gender nonconforming in each of the following social circles or settings? Please select Not Applicable if the question does not apply to you

	None	**A Few**	**Some**	**Most**	**All**	**Not Applicable**
At home						
On the job						
In public social settings						
When seeking medical care						
With friends						
With family						

PART 2: Mental health items

Table A3.7. PROMIS Emotional Distress – Anxiety Short Form 7a
Please respond to each item by marking one box per row

In the past 7 days…	**Never**	**Rarely**	**Sometimes**	**Often**	**Always**
I felt fearful…	1 [ ]	2 [ ]	3 [ ]	4 [ ]	5 [ ]
I felt anxious…	1 [ ]	2 [ ]	3 [ ]	4 [ ]	5 [ ]
I felt worried...					
I found it hard to focus on anything other than my anxiety…	1 [ ]	2 [ ]	3 [ ]	4 [ ]	5 [ ]
I felt nervous…	1 [ ]	2 [ ]	3 [ ]	4 [ ]	5 [ ]
I felt uneasy…	1 [ ]	2 [ ]	3 [ ]	4 [ ]	5 [ ]
I felt tense…	1 [ ]	2 [ ]	3 [ ]	4 [ ]	5 [ ]

Table A3.8. PROMIS Emotional Distress – Depression Short Form 8a
Please respond to each item by marking one box per row

In the past 7 days…	**Never**	**Rarely**	**Sometimes**	**Often**	**Always**
I felt worthless…	1 [ ]	2 [ ]	3 [ ]	4 [ ]	5 [ ]
I felt helpless…	1 [ ]	2 [ ]	3 [ ]	4 [ ]	5 [ ]
I felt depressed…	1 [ ]	2 [ ]	3 [ ]	4 [ ]	5 [ ]
I felt hopeless…	1 [ ]	2 [ ]	3 [ ]	4 [ ]	5 [ ]
I felt like a failure…	1 [ ]	2 [ ]	3 [ ]	4 [ ]	5 [ ]
I felt unhappy	1 [ ]	2 [ ]	3 [ ]	4 [ ]	5 [ ]
I felt that I had nothing to look forward to…	1 [ ]	2 [ ]	3 [ ]	4 [ ]	5 [ ]
I felt that nothing could cheer me up…	1 [ ]	2 [ ]	3 [ ]	4 [ ]	5 [ ]

PART 3: Demographic Items

For each question, participants were asked to select the term or identity that best aligned with their experiences.

Which of the following best describes your gender?

a. Transman/ Trans man
b. Transwoman/ Trans woman
c. Genderqueer
d. Non-binary
e. Agender
f. Androgyne
g. Woman
h. Man
i. Bigender
j. Not listed (specify)

With which racial/ethnic group do you identify?

a. White
b. Black or African American
c. American Indian or Alaska Native
d. Asian
e. Native Hawaiian or Pacific Islander
f. Hispanic, Latino, or Spanish origin
g. From multiple races

Another race or ethnicity not listed above _____

Please enter your age

[continuous]

Are you currently in a romantic relationship?

a. No
b. Yes

What best describes your employment status? (select all that apply)

a. Employed full-time
b. Employed part-time
c. A full-time student
d. Unable to work for health reasons
e. Unemployed
f. Not listed (specify)

Which of the following best describes your living situation?

a. Living alone in an apartment, dorm, or house
b. Living with parents or family
c. Living with a roommate in an apartment, dorm, or house
d. Living with a romantic or sexual partner
e. Group home or residential treatment facility
f. No permanent home address (homeless, squatting, etc.)

What is the highest degree or level of school you have completed?

a. Elementary and/or junior high
b. Some high school to 12th grade
c. High school graduate – high school diploma or equivalent
d. Some college credit, but less than 1 year
e. Technical school degree
f. One or more years of college, no degree

g. Associate degree
h. Bachelor’s degree
i. Master’s degree
j. Doctorate or professional degree (e.g., PhD, MD, JD, DDS)

What is your current annual income (before taxes)?

a. Less than 10,000
b. 10,000-19,999
c. 20,000-29,999
d. 30,000-39,999
e. 40,000-49,999
f. 50,000-69,999
g. 70,000-99,999
h. More than 100,000

I have had difficulty getting medical or mental health treatment (transition -related or other) because of my gender identity or expression. (select all that apply)

a. Never
b. Yes, before age 18
c. Yes, after age 18
d. Yes, in the past year

CHAPTER 4: EXAMINATION OF IDENTITY DISCLOSURE AND MENTAL HEALTH AS PREDICTORS OF CERVICAL CANCER SCREENING PARTICIPATION AMONG BISEXUAL INDIVIDUALS

Introduction

Globally, cervical cancer is the fourth most common cancer among people assigned female at birth, resulting in 300,000 annual mortalities worldwide.[1] Human papillomavirus (HPV) is the primary causative factor associated with cervical cancer.[2] Routine cancer screening is effective in preventing HPV-related cancers and reducing late-stage diagnosis of cervical cancer.[2] Studies show that routine cervical screening reduces cervical cancer incidence by 60% - 90%[3-4] and increases 5-year survival rate from 18.9% to 90.5%.[3] Although the HPV vaccine is widely available and accounts for 40% of the decline in HPV-related cervical precancerous conditions (CDC, 2021), vaccine rates remain low (~50%)[5-6] leaving many individuals at risk for cervical cancer. Thus, on-time regular cervical cancer screening is crucial.

While the health benefits of routine screening are clear, people with stigmatized sexual identities (e.g., lesbian, gay, bisexual) are 25% less likely than heterosexual people to participate in cervical cancer screening.[7-9] Among stigmatized sexual identities, bisexual people (attracted to more than one gender) are 4% less likely to screen for cervical cancer than lesbian people.[10] Additionally, bisexual individuals are often at increased risk for cervical cancer because cigarette smoking is more prevalent in this population.[9] It was estimated that 23.2% of bisexual people regularly use cigarettes, compared with 15%–18% of lesbian and heterosexual people.[9] Consequently, bisexual people are 2 times more likely than heterosexual people to develop cervical cancer.[8,11] Bisexual individuals also experience worse cancer outcomes than heterosexual people, including greater pelvic pain and mental health symptoms.[11-12]

When compared to other stigmatized sexual identities, bisexual people are more likely to report heightened anxiety or meet criteria for generalized anxiety disorder.[13-15] Bisexual people experience additional sexual identity-related stigma and stereotyping (e.g., perceived promiscuity, identity confusion), which contributes to greater anxiety and fear for future health encounters.[13,16] Although anxiety experiences have been associated with cancer screening nonparticipation in the general population,[15,17] it is currently unknown whether increased levels of anxiety among bisexual people puts them at greater risk for cervical cancer screening nonparticipation.

Bisexual people are also at higher risk for depression. Compared to heterosexual individuals, those with stigmatized sexual identities have approximately 3 to 5 times greater odds of being diagnosed with clinical depression.[18] Furthermore, bisexual people have 2.38- and 1.45-times greater odds of reporting depressive symptoms than heterosexual individuals, and gay and lesbian individuals, respectively.[15] While depression is associated with nonparticipation in cervical cancer screening in the general population, the association between depressive symptoms and cervical cancer screening nonparticipation among bisexual individuals is yet to be confirmed.[15,17]

Studies show that sexual identity nondisclosure to healthcare providers is associated with low preventive health utilization, including reduced cervical cancer screening participation among lesbian people.[19-22] Nondisclosure to healthcare providers may be related to fear of stigma from providers based on sexual identity, potentially reducing motivation to participate in preventive care.[23] One study found bisexual people are less likely than gay and lesbian people (24% versus 70%–80%) to disclose their identity with their primary healthcare provider.[24] Identity nondisclosure may be more prominent in cervical cancer screening contexts where bisexual individuals experience heightened physical and emotional vulnerability, possibly contributing to lower rates of participation among bisexual people.[25] However, the effects of bisexual identity disclosure in healthcare on cervical cancer screening participation is unknown.

Sexual identity nondisclosure in settings outside of healthcare can affect cervical cancer screening participation for people with stigmatized sexual identities. One study found that nondisclosure of lesbian identity, but not bisexual identity, with family was related to low cervical cancer screening participation.[26] This suggests that the effects of bisexual identity disclosure in non-healthcare settings are unique. Compared to lesbian people, bisexual people disclose less, and later in life across various social settings,[27] and may choose not to disclose their identity in social settings where they are vulnerable to unique bisexual stigma.[28-30] Nondisclosure of a stigmatized sexual identity across multiple settings has been found to contribute to negative health outcomes.[31] Despite higher rates of nondisclosure across social settings, possibly due to fear of stigma, current research fails to consider how identity disclosure across social settings affects cervical cancer screening participation in bisexual people.

Study Framework

This cross-sectional descriptive study is underpinned by the Concealable Stigmatized Identities Outcomes (CSI-O) model, which describes the unique factors influencing healthcare consequences of concealable (able to withhold disclosing one's identity) stigmatized identities, offering an innovative approach to study healthcare utilization among stigmatized sexual identity groups (**Appendix A, Figure A4.1**).[32] The CSI-O model informs the proposed relationships among study variables (i.e., identity disclosure, anxiety and depressive symptoms, fear of stigma in healthcare) and the study outcome (screening participation).

To address cervical cancer disparities for a stigmatized sexual identity group, the purpose of this study was to investigate how mental health symptoms (anxiety, depressive symptoms, fear of stigma in healthcare) and identity disclosure influence cervical cancer screening participation among bisexual people. The primary aims of this study were to examine the predictive relationship between (a) identity disclosure and cervical cancer screening participation, and (b) mental health symptoms and cervical cancer screening participation among bisexual adults.

Methods

Research Design

This descriptive cross-sectional study employed web-based surveys to collect data from participants across multiple social media and campus-area settings.[33]

Setting and Sample

The study sample included 167 bisexual-identifying people aged 21–48 years recommended for routine cervical cancer screening. To encourage participation of disclosed as well as nondisclosed bisexual people, two versions of the study flyer were posted in each recruitment venue: one describing the study population (bisexual-identifying people), and another not explicit about the study population. During screening, potential enrollees were provided with the study definition for bisexual-identifying people (anyone sexually and/or romantically attracted to more than one gender),[24] and asked “Do you consider yourself to be (1) straight, (2) lesbian or gay, (3) bisexual (4) asexual” (select all that apply); people were considered bisexual-identifying if their answer(s) included (3) bisexual. Study inclusion criteria included individuals who were (a) bisexual-identifying, (b) aged 21–65, (c) living in the United States, and (d) eligible for cervical cancer screening (has a cervix). Exclusion criteria were: (a) a history of cancer, (b) a history of hysterectomy, and (c) non-English speakers (**Appendix A**).

Potential participants were recruited via flyers posted on public communication boards at a university campus and at local cafés and community centers. Sampling of online venues included social media settings with a high percentage of people with stigmatized sexual identities (e.g., “Queer Nerdfighters” Facebook, *#LGBTHealth* Twitter).[34-35] To ensure samples represented those with diverse age, race/ethnicity, and socioeconomic status, Amazon MTurk was a third venue intended to target recruitment towards groups underrepresented in other venues, such as older adults or diverse races/ethnicities.[34] To promote recruitment, convenience snowball sampling methodology was used across multiple venues.[35]

Power Analysis. A priori power analysis was conducted to achieve a study power of .90 (assuming a significance level of α = 0.05) and medium effect size as determined by relevant literature comparing identity nondisclosure to cancer screening participation.[21,36] To determine the estimated sample size needed to predict cervical cancer screening participation, a Z test for logistic regression was conducted using G*Power analysis software,[37-38] and resulted in a suggested sample size of 156. When adjusted to accommodate 25% attrition, the final suggested sample size was *n* =195.[35]

Measurement

All data were collected through self-report, via a confidential Qualtrics survey. Major study variables included cervical cancer screening participation, identity disclosure, and mental health (anxiety and depressive symptoms; fear of stigma). Psychometric properties and full study questionnaires (**Appendix A**) are provided in supplemental study materials.

Cervical Cancer Screening Participation. Cervical cancer screening participation was evaluated by whether participants 1) had ever screened, 2) had screened up to date, and 3) intended to screen. **Table 4.2** provides study definitions of “screened” and “not screened” for each cervical cancer screening measure (i.e., ever screened, screened up to date, intend to screen).

Ever screened. Two items from the Behavioral Risk Factor Surveillance System (BRFSS) questionnaire were used to evaluate past cervical cancer screening participation (**Appendix A, Part 3**). The BRFSS questionnaire assesses cervical cancer screening participation annually across a large national sample.[3] The survey has been previously used in a study of cervical cancer screening participation among people with stigmatized sexual identities.[39]

Screened up to date. To assess whether participants followed age-based recommendations for cervical cancer screening participation, two questions from the BRFSS questionnaire were used to address the timing of the last screening. Responses were dichotomized into those who were screened up to date (Pap/HPV < 3y [ages 21-29], Pap < 3y [ages 30-65] or HPV < 5y [ages 30-65]) or were not screened up to date (Pap $\geq$ 3y [ages 21-29] or $\geq$ 5y [ages 30-65]; or never had Pap).[30-31]

Intend to screen. To evaluate whether participants intended to participate in future cervical cancer screening based on the age-based recommendation, intention to screen was assessed by “How likely are you to complete an HPV test within the next 5 years, or a Pap test within the next 3 years?” via 5-point numeric scale ranging from 0 (not at all likely) to 5 (very likely).[32] Scores were recoded dichotomously to identify those who intend (score = 1), or do not intend (scores >1). Assessments of intention are often used as a proxy for observed screening behavior, and can be valuable in the analysis of factors potentially affecting participation.[33-35]

Identity Disclosure. Identity disclosure was measured using 7 items from Brownfield and Brown’s version of the Nebraska Outness Scale – Disclosure,[36] which was adapted for bisexual participants. In addition to the 7 social settings addressed in Brownfield and Brown’s adapted scale (family, extended family, people at work/school, strangers, and heterosexual/straight, lesbian/gay, and bisexual people they socialize with), 1 new group (i.e., people in healthcare settings) was added to measure disclosure in healthcare.[37] Participants rated disclosure level in each of the 8 social settings by answering “What percent of people in this group do you think are aware of your bisexual identity (meaning they are aware that you consider yourself bisexual)?” For a given social setting, each question asked participants to rate their disclosure level, from 0% - 100%, with response options provided in increments of 10%. For each participant, a total disclosure score was calculated as the percentage disclosed across all social settings to which the participant responded. Higher scores mean greater disclosure.

The original Nebraska Outness - Disclosure scale demonstrated strong validity and internal consistency reliability ($\alpha = .82$, $r = .83$ against the Outness Indicator) among adults with stigmatized sexual identities.[37] Brownfield and Brown’s adapted scale was content validated for bisexual populations and with an appropriate internal consistency reliability ($\alpha = .83$).[36] The Cronbach’s alpha for the 8-item Brownfield and Brown’s adapted scale was .844 for this study.

To provide additional support for the temporality of the relationship between identity disclosure and screening participation, 1 question was added to directly assess identity disclosure in prior cervical cancer screening: “At the time of your last cervical cancer screening, was your provider aware of your bisexual identity?” with response options including yes, no, or don’t know/unsure. If the participants had never screened, they were not asked about their disclosure status at their last screening.

Anxiety. State anxiety was measured using PROMIS Anxiety (**Appendix A, Part 5**; Short Form 8a).[38-39] This 8-item measure identifies symptoms of anxiety (e.g., fearfulness, worry) over the past 7 days. The PROMIS Anxiety allows for an evaluation of participants’ recent or “state” anxiety experiences, rather than a clinical diagnosis. A systematic review found that state measures of mental health symptoms, such as the PROMIS Anxiety, provided an accurate examination of cancer screening-related anxiety.[40] PROMIS scales were developed for public domain and tested in a large, representative sample of the general population. The PROMIS Anxiety demonstrated strong reliability and validity in stigmatized sexual identity populations and outpatient oncology patients.[28,41] Numeric rating responses range from 1 (never) to 5 (always). Raw scores from each item were converted to T-scores, with higher scores meaning greater anxiety symptoms. The Cronbach’s alpha for the PROMIS Anxiety was .932 for this study.

In addition, **trait anxiety** was measured using the State Trait Anxiety Inventory – Trait (form Y-2).[42] This legacy measure evaluates how one experiences anxiety symptoms generally. To examine tendency towards anxiety, participants rated how they generally feel about 20 statements on a numeric scale from 1 (almost never) to 4 (almost always). Negative statements (e.g., “I feel like a failure,” “I feel nervous and restless”) were scored according to the numeric scale, while positive statements (e.g., “I feel secure”, I make decisions easily”) were reverse-scored. The Trait subscale of the State-Trait Anxiety Inventory has demonstrated strong internal consistency reliability in a sample of sexual minority adults (α = .89-.92), with convergent validity of r = .75 - .80 against similar measures of anxiety (e.g., Beck Anxiety Inventory, Self-rating Anxiety Scale).[44] The Cronbach’s alpha for the State Trait Anxiety Inventory – Trait (Form Y2) was .924 for this study.

