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Papanicolaou (Pap) Test and Human Papillomavirus (HPV) Test Adherence:
Sexual Violence Victims and Fear of Retraumatization

by

Murielle Sighe

Claremont Graduate University

2022

Approval of the Dissertation Committee

This dissertation has been duly read, reviewed, and critiqued by the Committee listed below, which hereby approves the manuscript of Murielle Sighe as fulfilling the scope and quality requirements for meriting the degree of Doctor of Public Health.

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ABSTRACT

Papanicolaou (Pap) Test and Human Papillomavirus (HPV) Test Adherence: Sexual Violence
Victims and Fear of Retraumatization

by

Murielle Sighe

Claremont Graduate University: 2022

Background: To include all vulnerable women population who faced barriers to participating in preventive cervical cancer screening, the public health community must better understand the factors that affect their decision for getting Pap and HPV tests. Public health must understand the sexual violence victims, a subgroup of women who faced the onset of trauma and explore their adherence to routine screening. This study investigated whether sexual women with a history of sexual violence (SV), likelihood to get screened for cervical cancer would be impacted given the fear of suffering from secondary trauma during conventional screening procedures.

Methods: Knowledge of cervical screening tests, and the prevalence of victims who indicated being afraid of getting flashbacks from past trauma, participation in Pap and HPV test was estimated using the 2018 BRFSS national survey. Connecticut and New Mexico were datasets used and major predictors in multivariable logistic regressions analyzing the odds of history of sexual violence trauma and cervical cancer screening.

Results: SV in lifetime HPV participants are significantly ($p < 0.001$) more likely (AOR = 2.08, CI = 1.46 – 2.95) to receive HPV test cervical screening compared to participants who did not

report past SV and SV in lifetime Pap women were twice as likely (p-value = 0.036) to participate in PAP testing (AOR = 2.15, CI = 1.05 – 4.41), whereas SV last 12 month HPV Women were less likely to have received cervical testing than those not reporting recent SV (AOR = 0.84, CI = 0.19 – 3.60) and SV last 12-month Pap women were less likely to have received cervical testing than those not reporting recent SV (AOR = 0.23, CI = (0.04 -1.10).

Conclusions: Notable findings were the difference in the likelihood of participation in either Pap and HPV test between lifetime SV who were more likely to get screened for cervical cancer, and last 12 month SV seemingly reported less likelihood participation in cervical screening.

Subsequent studies may elucidate why the difference in these patterns was observed and indicate which other factors might effectively-being considered impacting screening decision making and which ones are not. Understanding SV fear of retraumatization and insightful indicators can help practitioners to improve participation in cervical screening toward knowledge gaps and their causes.

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CHAPTER 1. INTRODUCTION

Background of Study

The primary cause of cervical cancer is the sexually transmitted human Papillomavirus (HPV), the most common viral infection of the reproductive tract. The American Cancer Society's estimates in the U.S. for 2022: About 14,100 new cases of cervical cancer will be diagnosed & 4,280 women will die from it (American Cancer Society, 2022). When caught early, cervical cancer is very treatable. In 2018, the US Preventive Services Task Force (USPSTF) recommended screening for cervical cancer every three years with cervical cytology (Pap test) alone in women aged 21 to 29 years. For women aged 30 to 65 years, the USPSTF recommended screening every three years with cervical cytology alone, every five years with HPV testing alone, or in combination every five years (US Preventive Services Task Force, 2018). However, in 2021, the National Cancer Institute (NCI) put in place the most recent recommended screening guidelines for cervical cancer: age group between 21 to 24 are not recommended to get screening compared to 2018, when they were required to get Pap test every 3 years (NCI Staff, 2021). Under the new guidelines, every 5 years with HPV test alone in women aged 25 to 29 years is preferred, but HPV/Pap co-test every 5 years is acceptable, and Pap test every 3 years is also acceptable, when in 2018 Pap test was required every 3 years (NCI Staff, 2021). For women aged 30 to 65 years, the NCI states screening every five years with HPV alone is preferred, or in combination with the Pap test is acceptable, but Pap test every 3 years is also acceptable, when in 2018, PAP test was required every 3 years (NCI Staff, 2021). For the last age range, 65 and older, the NCI states that no screening is necessary, if a series of prior tests were normal. There is more interest now in examining people who had an abnormal screening test result at an older age to see if they require more years of screening or more frequent screening (US Preventive Services Task Force, 2018;

NCI Staff, 2021).