Depressive Symptoms. State depressive symptoms were measured using PROMIS Depression measure (**Appendix A, Part 5**; Short Form 8a).[38-39] This 8-item measure evaluates the presence of depressive symptoms (e.g., feeling worthless, helpless) over the past 7 days. Numeric rating responses range from 1 (never) to 5 (always). Like the PROMIS Anxiety, the PROMIS Depression measure demonstrates strong reliability and validity in stigmatized sexual identity groups and outpatient oncology patients.[28,41] Additionally, a systematic review supports those measures of state or recent mental health symptoms, such as the PROMIS Depression, are appropriate for use in cancer screening contexts.[40] Raw scores from each item were converted to T-scores, with higher scores meaning greater depressive symptoms. The Cronbach's alpha for the PROMIS Depression was .924 for this study.

In addition, **trait depressive symptoms** were measured using the Maryland Trait and State Depression (trait) scale.[45] To examine one's tendency towards depression, participants rated how they generally feel about 18 statements (e.g., "I sleep more than most people when my mood is low," "I feel hopeless about my future") on a numeric scale from 0 (never) to 4 (experienced many times in a month for almost every month of my adult life). Higher scores mean greater depressive symptoms. The Trait subscale of the Maryland Trait and State Depression scale has demonstrated strong internal consistency reliability in a study of sexual behaviors among Iranian American adults ($\alpha = .96$),[46] and has been validated against legacy depression measures, including the Brief Psychiatric Rating Scale-Depression ($r = .53$).[45] The Cronboch's alpha for this 18-item scale was .926 for this study.

Fear of Stigma. Fear of Stigma was measured using a single-item question "Have you ever felt afraid or avoided healthcare services because of fear that someone may learn about your sexual identity?" (**Appendix A, Part 5C**).[47] This question was developed based on the Concealable Stigmatized Identities - Outcomes framework to examine how fear of stigma affects participation in preventive healthcare.[47] Levels of fear were subjectively rated on a numeric rating scale ranging from 1 (never) to 5 (always). Higher scores mean greater self-reported fear. For binary comparison, scores were then recoded dichotomously to identify those without fear (score = 1) and those with fear (scores >1).

Demographics. A 10-item demographic questionnaire evaluated age, gender identity, partner status, partner gender, insurance status, employment status, household income, education level, race/ethnicity, and rurality (**Appendix A, Part 6**). This demographic questionnaire was created using a 2025 systematic review identifying determinants of health affecting cancer screening among stigmatized sexual identity groups,[20,48-50] and used the updated race/ethnicity options supported by 2024 revised national standards.[51]

Data Collection

Participants were recruited via screening survey links on flyers posted in various online and in-person campus-area venues. Screening surveys were reviewed by the PI for eligibility, and all eligible participants were emailed a personalized link to the study consent and questionnaires, including 4 cervical cancer screening items from the BRFSS, Nebraska Outness-Disclosure scale, PROMIS Anxiety 8a, State Trait Anxiety Inventory-Trait, PROMIS Depression 8a, Maryland Trait and State Depression-Trait, demographic questionnaire, and single-item responses to assess fear of stigma, disclosure at last screening, and screening intention. Participants were allowed to complete the surveys until data collection concluded, and were sent reminder emails every 2 weeks, up to 3 times, or until the survey was completed. See **Figure 4.1** for CONSORT chart, or **Figure A4.2 (Appendix A)** for a more detailed diagram of recruitment and enrollment.

Fraud prevention efforts included (a) individual screening of all questionnaires for suspicious, incongruent, or multiple responses, (b) Qualtrics fraud protection including CAPTCHA technology, personalized survey links, (c) unique graphical identifiers for participant authentication (**Appendix A, Part 2**),[52] (d) “speed bump” items to encourage participant attentiveness,[53] (e) separate survey links for screening and data collection, and (f) unique study links for different recruitment venues. Participants who successfully completed the study survey received a $10 Amazon e-gift card.

Ethical Considerations

Approval for the study was obtained by the Michigan State University Institutional Review Board. Participants were notified that completion of the study questionnaires indicates their consent, and were informed that they could withdraw from the study at any time (**Appendix A, Part 1**). Participant name, contact, and unique identifier were stored in a separate location from study data, providing both confidentiality of responses and a method of contact for compensation or follow-up.

Data Analysis

Descriptive statistics included means and standard deviations for continuous variables, and percentages for categorical variables. Spearman correlations were used to identify significant correlations among demographic variables and outcome variables. Demographics with significant correlation coefficients were then statistically controlled in logistic regression models. K-means cluster analysis was used to identify common patterns of individual sexual identity disclosure level across all 8 settings (with family, with extended family, at work or school, with strangers, with heterosexual, lesbian/gay, bisexual social settings, and in healthcare). To determine distinct identity disclosure patterns, a series of K-means cluster analyses was run to identify how many clusters could be formed that represented unique disclosure patterns, and had sample sizes large enough for interpretation. To determine the final number of clusters, ANOVAs and Tukey's post-hoc tests were used to identify significant differences between cluster pairs in average disclosure levels for each setting. for each setting. To identify the final K-means cluster analysis model, we considered the number of clusters generated, with significant between-cluster differences, and fewest iterations to obtain cluster center convergence.

Logistic regression (continuous independent variables) or Chi Square analysis (categorical independent variables) was conducted to determine the likelihood of cervical cancer screening participation (i.e., ever screened, screened up to date, intent to screen) for each predictive variable (i.e., trait and state anxiety, trait and state depressive symptoms, fear of stigma, total identity disclosure, disclosure in healthcare, disclosure status at last screening, and identity disclosure pattern). Significance was set at alpha $\leq .05$. Following survey data collection, missing data were addressed using group mean substitution imputation.[54] Models were compared for significant differences, and sensitivity analysis was conducted.

Results

A total of 167 bisexual participants were included for analysis, comprising 18, 139, 2, and 8 participants recruited from paper flyers, social media, Amazon M-Turk, and other venues, respectively (see **Figure 4.1**). **Table 4.1** describes the demographic information for participants. The most common participant gender identities included woman (70.7%, *n* = 118) and nonbinary (14.4%, *n* = 24). The majority (79.5%, *n* = 132) of participants identified as White, while 8.4% identified as Asian (*n* = 14). The mean age was 31.2 (±5.8), with the majority (60.4%, *n* = 101) of participants between the ages of 26 and 35. Participants were generally employed full-time (60.5%, *n* = 101) with private insurance (80.8%, *n* = 135), had a bachelor's or master's degree education (64%, *n* = 107), and had annual household income between $20,000 and $75,000 (46.1%, *n* = 77). Of the 127 (76.1%) participants who had a romantic partner, 66 (52%) were women partnered with men. Most participants (56.3%, *n* = 94) were from suburban residences.

Cervical Cancer Screening Participation

Table A4.1 (**Appendix A**) details the distribution of cervical cancer screening participation by demographic characteristics. Among 167 bisexual participants, 144 (86.2%) had ever participated in cervical cancer screening, 123 (73.6%) were screened up to date, and 147 (88%) reported intention to participate. Guidelines recommend screening begin at age 21. While no participants aged 21 reported ever screening, 83.3% reported intention to screen. Compared to participants who were not partnered, partnered participants reported higher percentages in ever screened (77.5% vs. 89%) or screened up to date (67.5% vs. 75.6%). Among partnered participants, cervical cancer screening participation was higher among those whose partners identified as men, compared with participants with partners who did not identify as men (92.6% vs. 82.6% ever screened, 79% vs. 69.6% screened up to date).

Identity Disclosure

Table A4.2 (**Appendix A**) describes average identity disclosure percentage for each of the 8 disclosure settings. Among all participants, disclosure was lowest with strangers (11.4%, ±16.9%), with extended family (30.1%, ±32.8%), in healthcare settings (33.3%, ±32.8%), and at work/school (34.9%, ±32.8%). Alternatively, disclosure was highest with people identifying as bisexual (84.6%, ±26.3%), and lesbian/gay (81%, ±26.9%).

Cluster analysis identified 3 distinct patterns of identity disclosure: (1) Mostly not disclosed (*n* = 17), (2) Mostly disclosed (*n* = 63), and (3) Some disclosure (*n* = 68). The 3 cluster centers converged within 11 iterations, and ANOVAs confirmed that the 3 patterns represented the largest number of clusters with significant between-cluster differences in mean disclosure level for the 8 settings, with Tukey's post-hoc test confirming each cluster pairing had significant differences in over half of the disclosure settings. **Figure 4.2** displays average identity disclosure percentage in each setting by the 3 identity disclosure patterns. Across all 3 disclosure patterns, disclosure was lowest with strangers (range 1.1% - 20%); conversely, disclosure was highest with bisexual people (range 30% - 95.9%). Disclosure levels in 'mostly not disclosed' were highest with bisexual (30%) and gay/lesbian people (27.2%), and were lowest with strangers (1.1%) and extended family (2.8%). Disclosure levels in 'mostly disclosed' were highest with bisexual (95.9%) and lesbian/gay people (94.9%), and with family (94.6%). However, disclosure levels in those 'mostly disclosed' were markedly lower with heterosexual (78.4%) than with bisexual or lesbian/gay people. Similar to 'mostly disclosed,' disclosure levels for ‘some disclosure’ were highest with bisexual (91.3%) and lesbian/gay people (86.3%), but were lowest with strangers (7.6%), with extended family (12.8%), in healthcare, (18.2%), and at work/school (19.1%).

Identity Disclosure and Cervical Cancer Screening Participation

Logistic regression revealed that neither total disclosure score, nor disclosure in healthcare, were significantly associated with any of the cervical cancer screening participation measures (i.e., intent to screen, screened up to date, and ever screened; **Table 4.3**). However, Chi Square analysis determined that pattern of identity disclosure (**Table 4.5**) was significantly associated with screening intention (p = .03). Among the 3 identity disclosure patterns, participants with ‘some disclosure’ reported highest intention, compared with participants with ‘mostly disclosed’ or ‘mostly not disclosed.’ However, neither the association between identity disclosure patterns and whether participants had ever screened (p = .83) or whether participants screened up to date (p = .08) was statistically significant. Regarding identity disclosure at last screening, findings varied depending on the measure of screening participation. Associations between identity disclosure at last screening and whether participants screened up to date were statistically significant (p = .003); participants who disclosed at their last screening were more often screened up to date than those who had not disclosed at their last screening. Associations between disclosure at last screening and intention to screen were not statistically significant (p = .10).

Mental Health Symptoms and Cervical Cancer Screening Participation

Table A4.2 (Appendix A) presents state and trait mental health scores. Overall, anxiety and depressive symptoms were not significantly associated with cervical cancer screening participation (i.e., ever screened, screened up to date, or intent to screen; **Table 4.4**), with one exception. Participants with higher state depressive symptoms (measured by PROMIS Depression) were significantly less likely to screen up to date (OR = .95, p = .04). However, this relationship was no longer significant after controlling for age and education (OR = .95, p = .07).

Similarly, participants with higher state depressive symptoms reported significantly lower intention to screen (OR = .93, *p* = .04), but the relationship became nonsignificant (OR = .94, *p* = .11) after controlling for age and education.

Compared to participants who had fear of stigma in healthcare, participants who did not have fear of stigma reported significantly higher intention to screen (*p* = .05; **Table 4.5**). However, fear of stigma in healthcare was not significantly associated with past screening behavior (ever screened *p* = .90; screened up to date *p* = .68).

Discussion

Mental Health and Cervical Cancer Screening Participation

This study was among the first to examine associations between mental health and cervical cancer screening participation in bisexual people. The findings are mixed in supporting the association between mental health and cervical cancer screening participation, depending on the measures used to evaluate mental health and cervical cancer screening participation. While no significant direct relationships were identified with anxiety or depression and cervical cancer screening participation, indirect relationships (i.e., mediators) may exist that were not identified. However, a significant direct association was found between fear of stigma and cervical cancer screening nonparticipation.

Findings from this study suggest that anxiety was not associated with cervical cancer screening participation for bisexual people. Although this finding is inconsistent with prior research that anxiety is related to screening nonparticipation, past studies analyzed samples of general populations or sexual minority women as a whole, but not bisexual people.[17,21,55] Bisexual people experience greater anxiety than general populations or other stigmatized sexual identities, limiting variability, and potentially contributing to the nonsignificant relationship between anxiety and cervical cancer screening participation in this study.

While this study determined that depressive symptoms were associated with cervical cancer screening nonparticipation, the relationship was no longer significant after controlling for age and education. Age is known to be associated with both cervical cancer screening participation, and depressive symptoms. Previous studies have found a curvilinear relationship between age and cervical cancer screening participation, peaking around age 30.[39] In addition, studies have found that, among people with stigmatized gender or sexual identities, higher depression is reported in younger generations.[56] The observed relationship between depressive symptoms and cervical cancer screening participation may be due to the influence of age on both depressive symptoms and cervical cancer screening. Similarly, education is known to be associated with both depressive symptoms, and cervical cancer screening participation. Previous research has shown strong relationships between education and depression (i.e., higher education predicts lower depression, lower education predicts higher depression.[57] In addition, low education level, including poor health literacy, has been associated with lower participation in preventive cancer screening.[20] Therefore, the relationship between depressive symptoms and cervical cancer screening became nonsignificant after controlling for age and education.

This study determined that subjective fear of stigma, but not anxiety or depressive symptoms, was related to cervical cancer screening nonparticipation. This finding suggests that mental health symptoms are relevant to bisexual screening behavior if they are a direct consequence of the threat of stigma. Fear of stigma may be associated with screening nonparticipation due to the anticipation of unique bisexual stigma experiences (e.g., assumptions of sexual promiscuity), which are more likely to take place in cervical cancer screening environments, where sexual history is often discussed.[58]

Identity Disclosure and Cervical Cancer Screening Participation

Findings suggest that neither total identity disclosure, nor disclosure in healthcare settings, are significantly related to cervical cancer screening participation for bisexual people. This is in stark contrast to prior research which supports increased cervical cancer screening participation among lesbian individuals who disclosed sexual identity to healthcare providers.[20]

The discrepancy may due to differences in the lifetime disclosure process between people with bisexual and lesbian identities. Prior research recognizes bisexual people, compared with gay and lesbian people, conceal their identity longer, and disclose their identity later in life.[27] With most participants under age 35, bisexual people in this study may be more accustomed to concealing than disclosing their identity. Thus, the age of bisexual participants in this study may have limited experience with disclosing identity in healthcare or other settings, thus limiting the ability to identify relationships between identity disclosure and cervical cancer screening participation.

In this study, identity disclosure was significantly associated with cervical cancer screening. However, the relationship was dependent on measures of identity disclosure and cervical cancer screening participation. Unlike most measures of identity disclosure which only evaluate disclosure in a single setting, identity disclosure patterns consider the pattern across all settings and provide insight into the dynamic disclosure process experienced by bisexual people. During the bisexual disclosure process, people with 'some disclosure' have begun disclosing their bisexual identity in some settings (i.e., are no longer 'mostly not disclosed'), but are not yet disclosed across all settings (i.e., mostly disclosed). Compared with other measures of disclosure in a single setting, the 3 disclosure patterns can better capture this complicated process by showing how a person's disclosure levels in each setting progress. In this study, while bisexual people with 'some disclosure' had low disclosure in healthcare settings, they reported high intention for future cervical cancer screening. These findings suggest that hesitance to disclose in healthcare may improve throughout the disclosure process (i.e., from 'some disclosure' to 'mostly disclosed'), resulting in greater intention to participate in vulnerable healthcare settings where identity disclosure could occur (i.e., cervical cancer screening).

Additional considerations

Findings from this study were consistent with prior research that people with stigmatized sexual identities who are in relationships have higher cervical cancer screening participation than those not in relationships.[20] However, previous studies did not examine how bisexual-specific relationship factors (i.e., partner gender) affect cancer screening participation. This study further examined partner gender and determined that bisexual people whose partners were men had higher cervical cancer screening participation (i.e., ever screened, screened up to date, and intent to screen) than people whose partners were not men. The observed differences may be due to a common misconception among lesbian people, that those in same-sex relationships are not at risk for cervical cancer.[20] If this misconception is true for bisexual people in same-sex relationships, it could explain why cervical cancer screening participation was higher among those who partnered with men in this study. Thus, similar to lesbian people, bisexual people who are not partnered with men may benefit from education to increase their knowledge of cervical cancer risk. However, partner sex assigned at birth was not evaluated, so it is unknown whether those partnered with men were necessarily in same-sex relationships.

Limitations

The study questionnaires relied on participant self-report, possibly limiting response accuracy for some questions, particularly those with unfamiliar terminology. For example, up to date screening was determined using separate questions for Pap and HPV testing, potentially contributing to inaccurate or incomplete results if participants were unaware of which cervical cancer screening test(s) they received. Participant surveys also required individuals to self-identify as “bisexual.” This may have affected the accuracy of the identity disclosure questionnaire, as disclosure of “bisexual identity” may have been perceived as irrelevant to participants who met the study definition, but typically used a different label to describe their sexual identity (e.g., pansexual, queer).

Individuals who met the study definition of “bisexual,” but who typically used a different label to describe their sexual identity, may have been unintentionally excluded from the study if they believed they did not meet study inclusion criteria.. As people of younger generations (i.e., generation alpha, generation z) are less likely to self-identify as bisexual, recruitment for this study may have overlooked eligible people from younger generations. Conversely, the notable absence of participants over the age of 40 was likely due to the large proportion of participants recruited over social media, as people over the age of 40 are less likely to use social media. Overall, while recruitment methods succeeded in meeting the target sample size, the sample lacked diversity of age, race/ethnicity, and socioeconomic status, limiting generalizability of findings. Furthermore, prior research supports the relationship between disclosure of stigmatized gender identities and cervical cancer screening participation.[59] This study did not assess gender identity disclosure, thus limiting the ability to explore how this relationship presents for bisexual people.

Conclusion

This study identified the characteristics of bisexual individuals who are most at-risk for cervical cancer screening nonparticipation, including those with fear of stigma in healthcare, and those who had not disclosed their bisexual identity at their last cervical cancer screening. The study most notably identified that, with respect to cervical cancer screening participation, identity disclosure may affect bisexual people differently. While prior research showed that lesbian individuals have increased cervical cancer screening participation if they disclose in healthcare settings, this study found that disclosure in healthcare did not significantly influence cervical cancer screening participation for bisexual people. Strategies to increase screening for bisexual people might include reducing fear of stigma in healthcare by increasing accessibility and visibility of safe and affirming healthcare environments. In addition, bisexual people often have unique romantic partnership experiences (i.e., partner sexual and gender identity, perceptions of promiscuity), compared with other sexual minorities, e.g., lesbian individuals. Further investigation of the influence of unique bisexual romantic partnership experiences on cancer screening participation is warranted. To ensure the health needs of each sexual minority identity are met, future cervical cancer screening research should consider the unique characteristics and behaviors of each sexual minority identity.

Tables & Figures

Table 4.1. Sample characteristics

	Total *n* = 167		
Characteristic	***n* =**	**(valid %)**	**Mean (SD)**
[†]Gender identity			
Woman	118	(70.7)	
Man	5	(3)	
Non-binary	24	(14.4)	
Genderqueer, gender non-conforming, or agender	16	(9.6)	
Another answer not listed here	4	(2.4)	
[‡]Age (years)			
21–25	24	(14.6)	31.23 (5.8)
26-30	55	(32.9)	
31–35	46	(27.5)	
36–40	31	(18.6)	
41-65	11	(6.6)	
[§]Race/Ethnicity			
White	132	(79.5)	
Black or African American	4	(2.4)	
Asian	14	(8.4)	
Middle Eastern or North African	1	(0.6)	
Hispanic, Latino, or Spanish origin	7	(4.2)	
From multiple races	8	(4.8)	
Rurality			
Rural	17	(10.2)	
Suburban	94	(56.3)	
Urban	56	(33.5)	
Household income (annual)			
Less than $20,000	17	(10.2)	
$20,000 to $75,000	17	(46.1)	
More than $75,000	73	(43.7)	
Partner status			
Single	39	(23.4)	
Legally married	70	(41.9)	
Formalized partnership	4	(2.4)	
In a relationship, cohabitating	29	(17.4)	
In a relationship, non-cohabitating	24	(14.4)	
Divorced/separated	1	(0.6)	
If partnered *(n = 127):*			
Partner gender identity			
Woman	20	(15.7)	
Man	81	(63.8)	
Non-binary	14	(11)	
Genderqueer, gender non-conforming, or agender	8	(6.3)	
Another answer not listed here	4	(3.1)	
Insurance			
Has health insurance (public)	26	(15.6)	
Has health insurance (private)	135	(80.8)	
Does not have health insurance	6	(3.6)	
Employment status			
Full time employment	101	(60.5)	
Part time employment	21	(12.6)	
Self-employed	11	(6.6)	
Unemployed	11	(6.6)	
Unable to work/disabled	7	(4.2)	
Full time student	16	(9.6)	
Education level			
High school diploma or equivalent	4	(2.4)	
Some college/vocational	27	(16.2)	
Associate degree	13	(7.8)	
Bachelor's degree	65	(38.9)	
Master's degree	42	(25.1)	
Doctoral or professional degree	16	(9.6)	

[†] Some categories combined for low sample

[‡] Age was measured continuously, and categorized here in 5-year increments, with exception of those age 41 or greater, who were combined into a single category due to low sample)

[§] Categories with no responses are not included in table

Table 4.2. Definition of screened and not screened

	Screened	**Not Screened**
Past Behavior – Ever Screened	Has ever had Pap and/or HPV testing	Has never had Pap and/or HPV testing
Past Behavior – Up to Date	**<u>If ages 21-29:</u>** Has had Pap and/or HPV test within past 3 years **<u>If ages 30-65:</u>** Has had Pap test within past 3 years and/or Has had HPV test within past 5 years	**<u>If ages 21-29:</u>** Has **not** had Pap and/or HPV test within past 3 years **<u>If ages 30-65:</u>** Has **not** had Pap test within past 3 years and/or Has **not** had HPV test within past 5 years
Future Intention	Intends to complete Pap within next 3 years or HPV within next 5 years (Scale 1-5 how likely)	**Does not** intend to complete Pap within next 3 years or HPV within next 5 years (Scale 1-5 how likely)

Table 4.3. Identity disclosure and odds of cervical cancer screening participation

	Ever Screened			Screened Up to Date			†Intend to Screen		
Predictor	OR	*p* - value	(95% CI)	OR	*p*- value	(95% CI)	OR	*p*- value	(95% CI)
Step 1									
(Identity disclosure)									
With family (%)	1.002	.787	(.990, 1.013)	.996	.390	(.987, 1.005)	1.005	.403	(.993, 1.017)
With extended family (%)	1.008	.268	(.994, 1.023)	1.000	.980	(.989, 1.010)	1.001	.871	(.987, 1.016)
With heterosexual people you socialize with (%)	1.006	.442	(.991, 1.021)	1.008	.190	(.996, 1.020)	1.011	.173	(.995, 1.027)
With lesbian/gay people you socialize with (%)	1.006	.437	(.991, 1.021)	1.006	.379	(.993, 1.018)	1.015*	.048	(1.000, 1.030)
With bisexual people you socialize with (%)	1.006	.411	(.991, 1.022)	1.010	.126	(.997, 1.022)	1.012	.125	(.997, 1.027)
People at work/school (%)	1.002	.825	(.988, 1.015)	.998	.678	(.987, 1.008)	.992	.279	(.978, 1.006)
Strangers (%)	.991	.485	(.966, 1.016)	1.002	.841	(.981, 1.024)	.984	.199	(.960, 1.009)
In healthcare (%)	.999	.860	(.985, 1.013)	1.003	.559	(.992, 1.014)	1.002	.749	(.988, 1.018)
Total in an all settings (%)	1.006	.570	(.985, 1.027)	1.004	.653	(.988, 1.020)	1.008	.476	(.986, 1.030)
Step 2									
†(Identity disclosure + age + education)									
With family (%)	1.001	.936	(.987, 1.014)	.996	.358	(.986, 1.005)	1.005	.404	(.993, 1.018)
With extended family (%)	1.011	.233	(.993, 1.028)	1.001	.898	(.990, 1.012)	1.002	.801	(.987, 1.017)
With heterosexual people you socialize with (%)	1.008	.367	(.990, 1.027)	1.010	.126	(.997, 1.023)	1.011	.191	(.995, 1.027)
With lesbian/gay people you socialize with (%)	1.004	.646	(.986, 1.023)	1.006	.385	(.993, 1.019)	1.015	.057	(1.000, 1.030)
With bisexual people you socialize with (%)	.995	.651	(.976, 1.016)	1.007	.322	(.993, 1.020)	1.009	.257	(.994, 1.025)
People at work/school (%)	.997	.730	(.980, 1.014)	.996	.474	(.984, 1.008)	.993	.381	(.978, 1.009)
Strangers (%)	.998	.905	(.968, 1.028)	1.008	.499	(.985, 1.031)	.985	.245	(.959, 1.011)
In healthcare (%)	1.004	.625	(.988, 1.020)	1.005	.420	(.993, 1.016)	1.004	.595	(.989, 1.019)
Total in an all settings (%)	1.006	.650	(.981, 1.031)	1.004	.610	(.988, 1.021)	1.009	.451	(.986, 1.031)

* = $p<0.05$; ** = $p<0.01$; CI = Confidence Interval; †Intention to screen adjusted for education only (step 2)

Table 4.4. Mental health and odds of cervical cancer screening participation

Predictor	Ever Screened			Screened Up to Date			Intend to Screen		
	OR	*p* - value	(95% CI)	OR	*p*-value	(95% CI)	OR	*p*-value	(95% CI)
Step 1 (Mental Health)									
Trait anxiety (T-Score)	.970	.137	(0.931, 1.01)	.977	.138	(0.946, 1.008)	.969	.152	(0.928, 1.012)
State anxiety (T-Score)	.984	.599	(0.925, 1.046)	.956	.075	(0.909, 1.005)	.979	.522	(0.916, 1.045)
Trait depressive symptoms (0-4 scale)	.816	.470	(0.471, 1.415)	.643	.051	(0.413, 1.002)	.606	.104	(0.339, 1.109)
State depressive symptoms (T-Score)	.945	.084	(0.887, 1.008)	.949*	.039	(0.903, 0.997)	.93*	.044	(0.868, 0.998)
Step 2 (Mental Health + age + education)									
Trait anxiety (T-Score)	.970	.210	(0.926, 1.017)	.983	.306	(1.021, 1.17)	1.009	.451	(0.986, 1.031)
State anxiety (T-Score)	.999	.971	(0.931, 1.072)	.966	.191	(0.917, 1.017)	1.004	.595	(0.989, 1.019)
Trait depressive symptoms (0-4 scale)	.948	.877	(0.483, 1.861)	.731	.194	(.455, 1.174)	.979	.362	(.937, 1.024)
State depressive symptoms (T-Score)	.938	.073	(0.874, 1.006)	.955	.072	(0.908, 1.004)	.992	.808	(0.927, 1.061)

* = $p<0.05$; ** = $p<0.01$; OR = Odds Ratio; CI = Confidence Interval

Table 4.5. Categorical predictors of cervical cancer screening participation

		Ever Screened			**Screened Up to Date**			**Intend to Screen**		
Predictor	**Categories**	Never screened % (*n*)	Has screened % (*n*)	χ^2 (*p* value)	Not up to date % (*n*)	Up to date % (*n*)	χ^2 (*p* value)	Does not intend % (*n*)	Intends % (*n*)	χ^2 (*p* value)
Fear of stigma in healthcare	Not fearful	17% (3)	83% (15)	.36 (.83)	26% (33)	74% (96)	.171 (.679)	9% (12)	91% (117)	*3.85 (.05)
	Fearful	14% (9)	86% (54)		29% (11)	71% (27)		21% (8)	79% (30)	
Identity disclosure pattern	Mostly not disclosed	17% (3)	83% (15)	.36 (.83)	39% (7)	61% (11)	5.08 (.079)	28% (5)	72% (13)	*6.93 (.031)‡
	Mostly disclosed	14% (9)	86% (54)		32% (20)	68% (43)		13% (8)	87% (55)	
	Some disclosure	12% (8)	88% (60)		18% (12)	82% (56)		6% (4)	94% (64)	
†Identity disclosure status at last screening	Was not disclosed	-	-	-	37% (31)	63% (53)	**8.68 (.003)	18% (15)	82% (69)	2.78 (.096)
	Was disclosed	-	-		15% (9)	85% (52)		8% (5)	92% (56)	

* = $p<0.05$; ** = $p<0.01$; *** = $p<.001$

† If the participants had never screened, they were not asked about their disclosure status at their last screening

‡ 'Some disclosure' significantly more likely to intend to screen than 'mostly not disclosed.' No significant differences between mostly disclosed and the other 2 patterns (Bonferroni correction for multiple comparisons)

Figure 4.1. Participant recruitment for each recruitment venue

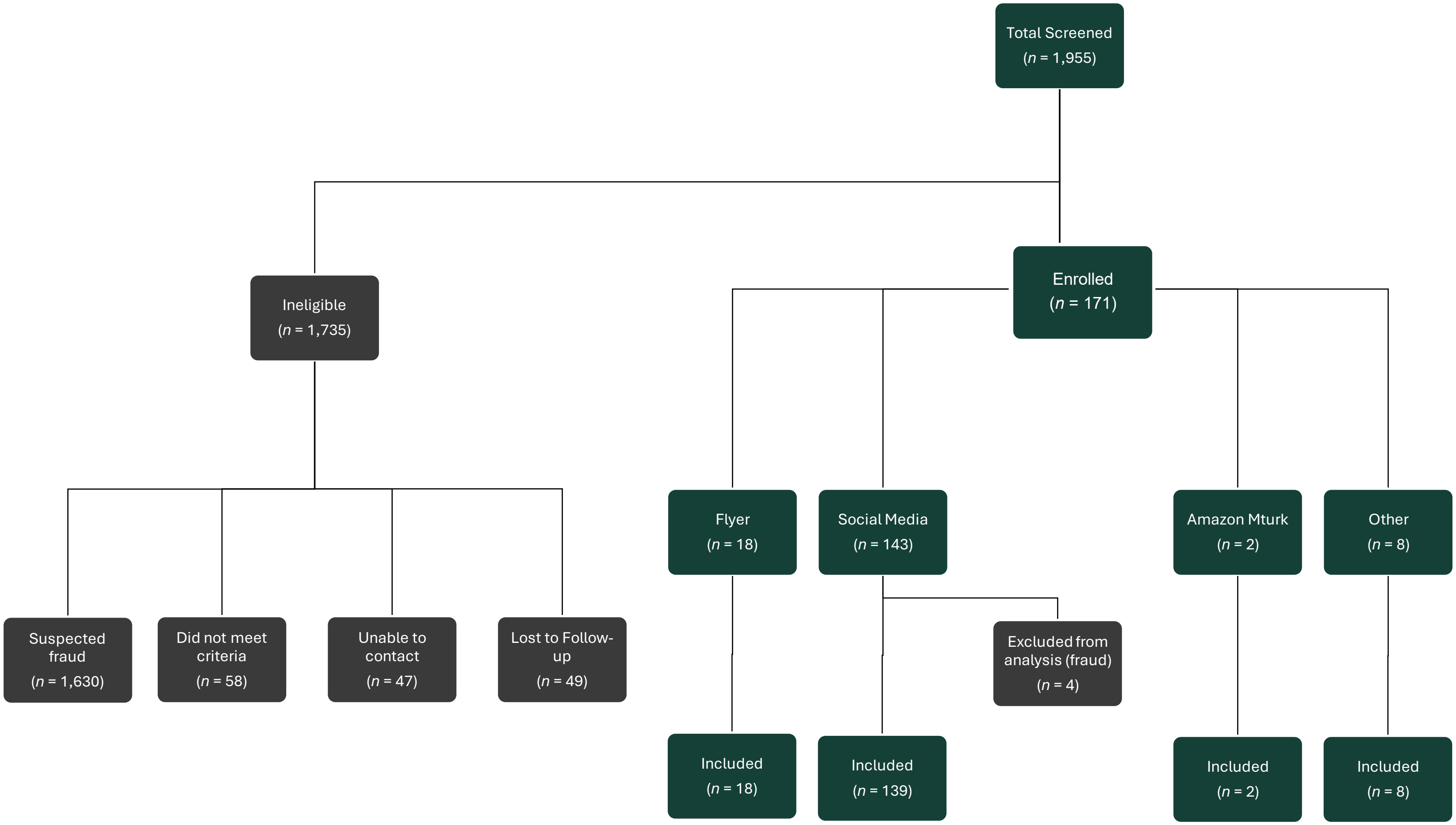
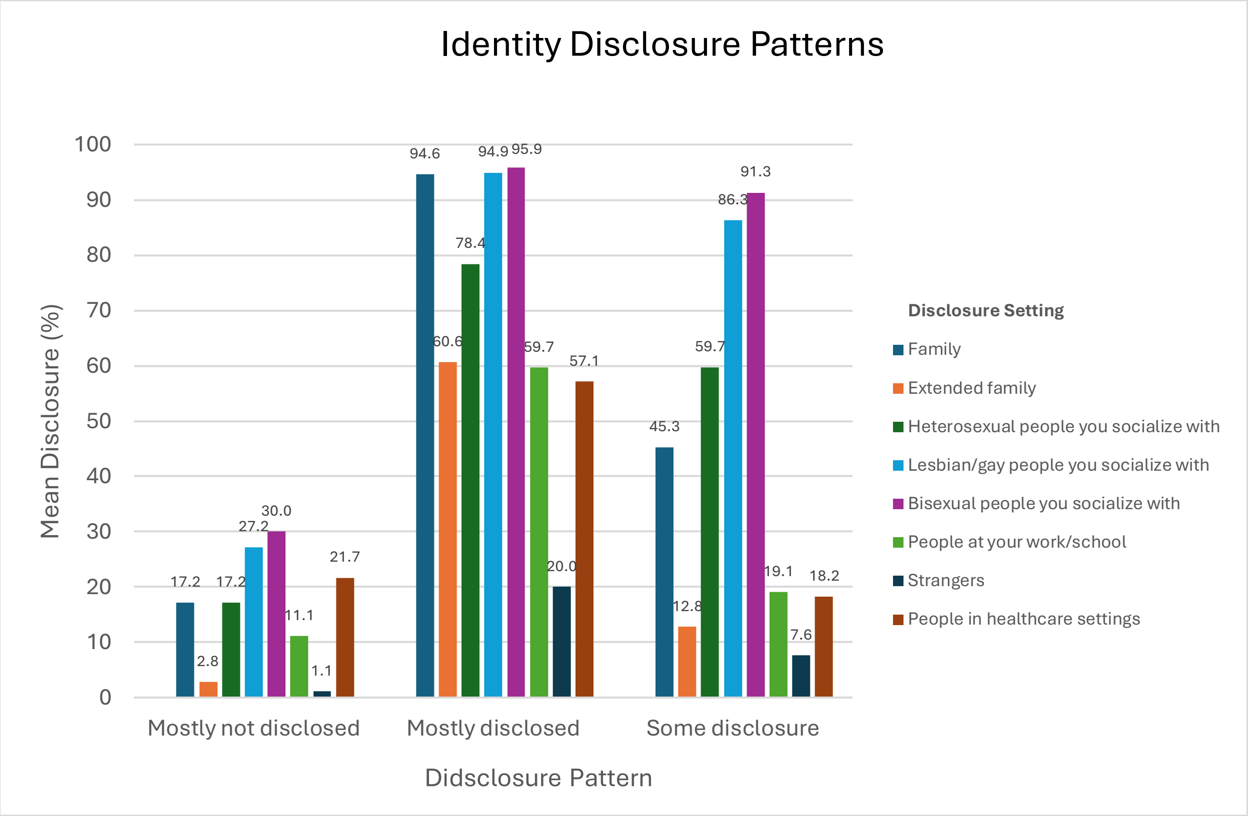