Both the Pap and HPV tests consist of a doctor using a speculum to widen the vagina, examine the cervix, and collect a few cells from the cervix. Some women face barriers that prevent them from seeking preventive screening (Watson-Johnson, Townsend, Basile, & Richardson, 2012; Farid, 2019; Chivers-Wilson, 2006). One of these barriers is the fear of retraumatization- which is a conscious or unconscious reminder of past trauma that results in a re-experiencing of the initial traumatic event (Farid, 2019). It may be triggered by a situation, an attitude or expression, or a specific environment that replicates the dynamics (loss of power/control/safety) of the original trauma (Duckworth & Follette, 2012). Victims of sexual abuse may fear retraumatization when undergoing a gynecological exam, thus decreasing the chances of seeking cervical cancer preventive care.

According to the National Sexual Violence Resource Center (NSVRC), in the U.S., 1 in 5 women reported completed or attempted rape at some point in their lifetime. In other words, one in three women experienced some form of contact of sexual violence in their lifetime (Morgan & Kena, 2019). The percentage of persons who experienced rape or sexual assault, aggravated assault, or simple assault increased from 2015 to 2018 and the rate of rape or sexual assault increased from 1.4 victims per 1,000 persons aged 12 or older in 2017 to 2.7 per 1,000 in 2018. It is estimated that 734,630 people have experienced either threatened, attempted, or completed rape in the U.S. in 2018 (Pennsylvania Coalition Against Rape, 2021). Moreover, 81% of women who were raped reported significant short- or long-term impacts, such as post-traumatic stress disorder (Pennsylvania Coalition Against Rape, 2021) Most findings support the fact that sexual violence traumatizes women so greatly that they no longer seek a standard routine cervical cancer screening- a procedure important for their reproductive health (Farid, 2019). Female rape victims face more

complicated barriers than women who do not have past history with sexual violence to cervical cancer screening (Pap test , HPV test) because not only are their bodies considered as a piece of evidence of sexual assault, but they can also be retraumatized during gynecological exams such as Pap and HPV testing, which requires the insertion of a foreign body into their private parts (Haskell & Randall, 2019).

Previous studies assessing the different reasons that might affect a woman's decision to get cervical screening (Pap and HPV) reveal that a woman's comfort and confidence is crucial to understanding their willingness to get cervical screenings (Fiebig, Haas, Hossain, Street, & Viney, 2009). Other studies have extensively used qualitative (interviews, focus groups), quantitative (surveys) and randomized trials to assess willingness barriers, but there are limited studies on sexual violence's impact on female victims seeking routine gynecological care (Du Plessis, 2007). Hence, this study will focus on female sexual violence victims and their participation in cervical cancer screening.

Problem Statement

There is a public health concern of lower participation in cervical screening among sexual assault victims, with fear of secondary trauma associated with rape, i.e., an experience in physical assault, including vaginal/anal penetration cited as one of the reasons. HPV and Pap tests both consist of inserting a speculum into the vagina and collecting cells from the cervix – the lower, narrow end of the uterus that is at the top of your vagina (Office on Women's Health, 2021). The fact that cervical screening consists of a foreign object's insertion into the vagina is considered a triggering factor that can cause a rape victim to relive the past traumatic experience (Farid, 2019; Chivers-Wilson, 2006). Therefore, a Pap and an HPV test can lead to fear of retraumatization and prevent female victims from participating in cervical screening.