Figure 4.2. Patterns of identity disclosure across each setting



REFERENCES

1. International Agency on Cancer Research (2022). *Absolute Numbers, Mortality, Females, in 2022*. Retrieved from Global Cancer Observatory: Cancer Today: https://gco.iarc.who.int/today/en/dataviz/pie?mode=cancer&types=1&sexes=2&cancers=23&show_table_pie=1&group_populations=1

2. Buskwofie, A., David-West, G., & Clare, C. A. (2020). A review of cervical cancer: Incidence and *J Natl Med Assoc*, *112*(2), 229232. doi:10.1016/j.jnma.2020.03.002

3. Centers for Disease Control and Prevention (November 2021). Incidence and Relative Survival by Stage at Diagnosis for Common Cancers: USCS Data Brief, no. 25. Retrieved from https://www.cdc.gov/cancer/uscs/about/data-briefs/no25-incidence-relative-survival-stage-diagnosis.htm

4. Nelson, W., Moser, R. P., Gaffey, A., & Waldron, W. (2009). Adherence to cervical cancer screening guidelines for U.S. women aged 25-64: data from the 2005 Health Information National Trends Survey (HINTS). *Journal of women's health (2002), 18*(11), 1759-1768. doi:10.1089/jwh.2009.1430

5. Calo, W. A., Lennon, R. P., Ruffin M. T., Keller, C., Spanos, K., D'Souza, G., & Kraschnewski, J. L. (2022). Support for HPV vaccine school-entry requirements in the United States: The role of exemption policies. *Vaccine*, *40*(51), 74267432. doi:10.1016/j.vaccine.2022.08.019

6. KFF. (2021). *The HPV vaccine: Access and use in the U.S*. Retrieved from https://www.kff.org/womens-health-policy/fact-sheet/the-hpv-vaccine-access-and-use-in-the-u-s/

7. Hall, I. J., Tangka, F. K. L., Sabatino, S. A., Thompson, T. D., Graubard, B. I., & Breen, N. (2018). Patterns and Trends in Cancer Screening in the United States. *Prev Chronic Dis, 15*, E97. doi:10.5888/pcd15.170465

8. McCune, K. C., & Imborek, K. L. (2018). Clinical Care of Lesbian and Bisexual Women for the Obstetrician Gynecologist. *Clinical Obstetrics and Gynecology, 61*(4), 663-673. doi:10.1097/grf.0000000000000399

9. Sauer, A. G., Siegel, R. L., Jemal, A., & Fedewa, S. A. (2017). Updated review of prevalence of major risk factors and use of screening tests for cancer in the United States. *Cancer Epidemiol Biomarkers Prev, 26*(8), 1192-1208. doi:10.1158/1055-9965.Epi-17-0219

10. Herriges, M. J., Pinkhasov, R., Lehavot, K., Shapiro, O., Jacob, J. M., Sanford, T., Liu, N., Bratslavsky, G., & Goldberg, H. (2022). The association of sexual orientation with prostate, breast, and cervical cancer screening and diagnosis. *Cancer Causes Control, 33*(12), 1421-1430. doi:10.1007/s10552-022-01624-4

11. Robinson K, Galloway KY, Bewley S, Meads C. Lesbian and bisexual women's gynaecological conditions: a systematic review and exploratory meta-analysis. *BJOG*. 2017;124(3):381-392. doi:10.1111/1471-0528.14414

12. Hutchcraft, M. L., Teferra, A. A., Montemorano, L., & Patterson, J. G. (2021). Differences in Health-Related Quality of Life and Health Behaviors Among Lesbian, Bisexual, and

Heterosexual Women Surviving Cancer from the 2013 to 2018 National Health Interview Survey. LGBT health, 8(1), 68–78. doi:10.1089/lgbt.2020.0185

13. Bostwick, W. B., & Dodge, B. (2019). Introduction to the special section on bisexual health: Can you see us now? *Arch Sex Behav*, *48*(1), 7987. doi:10.1007/s10508-018-1370-9

14. Chan, R. C. H., Operario, D., & Mak, W. W. S. (2020). Bisexual individuals are at greater risk of poor mental health than lesbians and gay men: The mediating role of sexual identity stress at multiple levels. *J Affect Disord, 260*, 292-301. doi:10.1016/j.jad.2019.09.020

15. Ross, L. E., Salway, T., Tarasoff, L. A., MacKay, J. M., Hawkins, B. W., & Fehr, C. P. (2018). Prevalence of depression and anxiety among bisexual people compared to gay, lesbian, and heterosexual individuals: A systematic review and meta-analysis. *J Sex Res, 55*(4-5), 435-456. doi:10.1080/00224499.2017.1387755

16. Smith CP, George DR. Bisexual women's invisibility in health care. AMA J Ethics 2021;23(7):E563-568; doi:10.1001/amajethics.2021.563

17. Zhang, X., Mkuu, R., Samman, E., Cummings, S., Sherman, L., Wigfall, L. T., Wilkinson, L., & Burdine, J. N. (2020). Anxiety and depressive symptoms and missing breast cancer and cervical screening: Results from Brazos valley community health survey. *Psychology, Health & Medicine, 25*(4), 402-409. doi:10.1080/13548506.2019.1668031

18. Stacey, L., & Wislar, W. (2023). Physical and mental health disparities at the intersection of sexual and gender minority statuses: Evidence from population-level data. *Demography, 60*(3), 731-760. doi:10.1215/00703370-10708592

19. Brown A, Hassard J, Fernbach M, Szabo E, Wakefield M. Lesbians' experiences of cervical screening. *Health Promotion Journal of Australia*. 2003;14: 128-132

20. Kluitenberg Harris, C., Wu, H. S., Lehto, R., Wyatt, G., & Given, B. (2024). Relationships among determinants of health, cancer screening participation, and sexual minority identity: A systematic review. *LGBT Health, 12*(1) 3-19. doi:10.1089/lgbt.2023.0097

21. Milner, G. E., & McNally, R. J. (2020). Nonadherence to breast and cervical cancer screening among sexual minority women: Do stigma-related psychological barriers play a role? *Health Psychology, 39*(10), 891-899. doi:10.1037/hea0000887

22. Tracy JK, Schluterman NH, Greenberg DR. Understanding cervical cancer screening among lesbians: a national survey. *BMC Public Health.* 2013;13: 442-442

23. Brooks, H., Llewellyn, C. D., Nadarzynski, T., Pelloso, F. C., De Souza Guilherme, F., Pollard, A., & Jones, C. J. (2018). Sexual orientation disclosure in health care: systematic review. *Br J Gen Pract*, *68*(668), e187e196. doi:10.3399/bjgp18X694841

24. Human Rights Campaign Foundation. *Bisexual FAQ.* Retrieved from https://www.hrc.org/resources/bisexual-faq

25. Kano, M., Jaffe, S. A., Rieder, S., Kosich, M., Guest, D. D., Burgess, E., Hurwitz, A., Pankratz, V. S., Rutledge, T. L., Dayao, Z., & Myaskovsky, L. (2022). Improving Sexual and Gender Minority Cancer Care: Patient and Caregiver Perspectives From a Multi-Methods Pilot Study. Frontiers in oncology, 12, 833195. doi:10.3389/fonc.2022.833195

26. Charlton, B.M., Kahn, J.A., Sarda, V., Katz-Wise, S.L., Spiegelman, D., Missmer, S.A., & Austin, S.B. (2019). Maternal factors and sexual orientation-related disparities in cervical cancer prevention. *Womens Health Issues*, *29*(3), 238–244. doi:10.1016/j.whi.2018.12.001

27. Bishop, M. D., Mallory, A. B., & Russell, S. T. (2023). Sexual minority identity development: patent Profiles of developmental milestones in a national probability sample. *Psychology of sexual orientation and gender diversity, 10*(4), 622–637. doi:10.1037/sgd0000569

27. Dyar, C., Feinstein, B. A., Sarno, E. L., Pirog, S., Newcomb, M. E., & Whitton, S. W. (2021). Prospective associations between bi+ minority stressors and internalizing symptoms: The mediating roles of general and group-specific processes. *J Consult Clin Psychol, 89*(10), 845-855. doi:10.1037/ccp0000689

29. Feinstein, B. A., & Dyar, C. (2017). Bisexuality, minority stress, and health. *Current Sexual Health Reports*, *9*(1), 42–49. doi:10.1007%2Fs11930-017-0096-3

30. Centers for Disease Control and Prevention. *BRFSS Statistical Brief on Cervical Cancer Screening Questions*. Division of Cancer Prevention and Control. Centers for Disease Control and Prevention; September 2019

30. Feinstein, B. A., Hurtado, M., Dyar, C., & Davila, J. (2023). Disclosure, minority stress, and mental health among bisexual, pansexual, and queer (bi+) adults: The roles of primary sexual identity and multiple sexual identity label use. *Psychology of sexual orientation and gender diversity, 10*(2), 181–189. doi:10.1037/sgd0000532

31. Le Forestier, J. M., Page-Gould, E., & Chasteen, A. (2024). Identity Concealment May Discourage Health-Seeking Behaviors: Evidence From Sexual-Minority Men During the 2022 Global Mpox Outbreak. Psychological science, 35(2), 126–136. doi:10.1177/09567976231217416

31. National Association of Community Health Centers [NACHC] (2023). *Evidence-Based Care Companion Action Guide: Cancer Screening.* Retrieved from Value Transformation Framework: https://www.nachc.org/wp-content/uploads/2023/07/Action-Guide_Cancer-Screening.pdf

32. Quinn, D. M., & Earnshaw, V. A. (2013). Concealable stigmatized identities and psychological well-being. *Soc Personal Psychol Compass, 7*(1), 40-51. doi:10.1111/spc3.12005

32. Tabaac, A. R., Benotsch, E. G., & Barnes, A. J. (2019). Mediation models of perceived medical heterosexism, provider-patient relationship quality, and cervical cancer screening in a community sample ofsSexual minority women and gender nonbinary adults. *LGBT Health, 6*(2), 77-86. doi:10.1089/lgbt.2018.0203

33. Anderson, J., Bourne, D., Peterson, K., & Mackey, K. (2019). VA evidence-based synthesis program reports. In Evidence brief: Accuracy of self-report for cervical and breast cancer screening, U.S. Department of Veterans Affairs. https://www.ncbi.nlm.nih.gov/books/NBK539386/

34. Meyer, I. H., & Wilson, P. A. (2009). Sampling lesbian, gay, and bisexual populations. *Journal of Counseling Psychology, 56*(1), 23-31. doi:10.1037/a0014587

34. Roncancio, A. M., Ward, K. K., & Fernandez, M. E. (2013). Understanding cervical cancer screening intentions among Latinas using an expanded theory of planned behavior model. *Behavioral Medicine, 39*(3), 66–72. doi:10.1080/08964289.2013.799452

35. Guillory, J., Wiant, K. F., Farrelly, M., Fiacco, L., Alam, I., Hoffman, L., Crankshaw, E., Delahanty, J., & Alexander, T. N. (2018). Recruiting Hard-to-Reach Populations for Survey Research: Using Facebook and Instagram Advertisements and In-Person Intercept in LGBT Bars and Nightclubs to Recruit LGBT Young Adults. *J Med Internet Res, 20*(6), e197. doi:10.2196/jmir.9461

35. Roncancio, A. M., Ward, K. K., Sanchez, I. A., Cano, M. A., Byrd, T. L., Vernon, S. W., Fernandez-Esquer, M. E., & Fernandez, M. E. (2015). Using the theory of planned behavior to understand cervical cancer screening among Latinas. *Health Education & Behavior, 42*(5), 621–626. doi:10.1177/1090198115571364

36. Brownfield, J. M., & Brown, C. (2022). The relations among outness, authenticity, and well-being for bisexual adults. *Psychology of Sexual Orientation and Gender Diversity*, *9*(1), 71–80. doi:10.1037/sgd0000390

36. Chen, H., Cohen, P., & Chen, S. (2010). How big is a big odds ratio? Interpreting the magnitudes of odds ratios in epidemiological studies. *Communications in Statistics - Simulation and Computation, 39*(4), 860-864. doi:10.1080/03610911003650383

37. Faul, F., Erdfelder, E., Buchner, A., & Lang, A. G. (2009). Statistical power analyses using G*Power 3.1: tests for correlation and regression analyses. *Behav Res Methods, 41*(4), 1149-1160. doi:10.3758/brm.41.4.1149

37. Meidlinger P.C. & Hope D.A., (2014). Differentiating disclosure and concealment in measurement of outness for sexual minorities: The Nebraska Outness Scale. *Psychology of Sexual Orientation and Gender Diversity*, 1(4) 489-497. doi:10.1037/sgd0000080

38. Ader, D. N. (2007). Developing the Patient-Reported Outcomes Measurement Information System (PROMIS). *Medical Care, 45*(5). Retrieved from https://journals.lww.com/lww-medicalcare/fulltext/2007/05001/developing_the_patient_reported_outcomes.1.aspx

38. Faul, F., Erdfelder, E., Lang, A. G., & Buchner, A. (2007). G*Power 3: a flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behav Res Methods, 39*(2), 175-191. doi:10.3758/bf03193146

39. Cella D, Riley W, Stone A, Rothrock N, Reeve B, Yount S, Amtmann D, Bode R, Buysse D, Choi S, Cook K, Devellis R, DeWalt D, Fries JF, Gershon R, Hahn EA, Lai JS, Pilkonis P, Revicki D, Rose M, Weinfurt K, Hays R; PROMIS Cooperative Group (2010). The Patient-Reported Outcomes Measurement Information System (PROMIS) developed and tested its first wave of adult self-reported health outcome item banks: 2005-2008. *J Clin Epidemiol, 63*(11), 1179-1194. doi:10.1016/j.jclinepi.2010.04.011

39. Solazzo, A. L., Gorman, B. K., & Denney, J. T. (2017). Cancer screening utilization among U.S. women: How mammogram and pap test use varies among heterosexual, lesbian, and Bbsexual women. *Population Research and Policy Review, 36*(3), 357-377. doi:10.1007/s11113-017-9425-5

40. Chad-Friedman, E., Coleman, S., Traeger, L. N., Pirl, W. F., Goldman, R., Atlas, S. J., & Park, E. R. (2017). Psychological distress associated with cancer screening: A systematic review. *Cancer, 123*(20), 3882-3894. doi:10.1002/cncr.30904

41. Clover, K., Lambert, S. D., Oldmeadow, C., Britton, B., Mitchell, A. J., Carter, G., & King, M. T. (2022). Convergent and criterion validity of PROMIS anxiety measures relative to six legacy measures and a structured diagnostic interview for anxiety in cancer patients. *Journal of Patient-Reported Outcomes, 6*(1), 80. doi:10.1186/s41687-022-00477-4

42. Spielberger, C. D. (1983). State-Trait Anxiety Inventory for Adults (STAI-AD) [Database record]. APA PsycTests. doi:10.1037/t06496-000