Since fear of retraumatization is associated with victims remembering trauma-related experience to the unwanted and forced sexual activities (Watson, 2016), this dissertation focuses on sexual violence acts that includes forced genital penetration. Forced genital penetration may impact rape victims' decisions to seek standard cervical screening, a method that some of them may consider as an intrusive re-experience and can lead to avoidance of secondary trauma (Gonzalez, Jetelina, Olague, & Wondrack, 2018). Survivors of sexual assault have higher rates of anxiety compared to the general population (Chen, et al., 2010). Further, anxiety and powerlessness have been cited as barriers when it comes to cervical screening Akinlotan et. al. (2017), found that anxiety about the procedure was the third most commonly agreed-upon barrier to cervical cancer screening. Cervical examinations that require inserting an instrument through the vagina and reaching the cervix area—including Pap and HPV tests—can be retraumatization triggers for sexual assault victims, reminding them about the previous sexual assault trauma (Farid, 2019). Due to a victim's fear of retraumatization, the current study aims to address a knowledge gap in the current cervical screening literature and examine whether past rape trauma decreases a victim's participation in cervical cancer screening, (Pap and HPV tests). Through this study, an alternative way of testing may be established to encourage higher participation from this vulnerable population.

Purpose of Study

The purpose of this study is to examine whether sexual assault might impact a female victim's willingness to undergo cervical cancer preventive screening consisting of Pap and HPV testing. This study investigates the association between history of sexual violence and the female victim's level of participation to routine cervical screenings.

Research Questions and Hypotheses

Pap and HPV tests both require insertion of an instrument through the vagina and reaching the cervix area, which may be a trigger for retraumatization in female sexual abuse victims who have experienced sexual violence with vaginal or anal penetration. Thus, this study will address the following research question: “Does female rape victims’ experience of sexual abuse impact their decision-making process with regards to getting routine cervical cancer screening?” Specifically, “Does a history of sexual violence predict participant willingness in routine cervical cancer screening consisting of Pap and HPV testing?”

The central hypothesis of the current study is that a history of sexual violence for women is associated with a decrease in getting Pap and HPV tests, as previous studies have indicated that a woman’s comfort and confidence is a major factor in her decision to get a gynecological examination.

Advancing Scientific Knowledge

Previous studies on sexual violence and its relation to the victim’s participation in cervical cancer screening have involved either both men and women, have focused on multiple cancer screening procedures (prostate, breast, and cervical), or have concentrated on one state using a BRFSS survey (Alcalá, Keim-Malpass, & Mitchell, 2018). Another study assessed the relationship between rape and cervical cancer screening participation using the 2014 Kansas BRFSS Survey; however, the data they analyzed only included the Pap test (Bosch, 2017).

Therefore, in the current study, we seek to advance current scientific knowledge by assessing the level of participation in Pap and HPV testing among women with a past experience of sexual violence, considering that these tests may trigger retraumatization. Considering the improvements made through health coverage and access to preventive care for these women, a

statistical analysis on datasets from BRFSS survey on two states was conducted. The hope is that the results of this study will not only be able to examine the relationship history of sexual assault and cervical cancer screening, but to also shed light to alternative testing methods that could be given to help this vulnerable population have a more comfortable experience (and higher participation) with these preventive screening procedures.

Significance of the Study

Cervical cancer was previously the leading cause of death for women in the U.S. Death rates have decreased due to regular cervical screening. However, populations that are not screening—such as victims of sexual violence—may have their health unknowingly deteriorating, becoming a major public health concern. Moreover, not knowing the impacts sexual violence can have on an adult’s participation in routine cervical cancer preventive screening can slow down the process of public health program participation and exclude the vulnerable population from fully accessing to services that might save their lives. It is crucial and relevant to public health delivery to provide recommendations that will increase rape victims’ willingness to get preventive screenings for cervical cancer and give them confidence to undergo said examinations.

One of public health’s core values is to allocate tools and services that will help all populations, especially the hard-to-reach populations, have access to health programs and services. Some groups of people may have difficulties when trying to access healthcare services or may feel unconfident about reaching out for healthcare services that they can benefit from and prevent them from being at risk for certain diseases and conditions. This study provides further understanding into cervical cancer prevention barriers of a specialized population, consisting of sexual assault female victims, who have been impacted by their past experiences of abuse. This further explanation highlights how adapting delivery of a service might bring positive change to seeking

behaviors among vulnerable populations and increase participation in preventive care campaigns, such as cervical cancer screening.

Rationale for Methodology

For this study, we used an assessment-based approach to evaluate the relationship between sexual violence and the female rape victims' participation in cervical cancer screening, more specifically Pap and HPV tests. When looking at data that provided us with critical demographics to study relationships that may exist between sexual violence and participation in cervical screening, we wanted to get access to data that contains information on both sexual violence victims and their participation in Pap/HPV testing. Knowing the status of the population of interest and the judicial protection from which they benefit (116th Congress (2019-2020), 2019) it was uncertain for us to have direct access to their information or their contribution. The other approach was to look for secondary data that provide de-identified information accessible for studies and cover a larger population. However, while searching the American data collection process, we found out that among all the surveys conducted in the U.S., BRFSS, the Behavioral Risk Factor Surveillance System, was the one at this point, to conduct a yearly nationwide survey and included questionnaire on demographic, cancer screening and on sexual violence (BRFSS, Behavioral risk factor surveillance system questionnaire, 2019). We used secondary data; therefore a statistical analysis approach was best indicated to predict the female rape victim's participation to the said tests. Based on what has been done so far, we had estimated that getting results from the statistical analysis provided information left unanswered by the extant literature and reduced the literature gap.

Nature of the Research Design for the Study

To examine whether past sexual assault trauma decreases a victim's participation in

cervical screening, we worked with the BRFSS datasets to investigate the associations between history of sexual violence and getting a Pap test and/or HPV test, while controlling for other predictors. Searching for secondary data that included the variables of interest was arduous, especially when looking for data that included information on sexual violence, the victims, and cervical screenings. Searching for national surveys with relevant data and under several recommendations led us to the BRFSS, the nation's premier system of health-related telephone surveys that collect state data about U.S. residents regarding their health-related risk behaviors, chronic health conditions, and use of preventive services (BRFSS Questionnaire, 2009). This national yearly survey consists of modules that not only assess demographics, but also allow each state to add questions that they found critical to evaluate their population and other phenomena. To help predict the level of participation in routine cervical screening, and after reviewing other studies, a statistical analysis that not only predicts a relationship between variables but can also be used for hypothesis construction and testing to validate assumptions is needed (see Figure 1).

To assess rape's impact on the female victim's medical decision-making and how an alternative screening approach to the standard cervical cancer screening can affect their decision to get a pelvic exam, we used a quantitative research approach. Further, we conducted various models of analyses to examine the "independent" influence of access to healthcare and healthcare providers on the associations, corrected for age, educational attainment, income, sex, and race/ethnicity.