43. Donahue JM, DeBenedetto AM, Wierenga CE, Kaye WH, Brown TA. (2020). Examining day hospital treatment outcomes for sexual minority patients with eating disorders. International *Journal of Eating Disorders*. 2020;53: 1657-1666

44. Clark LA, Watson D. (1991).Tripartite model of anxiety and depression: Psychometric evidence and taxonomic implications. *Journal of Abnormal Psychology.* 1991;100: 316-336

45. Chiappelli, J., Nugent, K. L., Thangavelu, K., Searcy, K., & Hong, L. E. (2014). Assessment of trait and state aspects of depression in schizophrenia. *Schizophrenia bulletin, 40*(1), 132–142. doi:10.1093/schbul/sbt069

46. Torbati A, Ullrich HS, Cano MÀ, et al. Sociosexual domains as mediators of the relationship between trait depression and sexual risk: A serial mediation analysis in a sample of Iranian American adults. Journal of Affective Disorders Reports. 2022;9: 100362

47. Furukawa NW, Maksut JL, Zlotorzynska M, Sanchez TH, Smith DK, Baral SD. Sexuality disclosure in U.S. gay, bisexual, and other men who have sex with men: Impact on healthcare-related stigmas and HIV pre-exposure prophylaxis denial. *Am J Prev Med*. 2020 Aug;59(2):e79-e87. doi: 10.1016/j.amepre.2020.02.010. Epub 2020 May 4. PMID: 32376144; PMCID: PMC7375915

48. Barefoot, K. N., Warren, J. C., & Smalley, K. B. (2017). Women's health care: The experiences and behaviors of rural and urban lesbians in the USA. *Rural & Remote Health, 17*(1), 1-16. doi:10.22605/rrh3875

49. Lee, M., Jenkins, W. D., & Adjei Boakye, E. (2020). Cancer screening utilization by residence and sexual orientation. *Cancer Causes & Control, 31*(10), 951-964. doi:10.1007/s10552-020-01339-4

51. United States Office of Management and Budget. (2024). OMB Statistical Policy Directive No. 15. https://spd15revision.gov/content/spd15revision/en/2024-spd15.html

52. Islam, A., Por, L. Y., Othman, F., & Ku, C. S. (2019). A review on recognition-based graphical password techniques (Vol. 481). Springer Verlag. doi:10.1007/978-981-13-2622-6_49

53. Wang, J., Calderon, G., Hager, E. R., Edwards, L. V., Berry, A. A., Liu, Y., Dinh, J., Summers, A. C., Connor, K. A., Collins, M. E., Prichett, L., Marshall, B. R., & Johnson, S. B. (2023). Identifying and preventing fraudulent responses in online public health surveys:

Lessons learned during the COVID-19 pandemic. PLOS global public health, 3(8), e0001452. doi:10.1371/journal.pgph.0001452

54. Fox-Wasylyshyn, S.M. & El-Masri, M.M. (2005). Handling missing data in self-report measures*. Research in Nursing & Health, 28*(6), 488-495. doi:10.1002/nur.20100

56. Puckett, J. A., Tornello, S., Mustanski, B., & Newcomb, M. E. (2022). Gender variations, generational effects, and mental health of transgender people in relation to timing and status of gender identity milestones. *Psychol Sex Orientat Gend Divers, 9*(2), 165-178. doi:10.1037/sgd0000391

57. Taple, B. J., Chapman, R., Schalet, B. D., Brower, R., & Griffith, J. W. (2022). The impact of education on depression assessment: differential item functioning analysis. *Assessment, 29*(2), 272–284. doi:10.1177/1073191120971357

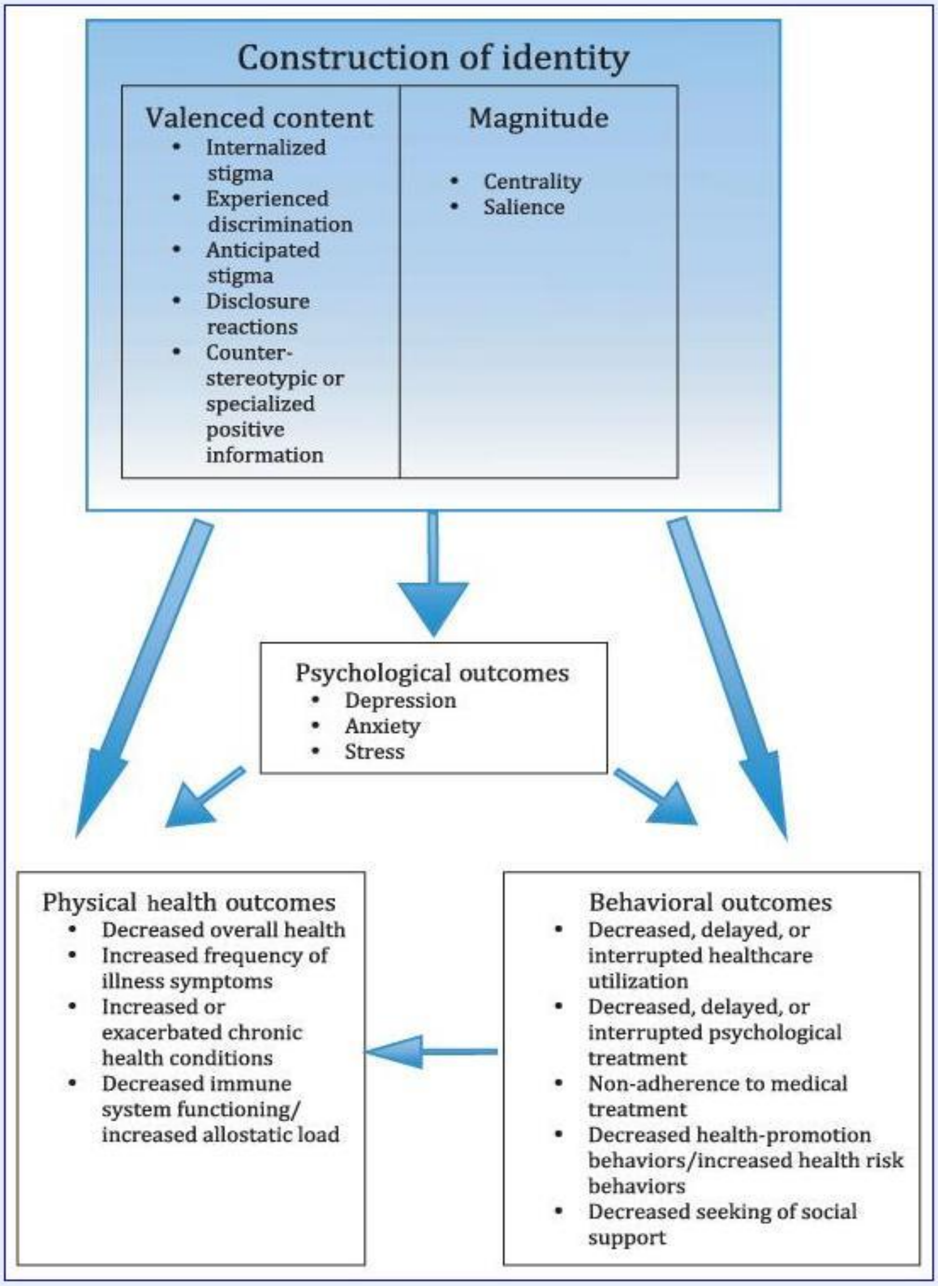
58. Brookmeyer, K.A., Coor, A., Kachur, R.E., Beltran, O., Reno, H.E., & Dittus, P.J. (2021). Sexual history taking in clinical settings: A narrative review. *Sexually Transmitted Diseases, 48*(6):p 393-402. doi:10.1097/OLQ.0000000000001319

59. Lui, M., Bockting, W., Cato, K., & Houghton, L. C. (2024). Prevalence and predictors of cancer screening in transgender and gender nonbinary individuals. *International journal of transgender health*, *25*(4), 957–970. doi:10.1080/26895269.2023.2294493

APPENDIX A: CHAPTER 4 SUPPLEMENTAL MATERIALS

Tables and Figures

Figure A4.1. Concealable Stigmatized Identities Outcomes Model



CSI-Outcomes Model. Concealable stigmatized identity construction and psychological, physical, and behavioral outcomes. *Reprinted with permission.

Table A4.1. Percent participation in cervical cancer screening for major sample characteristic subgroups

		Valid % of characteristic subgroup *(n)*		
Sample characteristic	**Sample characteristic subgroup (*n*)**	**Has Ever Screened**	**Is Up to Date**	**Intends to Screen**
[‡]**Gender identity**	Woman *(118)*	86.4% *(102)*	74.6% *(88)*	90.7% *(107)*
	All other identities *(49)*	85.7% *(42)*	71.4% *(35)*	81.6% *(40)*
Age (years)	[†]21 *(6)*	0% *(0)*	--- *(--)*	83.3% *(5)*
	22–30 *(73)*	82.2% *(60)*	74% *(54)*	87.7% *(64)*
	31 and older *(88)*	95.5% *(84)*	78.4 *(69)*	88.6% *(78)*
Race/Ethnicity	White *(132)*	87.9% (116)	75% (99)	87.9% (116)
	All other race/ethnicities *(34)*	79.4% (27)	70.6% (24)	88.2% (30)
Rurality	Rural *(17)*	88.2% (15)	70.6% (12)	88.2% (15)
	Suburban *(94)*	86.2% (81)	72.3% (68)	87.2% (82)
	Urban *(56)*	85.7% (48)	76.8% (43)	89.3% (50)
Household income (annual)	Less than $20,000 *(17)*	88.2% (15)	76.5% (13)	88.2% (15)
	$20,000 to $75,000 *(77)*	83.1% (64)	70.1% (54)	89.6% (69)
	More than $75,000 *(73)*	89% (65)	76.7% (56)	86.3% (63)
Partner status	Partnered *(127)*	89% (113)	75.6% (96)	87.4% (111)
	Not partnered *(40)*	77.5% (31)	67.5% (26)	90% (36)
If partnered *(127)*: [‡]**Partner gender identity**	Man *(81)*	92.6% (75)	79% (64)	91.4% (74)
	Another gender *(46)*	82.6% (38)	69.6% (32)	80.4% (37)
Insurance	Public health insurance *(26)*	80.8% (21)	73.1% (19)	84.6% (22)
	Private health insurance *(135)*	86.7% (117)	74.1% (100)	88.9% (120)
	No health insurance *(6)*	100% (6)	66.7% (4)	83.3% (5)
Employment status	Full time employment *(101)*	91.1% (92)	77.2% (78)	87.1% (88)
	Part time or self-employment *(32)*	75% (24)	65.6% (21)	81.3% (26)
	Not employed *(18)*	94.4% (17)	83.3% (15)	94.4% (17)
	Full time student *(16)*	68.8% (11)	56.3% (9)	100% (16)
Education level	Some college or less *(31)*	74.2% (23)	61.3% (19)	74.2% (23)
	Bachelor’s degree *(78)*	83.3% (65)	69.2% (54)	89.7% (70)
	Master’s degree or higher *(58)*	96.6% (56)	86.2% (50)	93.1% (54)

[†] Age 21 is first recommended age to screen; some have not screened, but are not considered late to screen until age 22

[‡] Survey questions regarding gender identity allow participants to select all that apply; percent may not equal 100%

Table A4.2. Average scores for mental health and identity disclosure variables

		Min.	Max.	Mean	*SD
Anxiety	State Anxiety (PROMIS Anxiety T-scores)	37.1	76.6	61.4	7.3
	Trait Anxiety (*STAI-Trait subscale T-scores)	38	93	62.4	11.3
Depressive Symptoms	State Depressive Symptoms (PROMIS Depression T-scores)	38.2	70.8	55.3	7.5
	Trait Depressive symptoms (*MTSD average scores)	.11	3.9	1.8	.81
Identity Disclosure	With family (%)	0	100	59.5	39.6
	With extended family (%)	0	100	30.1	32.8
	With heterosexual people you socialize with (%)	0	100	61.2	28.5
	With lesbian/gay people you socialize with (%)	0	100	81.0	26.9
	With bisexual people you socialize with (%)	0	100	84.6	26.3
	With people at your work/school (%)	0	100	34.9	32.8
	With strangers (%)	0	70	11.4	16.9
	With people in healthcare settings (%)	0	100	33.3	32.8
	Average across all settings (%)	0	93	49.3	21.2

SD = Standard Deviation; STAI = State Trait Anxiety Inventory;
MTSD = Maryland Trait and State Depression

Figure A4.2. Participant recruitment and retention for each recruitment venue

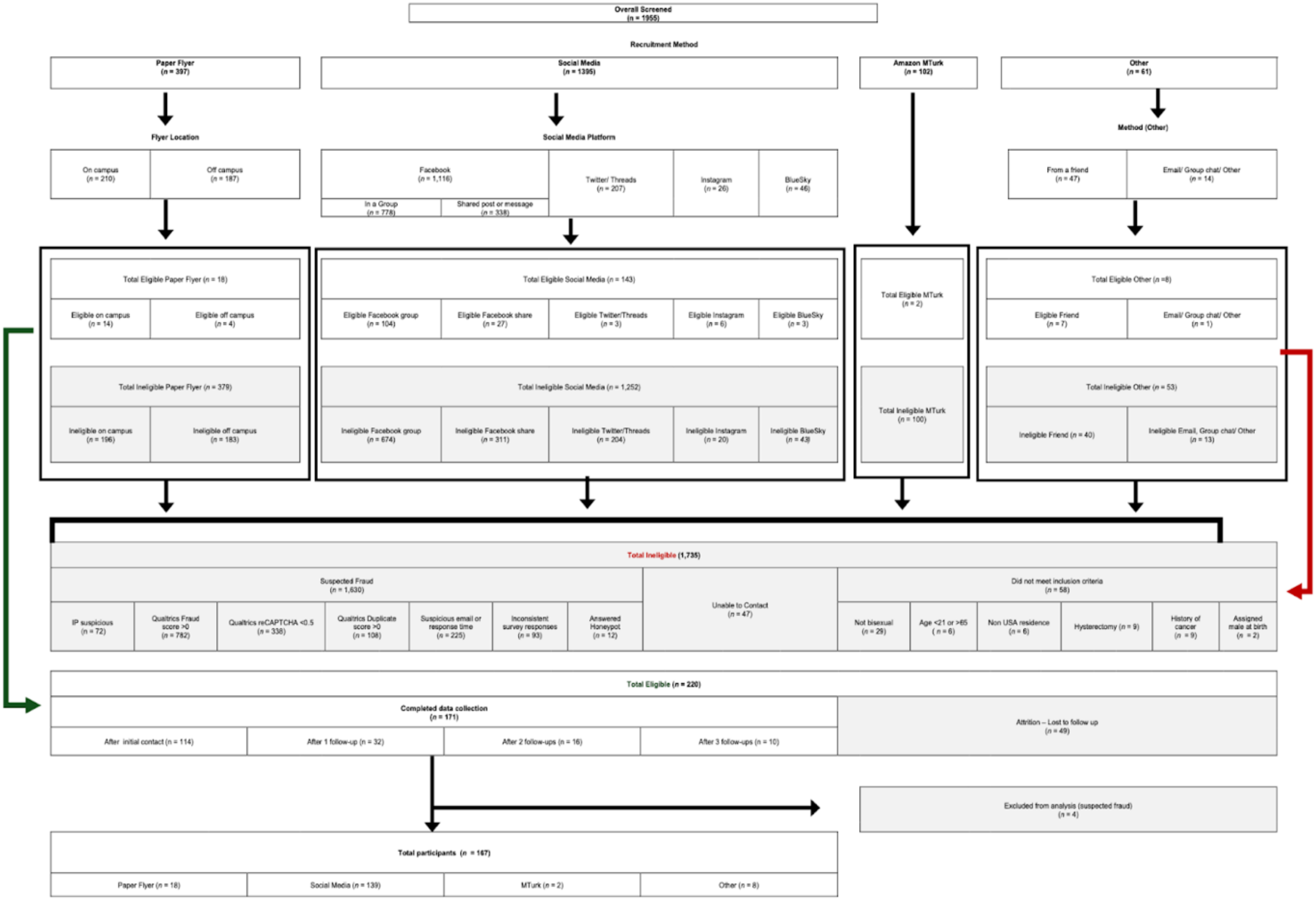


Figure A4.3. Identity disclosure level by screening participation (ever screened) in each identity disclosure setting