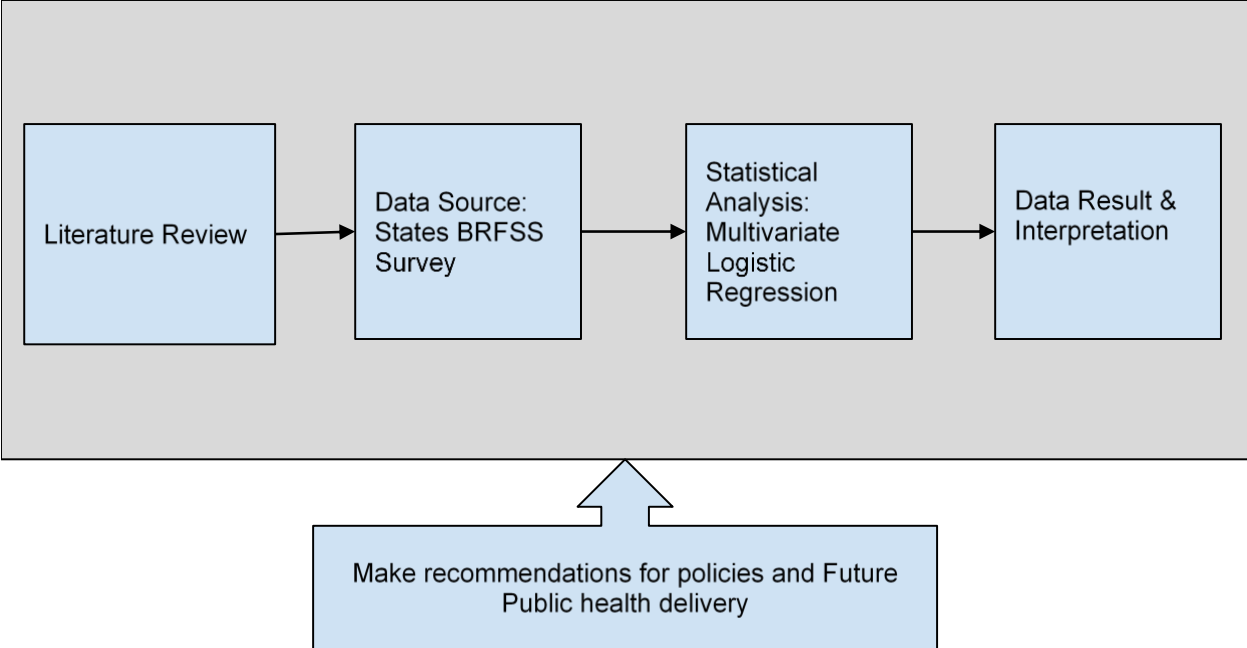


Figure 1: Conceptual Framework

Assumptions and Limitations

The assumptions of this study included that female rape victims face psychological barriers that might prevent participation in cervical cancer screening. Examining the impact of a sexual assault on a woman’s willingness to get a Pap or HPV test is essential for public health. With limited studies on sexual violence and its impact on a female victim seeking routine screening, this study aimed to shed light on barriers to participation in preventive cervical screenings from a group of women suffering from a traumatic past experience (Cadman et al., 2012). Additionally, exploring how an alternative method to delivering preventative cervical care might impact rape victims’ participation to cervical cancer screening may be beneficial to further research with actionable outcomes.

This study was limited to the use of secondary data from BRFSS. Since we had access to only two states’ data out of the eleven that met the requirements of our quantitative study, our statistical analysis was limited to the data from New Mexico and Connecticut. Furthermore, we

used the available modules and questionnaires that match our study population and outcome of interest from the 2018 BRFSS data. However, with fewer previous studies that have looked at the association between sexual violence and cervical cancer screening using BRFSS datasets, we acknowledged that each of the previous BFRSS studies have each used different survey year collections (Watson, 2016; Alcalá, Keim-Malpass, & Mitchell, 2018). Also, previous studies using BRFSS have been conducted using data collected from different states or only one state. We noted that cervical screening guidelines, health coverage and access to care are evolving and the recommendations that were made in 2004 or 2012 were different than those made in 2018. We then decided that this study would assess the association between rape and cervical screening using relevant information that were available in 2018 and compared with the findings of previous BFRSS studies.

Definition of Terms

Cervical Cancer Screening: The screening is looking for cancer before someone has the symptoms and is usually part of a woman's health checkup. There are two types of tests: the Pap test and the HPV test. For both, the doctor or nurse collects cells from the surface of the cervix.

HPV: HPV stands for human Papillomavirus and comprises a group of more than 200 related viruses, some of which are spread through vaginal, anal, or oral sex. Sexually transmitted HPV types fall into two groups, low risk and high risk. Low-risk HPVs mostly cause no disease. However, a few low-risk HPV types can cause warts on or around the genitals, anus, mouth, or throat. High-risk HPVs can cause several types of cancer. There are about 14 high-risk HPV types. Two of these, HPV16 and HPV18, are responsible for most HPV-related cancers (Understanding HPV and Pap Test Results).