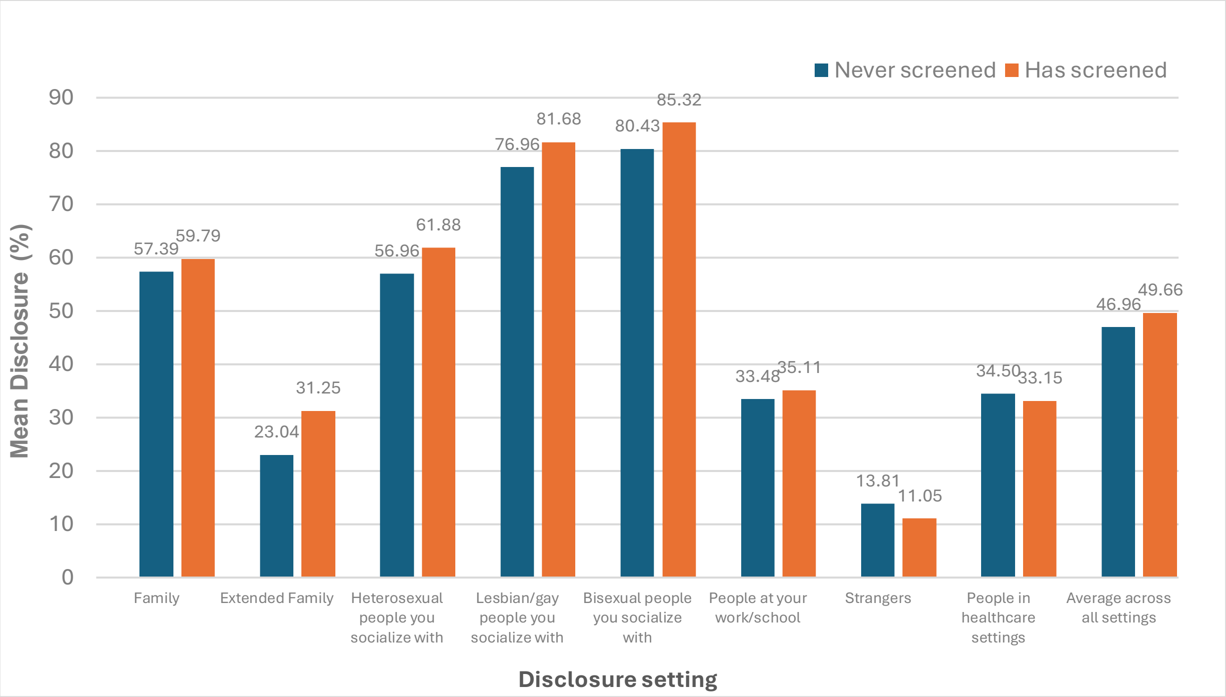


Figure A4.4. Identity disclosure level by screening participation (up to date) in each disclosure setting

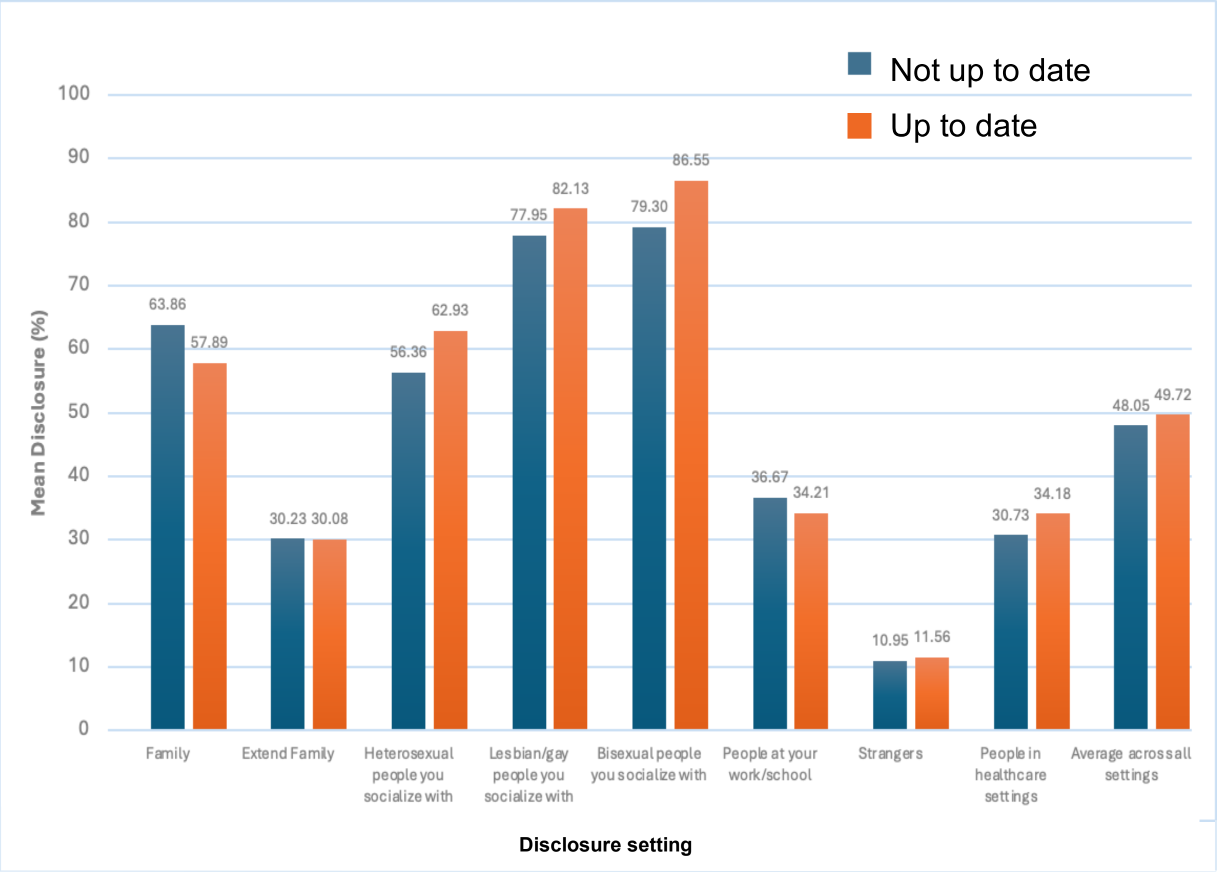


Figure A4.5. Identity disclosure level by screening participation (intention) in each disclosure setting

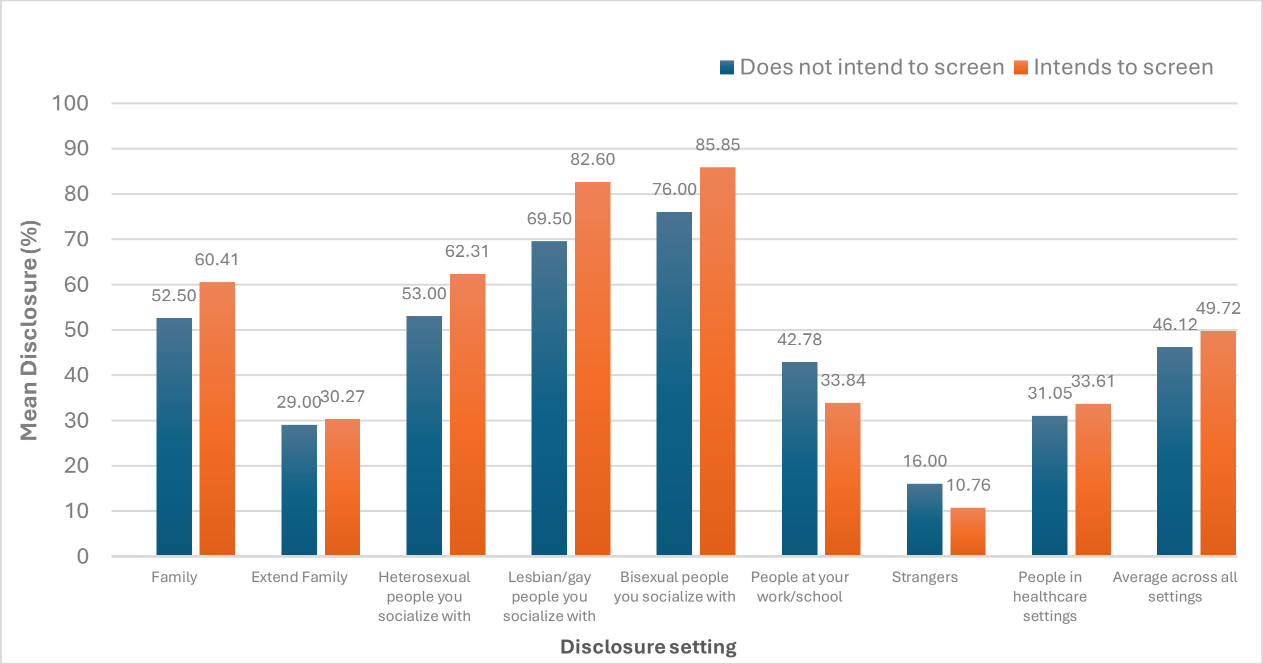


Table A4.3. STROBE statement—Checklist for cross-sectional studies

	Item No	Recommendation	Page No
Title and abstract	1	(*a*) Indicate the study's design with a commonly used term in the title or the abstract	1
		(*b*) Provide in the abstract an informative and balanced summary of what was done and what was found	(1)
Introduction			
Background/ rationale	2	Explain the scientific background and rationale for the investigation being reported	2-3
Objectives	3	State specific objectives, including any prespecified hypotheses	4
Methods			
Study design	4	Present key elements of study design early in the paper	4
Setting	5	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection	4-5
Participants	6	(*a*) Give the eligibility criteria, and the sources and methods of selection of participants	5
Variables	7	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable	6-9
Data sources/ measurement	8*	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group	*9*
Bias	9	Describe any efforts to address potential sources of bias	10
Study size	10	Explain how the study size was arrived at	11
Quantitative variables	11	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why	10-11
Statistical methods	12	(*a*) Describe all statistical methods, including those used to control for confounding	10-11
		(*b*) Describe any methods used to examine subgroups and interactions	10-11
		(*c*) Explain how missing data were addressed	10-11
		(*d*) If applicable, describe analytical methods taking account of sampling strategy	10-11
		(*e*) Describe any sensitivity analyses	10-11
Results			
Participants	13*	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed	11
		(b) Give reasons for non-participation at each stage	22
		(c) Consider use of a flow diagram	22
Descriptive data	14*	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders	11
		(b) Indicate number of participants with missing data for each variable of interest	
Outcome data	15*	Report numbers of outcome events or summary measures	11
Main results	16	(*a*) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included	11-13
		(*b*) Report category boundaries when continuous variables were categorized	
		(*c*) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period	
Other analyses	17	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses	

Table A4.3. (cont'd)

Discussion			
Key results	18	Summarise key results with reference to study objectives	13-15
Limitations	19	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias	16
Interpretation	20	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence	16
Generalisability	21	Discuss the generalisability (external validity) of the study results	16
Other information			
Funding	22	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based	

Table A4.4. Identity disclosure and mental health

	State Anxiety		Trait anxiety		State depression		Trait depression	
Predictor	β	*p* - value	β	*p*-value	β	*p*-value	β	*p*-value
Step 1								
(Identity disclosure)								
With family (%)	-.020	.163	-.046*	.040	-.031*	.035	.000	.920
With extended family (%)	-.010	.551	-.069**	.009	-.023	.189	-.001	.684
With heterosexual people you socialize with (%)	.004	.848	-.044	.157	-.017	.399	.002	.423
With lesbian/gay people you socialize with (%)	.003	.880	-.032	.335	-.014	.533	.004	.092
With bisexual people you socialize with (%)	.001	.946	-.038	.257	-.024	.301	.001	.762
People at work/school (%)	-.012	.515	-.031	.266	.007	.691	.001	.548
Strangers (%)	.023	.502	-.006	.914	.018	.986	.005	.216
In healthcare (%)	-.010	.588	-.025	.352	.001	.944	.002	.227
Total in an all settings (%)	-.013	.629	-.083*	.045	-.030	.284	.003	.386
Step 2								
(Identity disclosure + partner status + gender + rurality)								
With family (%)	-.024	.096	-.044*	.048	-.034*	.024	-.001	.688
With extended family (%)	-.011	.522	-.063*	.018	-.024	.191	-.001	.530
With heterosexual people you socialize with (%)	.002	.937	-.037	.237	-.019	.372	.001	.604
With lesbian/gay people you socialize with (%)	-.003	.877	-.033	.320	-.018	.413	.003	.247
With bisexual people you socialize with (%)	-.004	.849	-.039	.257	-.028	.232	.000	.843
People at work/school (%)	-.014	.458	-.029	.302	.007	.697	.001	.756
Strangers (%)	.017	.622	-.003	.959	-.003	.938	.003	.408
In healthcare (%)	-.012	.505	-.022	.415	.001	.967	.028	.393
Total in an all settings (%)	-.021	.453	-.080	.059	-.035	.225	.001	.744

* = *p*<0.05;   ** = *p*<0.01;   *** = *p*<.001

Measures & Questionnaires

Study Questionnaire 1: Eligibility Screening

For each question, please select the option that **most correctly** applies to you

1. Do you consider yourself to be (select all that apply):

   For the purposes of this study, "bisexual" refers to anyone who is sexually and/or romantically attracted to more than one gender.

   a. Straight
   b. Lesbian or gay
   c. Bisexual
   d. Asexual

2. What is your age?
[dropdown list 16 or younger, 17... 69, 70 or older]

3. What sex were you assigned at birth on your original birth certificate?
   a. Female
   b. Male
   c. Intersex, assigned female
   d. Intersex, assigned male
   e. Intersex, assigned intersex
   f. Unsure

3a. Have you had a hysterectomy?
   a. Yes
   b. No
   c. Don't know/ Not sure
   d. Refused

3b. Have you ever been diagnosed with cancer?
   a. Yes, I am currently receiving treatment
   b. Yes, I am currently in remission
   c. No
   d. Unsure

4. Do you speak a language other than English at home?
   a. Yes
   b. No [skip question 6]

5. How well do you understand English?
   a. Very well
   b. Well
   c. Not well
   d. Not at all

6. In which country do you currently reside?
   [dropdown list A–Z]

[Participant may be eligible IF: Q1 includes c; Q2 = b, c, d, e, f, or g; Q3 = a, c, or e; Q4=c; Q5=b OR (Q5=a AND Q6=a or b); and Q7= United States]

So that we may contact you for possible participation and enrollment, please provide your **full name** and **email** on the following form.
Please note you must provide a valid email address to be considered for study inclusion.

[link to participant contact form]

My Full Name is: ________

My email address is: ___________

Thank you for your interest in participating. Study personnel will review your responses for eligibility. Once eligibility determination is made, you will be contacted at the email address you provided.

Study Questionnaire 2: Data Collection

PART 1: INFORMED CONSENT

Consent Form for Online Survey

Examination of Bisexual Identity Disclosure and Mental Health as Predictors of Cervical Cancer Screening Participation

You are being asked to participate in a research study. The purpose of the study is to identify factors contributing to cervical cancer screening participation among bisexual people. You will be asked to answer questions about yourself in an online questionnaire, which should take about 20 minutes. Your participation is voluntary. You can skip any question you do not wish to answer. You may withdraw at any time prior to submitting the completed survey**.** Once you have successfully completed the survey, you will be compensated for your time with a $10 Amazon gift card code. You must be 18 or older to participate. If you have any questions please contact ***Callie Harris***, at ***517-XXX-XXXX***. You indicate that you voluntarily agree to participate in this research study by submitting the survey.

Study contact:
Callie Harris
Ph: 517-XXX-XXXX
Email: kluitenb@msu.edu
1355 Bogue St.
East Lansing, MI 48824

PART 2: PARTICIPANT PICTURE IDENTIFICATION

Please select your unique photograph (included in your email with the link to this survey)
[6 unique stock photos provided for options a – f]

Please select your unique icon (included in your email with the link to this survey)
[6 unique stock photos provided for options a – f]

Participant identification is important to verify that you are an eligible participant. It also allows us to locate your contact information for compensation following study completion. As a reminder, to protect your anonymity, study data will be associated with your unique picture identifiers only. Identifying information (name and contact) are kept separate from all study data.

PART 3: CERVICAL CANCER SCREENING PARTICIPATION

We are interested in learning about your past and future cervical cancer screening participation. For each question in this section, please select the option that most correctly applies to you. As people are very different, there is no correct answer for these questions.

1. What is your age (in years)
   [continuous]

2. Have you ever had a Pap and/or HPV test?

   a. Yes
   b. No [go to Q4]
   c. Don’t know/Unsure [go to Q4]
   d. Refused [go to Q4]

3. How long has it been since you had your last Pap and/or HPV test?

   a. Within the past year (anytime less than 12 months)
   b. Within the past 2 years (1 year, but less than 2 years)
   c. Within the past 3 years (2 years, but less than 3 years)
   d. Within the past 5 years (3 years, but less than 5 years)
   e. 5 or more years
   f. Don’t know/Unsure
   g. Refused

   [scoring note: If age 21 – 29, options a,b,c are participated; if age 30-65, options a,b,c,d,e are participated]

4a. [if age 21 - 29] How likely are you to complete a Pap and/or HPV test for cervical cancer screening within the next 3 years?

   a. Not at all likely
   b. Somewhat unlikely
   c. Neither likely nor unlikely
   d. Somewhat likely
   e. Very likely

4b. [if age 30 - 65] How likely are you to complete a Pap and/or HPV test for cervical cancer screening within the next 5 years?

   a. Not at all likely
   b. Somewhat unlikely
   c. Neither likely nor unlikely
   d. Somewhat likely
   e. Very likely

PART 4: IDENTITY DISCLOSURE

Please note that "bisexual identity" here includes a sexual identity where there is sexual and/or romantic attraction to more than one gender.

Table A4.5. 4A **-** Disclosure level

What percent of people in this group do you think are aware of your **bisexual identity** (meaning they are aware that you consider yourself bisexual)?

What percent of people in each group do you think are aware of your **bisexual identity** (meaning they are aware that you consider yourself bisexual)?											
	0%	**10%**	**20%**	**30%**	**40%**	**50%**	**60%**	**70%**	**80%**	**90%**	**100%**
9. Members of your immediate family (e.g., parents and siblings)											
10. Members of your extended family (e.g., aunts, uncles, grandparents, cousins)											
11. Heterosexual/straight people you socialize with (e.g., friends and acquaintances)											
12. Lesbian/gay people you socialize with (e.g., friends and acquaintances)											
13. Bisexual people you socialize with (e.g., friends and acquaintances)											
14. People at your work/school (e.g., coworkers, supervisors, instructors, students)											
15. Strangers (e.g., someone you have a casual conversation with in line at the store)											
16. People in healthcare settings (e.g., doctors, nurses, receptionists in a hospital or clinic)											

4B: Disclosure in Cervical Cancer Screening

[IF participant <u>has</u> screened for cervical cancer, answer question 9:]

9. At the time of your last cervical cancer screening, was your provider aware of your **bisexual identity**?
   - a. Yes
   - b. No
   - c. Don't know/Unsure

PART 5: MENTAL HEALTH SYMPTOMS

Table A4.6: 5A - Anxiety

For each question in this section, please select the option that most correctly applies to you. As people are very different, there is no correct answer for these questions. If you are not comfortable answering a question, you may skip and proceed to the next

In the past 7 days…	Never	Rarely	Sometimes	Often	Always
I felt fearful…	1 [ ]	2 [ ]	3 [ ]	4 [ ]	5 [ ]
I found it hard to focus on anything other than my anxiety…	1 [ ]	2 [ ]	3 [ ]	4 [ ]	5 [ ]
My worries overwhelmed me…	1 [ ]	2 [ ]	3 [ ]	4 [ ]	5 [ ]
I felt uneasy…	1 [ ]	2 [ ]	3 [ ]	4 [ ]	5 [ ]
I felt nervous…	1 [ ]	2 [ ]	3 [ ]	4 [ ]	5 [ ]
I felt like I needed help for my anxiety…	1 [ ]	2 [ ]	3 [ ]	4 [ ]	5 [ ]
I felt anxious…	1 [ ]	2 [ ]	3 [ ]	4 [ ]	5 [ ]
I felt tense…	1 [ ]	2 [ ]	3 [ ]	4 [ ]	5 [ ]

Table A4.7. 5B - Depressive symptoms

For each question in this section, please select the option that most correctly applies to you. As people are very different, there is no correct answer for these questions. If you are not comfortable answering a question, you may skip and proceed to the next

In the past 7 days…	Never	Rarely	Sometimes	Often	Always
I felt worthless…	1 [ ]	2 [ ]	3 [ ]	4 [ ]	5 [ ]
I felt helpless…	1 [ ]	2 [ ]	3 [ ]	4 [ ]	5 [ ]
I felt depressed…	1 [ ]	2 [ ]	3 [ ]	4 [ ]	5 [ ]
I felt hopeless…	1 [ ]	2 [ ]	3 [ ]	4 [ ]	5 [ ]
I felt like a failure…	1 [ ]	2 [ ]	3 [ ]	4 [ ]	5 [ ]
I felt unhappy	1 [ ]	2 [ ]	3 [ ]	4 [ ]	5 [ ]
I felt that I had nothing to look forward to…	1 [ ]	2 [ ]	3 [ ]	4 [ ]	5 [ ]
I felt that nothing could cheer me up…	1 [ ]	2 [ ]	3 [ ]	4 [ ]	5 [ ]

5C: Fear of Stigma

For each question in this section, please select the option that most correctly applies to you. As people are very different, there is no correct answer for these questions. If you are not comfortable answering a question, you may skip and proceed to the next.

Have you *ever* felt afraid or avoided healthcare services because of fear that someone may learn about your sexual identity?

a. Never
b. Rarely
c. Sometimes
d. Often
e. Always

PART 6: PERSONAL/DEMOGRAPHIC CHARACTERISTICS

In this section, we will ask you to provide additional details about yourself. This section provides valuable information about the characteristics of those participating in this study. If you are not comfortable answering a question, you may skip and proceed to the next.

For the following questions, you will be asked to select the option that ***best*** *describes you.*

1. What is your age
    [dropdown, options from 21 - 65]

2. With which racial/ethnic group do you identify?
    a. White
    b. Black or African American
    c. American Indian or Alaska Native
    d. Asian
    e. Middle Eastern or North African
    f. Native Hawaiian or Pacific Islander
    g. Hispanic, Latino, or Spanish origin
    h. From multiple races
    i. Another race or ethnicity not listed above _____

3. How would you describe the setting in which you live?
    a. Rural
    b. Suburban
    c. Urban

4. What is your current gender identity?
    a. Woman
    b. Man
    c. Non-binary
    d. Genderqueer *or* Gender non-conforming
    e. Agender
    f. Another answer not listed here ______

5. How would you describe your current partner status?
    a. Single
    b. Legally married
    c. Formalized partnership
    d. In a relationship, cohabitating
    e. In a relationship, non-cohabitating
    f. Divorced/Separated
    g. Widowed

(If question 5 answered b, c, d, or e):

6. How does your partner currently identify their gender? (Select all that apply)
    a. Woman
    b. Man
    c. Non-binary
    d. Genderqueer
    e. Gender non-conforming
    f. Agender
    g. Another answer not listed here _____

7. Do you currently have health insurance?
   a. Yes – Public plan (such as Medicare, Medicaid, Affordable Care Act)
   b. Yes – Private plan (such as through an employer, COBRA)
   c. No

8. What is your current employment status?
   a. Full-time employment
   b. Part-time employment
   c. Self-employed
   d. Unemployed
   e. Unable to work / Disabled
   f. Retired
   g. Full-time student

9. What is your highest level of education completed?
   a. Less than high school diploma
   b. High school diploma or equivalent
   c. Some college/vocational
   d. Associate degree
   e. Bachelor's degree
   f. Master's degree
   g. Doctoral or professional degree

10. What is your household income?
   a. Less than $20,000
   b. $20,000 to $75,000
   c. More than $75,000

Table A4.8. Instrument psychometric properties

Outcome		Measurement	Item Details	Scoring	Validity	Reliability (prior studies)	Components
Cervical cancer screening participation	**Past Behavior**	Behavioral Risk Factor Surveillance System; Cervical cancer screening questions (CDC, 2019)	3 items 2 min	Dichotomous (participates/ does not participate)	*r* = .652	N/A	Past pap screening participation (ever [1 question]; per age guidelines [2 questions])
	Intention	Intention to Screen (self-reported likelihood) (Tabaac, Benotsch, & Barnes, 2019)	1 item 5-pt numeric 1 min	↑ score = ↑ intention	N/A	N/A	Future cervical cancer screening participation
Identity disclosure		Nebraska Outness Scale – [bisexual disclosure] (Brownfield et al., 2022) – adapted to include healthcare	8 items 0-100%, increments of 10 5 min	Total % across all settings where an answer was provided	*Original scale r* = .83 (Against the Outness Indicator; Meidlinger, 2014). Adaptations validated by panel of experts	α = .83 internal consistency reliability, bisexual adults (Brownfield et al., 2022) α = .82 original scale	Disclosure with: healthcare; immediate family; extended family; heterosexual/straight, gay/lesbian, and bisexual people you socialize with; people at your work/school; strangers
Mental Health	**State Anxiety**	PROMIS, emotional distress anxiety form 8a	8 items 5-pt numeric 1 min	↑ score = ↑ anxiety	*r* = .835 (Against the Hospital Anxiety and Depression Scale; Clover et al., 2022)	α = .94–.95 sexual and gender minority adults (Dyar et al., 2021)	Emotional distress, anxiety
	Trait Anxiety	State and Trait Anxiety Inventory – Trait (Y-2)	20 items 4-pt numeric 5 min	↑ score = ↑ anxiety	*r = .75 - .80 (Against similar Beck Anxiety Inventory, Self-rating Anxiety Scale; Clark & Watson, 1991)*	α = .89-.92; sexual minority adults (Donahue et al., 2020),	Tendency towards anxiety
	State Depressive symptoms	PROMIS, emotional distress depression form 8a	8 items 5-pt numeric 1 min	↑ score = ↑ depressive symptoms	AUC = .82 (Against PHQ9; (Clover et al., 2022)	α = .94–.95 sexual and gender minority adults (Dyar et al., 2021)	Emotional distress, depression
	Trait Depressive Symptoms	Maryland Trait and Strait Depression Scale - Trait	18 items 5-pt numeric 5 min	↑ score = ↑ depressive symptoms	*r* = .53 (Against Brief Psychiatric Rating Scale-Depression; Chiappelli et al., 2014)	α = .96 Iranian American adults (Torbati et al., 2022)	Tendency towards depression
	Fear of stigma	Ever experienced (Furukawa et al., 2020)	1 item 5-pt numeric 1 min	↑ score = ↑ fear	NA	NA	Ever experienced fear of stigma
Personal/ Demographic Characteristics		Developed with key demographic variables identified in (Kluitenberg et al., 2024)	10 items Varies 5 min	N/A	N/A	N/A	• Age • Gender identity • Partner status • Partner gender • Insurance status • Income level • Employment status • Education level • Race/Ethnicity • Rurality
Total:			77 items 26 min				

CHAPTER 5: CONCLUSIONS AND IMPLICATIONS RESULTING FROM THIS DISSERTATION STUDY

Introduction

This dissertation, guided by an adaptation of the Concealed Stigmatized Identities – Outcomes model (CSI-O), used three manuscripts to examine the relationships among identity construction factors (i.e., identity disclosure), psychological outcomes (i.e., mental health symptoms), and behavioral outcomes (i.e., cervical cancer screening participation) for people with a stigmatized bisexual identity (i.e., bisexual people). Each manuscript was guided by different CSI-O-driven research questions to provide a different perspective on how these concepts within the CSI-O model can be applied to address disparities in cervical cancer screening participation among bisexual individuals. The three manuscripts in this dissertation resulted in new knowledge about 1) what personal/demographic characteristics are related to cervical cancer screening participation for bisexual people, 2) how identity disclosure relates to mental health for bisexual people with intersecting identities, i.e., people assigned female at birth who identify as transgender and bisexual, and 3) how identity disclosure and mental health are related to cervical cancer screening participation among bisexual people. Together, these findings support the need to further identify and explore bisexual-specific predictors of cervical cancer screening participation. This dissertation will serve to identify individuals at greatest risk for cervical cancer screening nonparticipation and target interventions towards their unique needs.

Overview of Manuscripts

Manuscript 1 (Chapter 2, **RQ** *1)*

RQ1: “What determinants of health (including personal/demographic characteristics) are associated with cancer screening participation (and nonparticipation) among adults with differing stigmatized sexual identities?”

Findings from Chapter 2 identified that across different sexual identifies, having a regular provider and a college education were associated with increased cervical cancer screening participation, while having household income <$20,000, lower education level, minoritized racial/ethnic identity (i.e., Black, Latinx), minoritized gender identity (i.e. transgender, nonbinary), history of discrimination in cancer screening, and being unemployed or underinsured, were associated with nonparticipation in cancer screening among individuals with stigmatized sexual identities. While breast and cervical cancer screening were most identified in the literature, the above personal/demographic characteristics consistently affected participation for cervical, but not breast cancer screening. Additionally, while few studies addressed non-lesbian samples, none centered exclusively on bisexual people (the largest sexual minority group). Manuscript 1 concluded that studies focusing on bisexual people are needed. In addition, in future studies with bisexual samples, four of the identified personal/demographic characteristics (i.e., lower education level, racial/ethnic minority identity, unemployment, and underinsurance) should be considered, as these characteristics were related to reduced cervical cancer screening participation in bisexual people.

In addition to identifying key personal/demographic characteristics, current literature (Manuscript 1) showed that identity disclosure to a parent improved cervical cancer screening participation among lesbian individuals, while no change was seen for bisexual people. This finding suggested that the relationship between sexual identity disclosure and cervical cancer screening participation differed between lesbian and bisexual individuals in at least one social setting (i.e., with a parent). In addition, while some studies supported that identity disclosure to a provider was associated with improved cervical cancer screening participation in lesbian people, this relationship had not been studied with bisexual people. Considering that 1) there is a difference between lesbian and bisexual people in how identity disclosure with a parent relates to participation in cervical cancer screening, and 2) it is currently unknown how identity disclosure to a provider relates to cervical cancer screening participation for bisexual people, this systematic review supported a need to examine the relationships between identity disclosure and cervical cancer screening among bisexual adults. This also supports ”identity disclosure,” rather than “disclosure reactions,” as the CSI-O identity construction factor addressed in this dissertation.

Manuscript 2 (Chapter 3, **RQ** *2)*

RQ 2: “What is the predictive relationship between identity disclosure in six key social settings (at home, with family, with friends, at work, in public, and in healthcare) and mental health symptoms among individuals who were assigned female at birth, and identify as bisexual and transgender?

To answer RQ2, a secondary data analysis (Manuscript 2) used data from a parent study, including a subsample of participants who were assigned female at birth and identified as bisexual and transgender. This study considered key personal/demographic characteristics identified in Manuscript 1 when examining the influence of identity disclosure on mental health. The parent study did not include cervical cancer screening participation, which was therefore not examined in this secondary analysis. In Manuscript 2, personal/demographic characteristics that were associated with identity nondisclosure included having a lower education level, not having a romantic partner, and having a history of discrimination in healthcare (i.e., difficulty accessing care related to gender identity). In addition, personal/demographic characteristics, including history of healthcare discrimination, unemployment, low education level, low income, non-binary gender identity, and minority racial/ethnic identity, were related to worse mental health.

Findings from Manuscript 2 supported that lower identity disclosure was associated with poorer mental health among individuals assigned female at birth who identified as bisexual and transgender. However, the study found that the influence of identity disclosure on mental health depended on the disclosure setting. For example, people who disclosed their bisexual identity in healthcare settings, but not at home, were likely to report higher anxiety and depressive symptoms. Additionally, the study found that instead of measuring disclosure level in an individual setting, measuring identity disclosure patterns that consider how individuals disclosed across different social settings provides a more comprehensive understanding of the relationships between identity disclosure and mental health. For example, participants who were ‘mostly not disclosed’ across six social settings (i.e., at home, with family, with friends, in public, at work, in healthcare) had greater anxiety and depressive symptoms than those with the other three disclosure patterns (i.e., ‘mostly disclosed’, ‘least disclosed in familial or healthcare settings’, or ‘least disclosed in public or work settings’).

While Manuscript 2 did not support the association between identity disclosure in healthcare settings and mental health, a history of difficulty receiving healthcare because of their gender identity was found significantly associated with both disclosure in healthcare settings and mental health. The findings showed that people with a history of difficulty receiving healthcare because of their gender identity (i.e., stigma in healthcare) had (1) higher levels of disclosure in healthcare settings, and (2) greater depressive symptoms. To further understand how these findings relate to cervical cancer participation), there is a need to examine whether (1) people who have experienced stigma associated with identity disclosure in a given healthcare context (i.e., cervical cancer screening) are less likely to seek future care in those contexts, and (2) people who have experienced negative mental health symptoms (i.e., anxiety, depressive symptoms) related to stigma in healthcare, are less likely to seek preventive healthcare (i.e., cervical cancer screening).

Manuscript 3 (Chapter 4, RQ 3.1, 3.2)

RQ 3.1: What is the predictive relationship between identity disclosure and cervical cancer screening participation among bisexual adults?”

RQ 3.2: “What is the predictive relationship between mental health symptoms and cervical cancer screening participation among bisexual adults?”

Manuscript 3 was a cross-sectional descriptive study using web-based survey conducted to answer the two research questions. This study considered key personal/demographic characteristics identified in Manuscript 1 (i.e., education, income, insurance, employment, race/ethnicity, gender identity), when examining the relationships among identity disclosure, mental health symptoms, and cervical cancer screening participation among bisexual people.

Answer to RQ 3.1. Findings from Manuscript 3 concluded that identity disclosure was associated with cervical cancer screening participation among bisexual people. However, these associations were dependent on how identity disclosure was measured (i.e., level of disclosure in each setting, disclosure patterns, history of disclosure), and the cervical cancer screening participation measure considered (i.e., ever screened, screened up to date, intend to screen).

People who were ‘mostly not disclosed’ had significantly lower cervical cancer screening participation compared with people who had ‘some disclosure.’ Additionally, individuals who disclosed their identity at their last cervical cancer screening were more likely to be up to date on cervical cancer screening. However, the level of identity disclosure in each setting was not significantly associated with any cervical cancer screening participation measure. Also, identity disclosure (any method of measurement) was not associated with whether someone had *ever* screened for cervical cancer.

RQ 3.1 Discussion. Manuscript 3 included additional measures of identity disclosure (i.e., disclosure in bisexual-specific and cervical cancer screening-specific settings), that were not included in manuscript 2, which only assessed disclosure in 6 social settings. One additional measure was to identify participant disclosure status at their last cervical cancer screening. This measure considered whether identity disclosure (predictor) had occurred at the time of cervical cancer screening participation (outcome), allowing for a more accurate examination of the relationship between identity disclosure and cervical cancer screening participation. Expanding upon manuscript 2 which considered identity disclosure in 6 social settings (e.g., with friends), manuscript 3 further explored disclosure among friends by assessing how bisexual people disclose with friends who are bisexual, gay or lesbian, or heterosexual. Although the measure for manuscript 4 was more population-specific and exhibited strong psychometric properties, differences in terminology for identity disclosure settings between manuscript 3 (e.g. “at home” and with family”) and manuscript 4 (e.g., “close family” and “extended family) limit the ability for direct comparison.

Findings from manuscript 1 suggested that lesbian individuals were more likely to screen if they had disclosed their identity to a provider in any healthcare setting or with family. This study found that identity disclosure in any of the 8 settings (including in healthcare or with family) was not associated with cervical cancer screening participation for bisexual individuals, despite the additional measurement of disclosure in bisexual-specific settings. Manuscript 3 revealed that, among bisexual people, ‘mostly not disclosed’ pattern of disclosure was associated with reduced screening intention. In addition, disclosure at a past cervical cancer screening was associated with being screened up to date. Thus, Manuscript 1 and Manuscript 3 supported relationships between identity disclosure and cervical cancer screening participation for both lesbian and bisexual people. However, the methods of identifying this relationship differed between lesbian and bisexual people. In manuscript 1, identity disclosure among lesbian people was associated with cervical cancer screening participation when measured in a single setting (i.e., in healthcare or with family). However, findings from the manuscript 3 study suggest that, for bisexual people, examination of identity disclosure pattern and disclosure status at last screening are more effective measures of identity disclosure than disclosure level in an individual setting. To provide a deeper understanding of the effects of bisexual identity disclosure, future research should consider measuring disclosure reactions, as supported by the CSI-O theoretical model.

Answer to RQ 3.2. Findings from Manuscript 3 determined that mental health was associated with cervical cancer screening participation. However, the only significant relationship identified was between fear of stigma in healthcare and intention to screen.

Compared to those who reported no fear of stigma in healthcare, those who subjectively reported having fear of stigma in healthcare were significantly less intent to screen. While state depressive symptoms were associated with screening participation, the relationship became nonsignificant after controlling for age and education.

This study expanded on findings from Manuscript 2 that having a history of difficulty getting care due to gender identity (i.e., stigma in healthcare) was related to mental health symptoms (anxiety and depressive symptoms). In Manuscript 3, fear of stigma in healthcare (i.e., stigma-related mental health symptoms) was related to reduced cervical cancer screening intention. Thus, it is possible that stigma (past or anticipated) and mental health (fear, anxiety, and depressive symptoms) have a synergistic effect on screening intention. Therefore, fear of stigma had a significant effect on cancer screening participation, while anxiety and depressive symptoms did not. It is possible that bisexual people who have had past experiences with stigma, or who anticipate future stigma, may avoid settings where stigma is likely to take place, such as cervical cancer screening.[1] Thus, a better understanding is needed of how, and in what circumstances, bisexual-specific stigma can affect one's decision to participate in cervical cancer screening.

RQ 3.2 Discussion. Building on Manuscript 2, Manuscript 3 considered a person's mental health with relation to their past behavior (i.e., past cervical cancer screening participation), and included 4 additional measures to assess mental health (i.e., State Trait Anxiety Inventory – Trait, Maryland Trait and State Depression Scale, fear of stigma in health care). The addition of fear of stigma in healthcare, measured subjectively using self-report, provided direct examination of how stigma-related mental health symptoms were related to participation in healthcare, such as cervical cancer screening. Manuscript 3 additionally included trait measures of anxiety and depressive symptoms to consider how a participant's general (non-situational) mental health symptoms related to cervical cancer screening participation. To provide deeper understanding of the fear of stigma experienced among bisexual people who do or do not screen for cervical cancer, future research should include qualitative examination of these experiences among people with minoritized sexual identities.

Discussion of Findings

Both manuscript 2 and manuscript 3 identified ‘mostly not disclosed’ as a key pattern of disclosure associated with poor mental health. However, manuscript 2 addressed gender identity disclosure, while manuscript 3 addressed sexual identity disclosure. Manuscript 2 included individuals who identified with both bisexual and transgender identity, while Manuscript 3 included individuals with bisexual identity with any gender identity. The two unique gender identity disclosure patterns identified in Manuscript 2 (i.e., ‘low disclosure in public or work settings’ and ‘low disclosure in familial or healthcare settings’) might be related to unintentional disclosure (e.g., people in public and at work can tell they are transgender), or perceived risk (e.g., loss of housing or healthcare discrimination), of disclosing in certain settings (i.e., public, work, family, and healthcare). Seemingly combining these two patterns, ‘some disclosure’ of bisexual identity included low disclosure with extended family, work, strangers, and healthcare settings. Thus, there may be differences in how unintentional disclosure and perceived risk affect disclosure of gender identity vs sexual identity. Among bisexual people, nondisclosure may be related to perceived risk in some settings (e.g., extended family, healthcare) or perceived necessity in others (e.g., sexual identity is not often discussed with strangers or at work).

Differences in disclosure patterns identified in Manuscript 2 and Manuscript 3 could additionally be explained by differences in participant characteristics. Participants in Manuscript 2 were significantly younger than those in Manuscript 3 (24.24 years vs 31.23 years). Participants in Manuscript 2 were also disproportionately full-time students living with family, and may still be covered under a parent’s insurance. Risks of disclosure with family and in healthcare settings among these participants could thus involve greater consequences, including loss of housing and insurance, possibly explaining the distinction of ‘low disclosure in familial or healthcare settings’ in Manuscript 2. Although bisexual people disclose their sexual identity later in life than other sexual minorities, bisexual people who are also transgender may be required to disclose their transgender identity earlier in life in certain settings. Thus, transgender identity disclosure at work and in public may be required at a younger age than bisexual identity disclosure, necessitating a ‘low disclosure in public or work settings’ pattern.

Implications

Research Implications

The findings of this dissertation support the key relationships identified in the CSI-O model: identity factors (i.e., identity disclosure) predict psychological outcomes, and identity factors and psychological outcomes (i.e., mental health symptoms) independently predict behavioral outcomes (i.e., cervical cancer screening). While statistical methods identified predictive relationships (i.e., independent variables preceded dependent variables), they could not assert causality (i.e., independent variables directly caused dependent variables). However, strong statistical methods were employed to support the predictive relationships, including multiple regression analysis and statistical control of confounding variables, and theoretical support from the adapted CSI-O model. To better understand potential direct causal relationships between 1) identity disclosure and mental health, 2) mental health and cervical cancer screening participation, and 3) identity disclosure and cervical cancer screening participation, additional research is needed using methods that are appropriate to test causality (i.e., longitudinal design, or analysis with structural equation modeling).

While the dissertation concluded that fear of stigma was related to reduced cervical cancer screening intention, findings did not support relationships between mental health (i.e., anxiety and depressive symptoms) and past cervical cancer screening behavior (i.e., ever screened, screened up to date). While intention is often used to evaluate cervical cancer screening participation, past behavior can be a more accurate predictor of future cervical cancer screening behavior than intention alone.[2] Thus, additional research is needed to support the connection between cervical cancer screening intention and future participation. To better understand bisexual-specific predictors of cervical cancer screening participation, qualitative research is needed to provide an in-depth examination of how bisexual identity-specific factors affect one's intention to participate, such as bisexual identity-related stigma, or late-life recognition and disclosure of one's bisexual identity. Considering bisexual people are often older than lesbian people when they recognize and disclose their sexual identity, the effects of bisexual identity disclosure on cervical cancer screening may be dependent on a person's age and stage in the sexual identity formation and disclosure process.

Quinn and Earnshaw's CSI-O model provides additional theoretical support that the examination of bisexual-specific identity factors, including stigma, and self-perceptions of bisexual identity, may be important in predicting psychological outcomes (i.e., mental health symptoms), and behavioral outcomes (i.e., cervical cancer screening participation). A qualitative study could provide understanding about how experiences with bisexual identity manifest in mental health and cervical cancer screening participation.

Studies that include both bisexual and lesbian samples could provide additional perspective about how the factors predicting cervical cancer screening participation differ between the two groups. Future quantitative research that includes both lesbian and bisexual samples should consider analyzing findings for each sexual minority group separately, as sample sizes allow. This would provide direct comparison between lesbian and bisexual groups, to better recognize how key factors (e.g., disclosure with family, fear of stigma) affect cervical cancer screening participation in each lesbian and bisexual groups.

Manuscript 3 findings confirmed prior research that sexual minority individuals with a romantic partner were more likely to participate in cervical cancer screening. Yet, findings also indicated that bisexual individuals partnered with a man were more likely to screen than those with partners of any other gender identity. Bisexual people have unique experiences with stigma related to the gender of their partner(s), including assumptions that women who are currently partnered with women are lesbian, and not bisexual. This could explain why bisexual people in a relationship with a man were more likely to screen for cervical cancer in this study. However, additional research is needed to confirm the hypothesis of how the gender of one’s partner may predict cervical cancer screening participation.

Recruitment strategies for Manuscript 3 were successful in achieving the target sample, however the sample lacked racial/ethnic and socioeconomic diversity, and required significant effort to ensure a valid sample. Strategies included multiple venues (i.e., paper flyers, social media, Amazon MTurk), well-planned methods of fraud detection (i.e., Qualtrics fraud protection settings, unique screening links for each recruitment venue, two-step process for screening and data collection), and protection of participant anonymity. Study recruitment strategies were successful in reaching eligible participants and achieving the desired sample size. While the funding for this dissertation study did not support such robust methods, future studies might consider including Qualtrics Panels. This resource would allow for large-scale and targeted recruitment with the support of professionals trained in the recruitment of minoritized populations, such as bisexual people, with minimal effort from the researcher. This would improve the ability to achieve the target sample by eliminating the need to maintain recruitment via social media, where the potential for fraud increases the time and effort required. Additionally, future studies should include study flyers (paper or digital) which list any sexual identity terms that fall under the study definition of ‘bisexual’ (i.e., bisexual, pansexual, queer). This would provide clarification to increase the recruitment of bisexual people who do not use the term ‘bisexual’ when describing their sexual identity. The strategies used in this study may also be applicable in research of other concealable stigmatized groups. As minoritized populations are typically difficult to recruit, these strategies may support the success of future research of minoritized groups.

Practice Implications

This dissertation showed that past difficulty receiving healthcare due to stigmatized gender identity was related to poor mental health. In addition, fear of stigma in healthcare was found to be related to lower intention to screen for cervical cancer. Healthcare environments, particularly environments where cervical cancer screening is conducted, are often unwelcoming for people with stigmatized sexual and gender identities (i.e., pink waiting rooms in gynecology, assumptions about sexual and romantic partners). Thus, findings from this dissertation, including poor mental health among people who experienced stigma in healthcare settings where they disclosed, support the need to maintain healthcare environments where bisexual and transgender identities are acknowledged and affirmed.

This dissertation supports that a ‘mostly not disclosed’ pattern of bisexual identity disclosure, and fear of stigma in healthcare, both reduce intention to screen for cervical cancer. It is important to note that both mental health (i.e., fear of stigma) and identity disclosure (i.e., ‘mostly not disclosed’) were predictive of intention to screen, but not past screening behaviors. Interventions that facilitate future cervical cancer screening participation, such as automatic scheduling of follow-up cervical cancer screening, may be necessary to close the gap between screening intention and behavior. The finding that fear of stigma is related to cervical cancer screening intention suggests an opportunity to facilitate future cervical cancer screening participation. By ensuring the initial cervical cancer screening is provided in an environment where patients feel comfortable returning for future exams. To increase the likelihood of future intention to participate in cervical cancer screening, educational workshops can be developed to provide healthcare providers with increased awareness of best practices for the care of sexual minority individuals.

*Policy Implicatio*ns

To avoid further increasing cancer disparities among sexual minorities, it is important to support policies to protect equitable treatment for bisexual individuals, to promote research that reduces disparities in bisexual health, and to encourage mandatory training for healthcare providers and students to understand care needs of bisexual individuals. However, the United States executive office is actively seeking to erase bisexual, and other minoritized groups, from ongoing and future research.[3] Thus, to support increased cervical cancer screening participation for bisexual people, creative solutions are needed which can be made available to the general population. One such solution is at-home self-testing for cervical cancer screening.

At-home testing kits are available to support self-screening for cervical cancer and should be more widely available to support increased cervical cancer screening participation for bisexual people. Increased availability of free COVID-19 self-testing kits increased reported at-home testing and detection of COVID-19 illness between 2021 and 2022.[4] One study reported that at-home testing for cervical cancer screening via self-sample was an acceptable alternative to in-person testing for over half of sexual minority people sampled.[5] Internationally, initiatives offering at-home testing have significantly increased screening participation among individuals who had not previously screened routinely.[6] Policies within the United States to provide eligible citizens at the state or national level with at-home self-sample cervical cancer screening kits could improve screening participation for bisexual people. Such policies could reduce identity disclosure related fear, thus reducing the risk of healthcare stigma among bisexual individuals. While self-testing may be effective in improving cervical cancer screening for bisexual people, it is important to make efforts to address fear of stigma in healthcare, which could improve healthcare participation both within and outside of cervical cancer screening contexts. This could be addressed by supporting new and existing policies that provide protection from discrimination for stigmatized sexual and gender identities, such as health insurance nondiscrimination laws.

Conclusions

This dissertation is the first step towards understanding the unique needs of bisexual individuals in cancer screening. Prior research has failed to address the unique needs and characteristics of bisexual individuals, despite evidence to support that bisexual people are screening less and have worse outcomes than other stigmatized identities. By focusing on bisexual individuals, this dissertation identifies bisexual-specific differences in key factors for cervical cancer screening participation and provides a pathway toward individualized care. Perhaps even more important, it brings awareness to the unique needs of different sexual and gender minorities, and importance in recognizing how these differences (e.g., identity visibility for bisexual people with same or different-gender partners) may affect how people with differing sexual and gender minority identities make decisions about participation in preventive healthcare.

Tables & Figures

Table 5.1. Key relationships identified

Dissertation Chapter	Identity Disclosure	Mental Health Symptoms	Cervical Cancer Screening Participation	Considerations
Chapter 3	Gender identity disclosure	State anxiety State depressive symptoms		Disclosure setting (family, home) Disclosure pattern (mostly not disclosed)
Chapter 4	Sexual identity disclosure		Screened up to date Intention to screen	Disclosure context (last screening) Disclosure pattern (mostly not disclosed)
Chapter 4		Fear of stigma	Intention to screen	Mental health context (stigma in healthcare)

REFERENCES

1. Bostwick, W. B., & Dodge, B. (2019). Introduction to the special section on bisexual health: Can you see us now? Arch Sex Behav, 48(1), 7987. doi:10.1007/s10508-018-1370-9

2. Avishai, A., Conner, M., & Sheeran, P. (2019). Setting realistic health goals: antecedents and consequences. *Annals of behavioral medicine : a publication of the Society of Behavioral Medicine*, *53*(12), 1020–1031. doi:10.1093/abm/kaz012

3. Associated Press (2025, March 24). *Trump administration cancels at least 68 grants focused on LGBTQ health questions*. CNN Health. https://www.cnn.com/2025/03/24/health/lgbtq-grants-canceled/index.html

4. Rader, B., Gertz, A., Iuliano, A. D., Gilmer, M., Wronski, L., Astley, C. M., Sewalk, K., Varrelman, T. J., Cohen, J., Parikh, R., Reese, H. E., Reed, C., & Brownstein, J. S. (2022). Use of At-Home COVID-19 Tests - United States, August 23, 2021-March 12, 2022. MMWR. Morbidity and mortality weekly report, 71(13), 489–494. doi:10.15585/mmwr.mm7113e1

5. Reiter, P. L., & McRee, A. L. (2015). Cervical cancer screening (Pap testing) behaviours and acceptability of human papillomavirus self-testing among lesbian and bisexual women aged 21-26 years in the USA. The journal of family planning and reproductive health care, 41(4), 259–264. doi:10.1136/jfprhc-2014-101004

6. Racey, C. S., Withrow, D. R., & Gesink, D. (2013). Self-collected HPV testing improves participation in cervical cancer screening: a systematic review and meta-analysis. Canadian journal of public health = Revue canadienne de sante publique, 104(2), e159–e166. doi:10.1007/BF03405681