HPV Test: Looks for cervical infection by high-risk types of HPV that are more likely to cause pre-cancers and cancers of the cervix. The test can be done by itself or at the same time as the Pap test (called a co-test) (with the same swab or a second swab), to determine your risk of developing cervical cancer. The American Cancer Society recommends a primary HPV test as the preferred way to screen for cervical cancers or pre-cancers in individuals 25 to 65 years with a cervix.

Papanicolaou test (Pap Test): The Pap test looks for cancers and precancers in the cervix. The cervix is the lower part of the uterus (womb), which opens into the vagina. the lab checks the sample for cancer cells or abnormal cells that could become cancer later (Dzuba, et al., 2002).

Rape: The U.S. Department of Justice defines rape as “the penetration, no matter how slight, of the vagina or anus with any body part or object, or oral penetration by a sex organ of another person, without the consent of the victim.” The federal government uses this legal definition to collect information from local police about rape (An Updated Definition of Rape, 2017).

Retraumatization: Retraumatization is the exposure to multiple physically and/or psychologically traumatizing events, such as multiple exposures to one type of traumatic event and/or multiple exposures to many different types of traumatic events (Lawson, Skidmore, & Akay-Sullivan, 2020).

Sexual Assault: Sexual assault is any type of sexual activity or contact, including rape, that happens without your consent. Sexual assault can include non-contact activities, such as someone “flashing” you (exposing themselves to you) or forcing you to look at sexual images (Sexual assault, 2019).

Trauma: Trauma is an emotional response that occurs as a result of violence, abuse, neglect, loss, disaster, war and other emotionally harmful experiences. Longer term reactions include unpredictable emotions, flashbacks, strained relationships and even physical symptoms like headaches or nausea. Trauma is a widespread, harmful, and costly public health problem and has no boundaries with regard to age, gender, socioeconomic status, race, ethnicity, geography or sexual orientation (U.S. Department of Health and Human Services, 2014).

Chapter 1 Summary

This chapter established that the level of participation to cervical cancer preventive screening, specifically PAP and HPV tests that requires the insertion of a foreign object to the vagina, of female victims of sexual abuse may be affected by their past traumatic experience and may trigger retraumatization. Examining the extent of this effect will shed light to possible alternatives that can favorably impact their approach to these tests. This study proposes to examine the association between a history of sexual assault and participation of the female victim to cervical cancer screening, as well as provide recommendations to facilitate their increased participation.

The remaining four chapters will describe this study's approach, go through an extensive literature review, provide details on the methodology, and finally provide ample information from the data collection, the data analysis to the data interpretation and recommendations. Chapter 2 consists of a thorough literature review of studies focusing on sexual violence victims and participation in routine cervical cancer screening among other vulnerable populations facing various barriers such as healthcare access, fear, and socio-economic status.

CHAPTER 2. LITERATURE REVIEW

Introduction

Cervical cancer is caused by the human Papillomavirus (HPV), the most common viral infection of the reproductive tract. Although effective preventive measures are available (Pap and HPV tests), some women face barriers that hinder their participation in his routine screening. (Defo & Domgue, 2020). One such population is women victims of sexual violence—defined as victims who have experienced sexual violence with or without vaginal or anal penetration. Many victims face long-lasting emotional trauma, including a lack of confidence and a fear of secondary trauma while attempting to participate cervical screening—an invasive procedure. However, there is little research available to develop effective interventions. This study’s goal was to fill gaps by investigating the impact of sexual violence on female victims’ participation in standard routine cervical screening (Farid, 2019).

Several vulnerable populations have been identified as having barriers to cervical screenings, including women from developing countries, women living in disadvantaged areas and those belonging to minority communities (Defo & Domgue, 2020). Additionally, barriers to pelvic examination have been observed among displaced or immigrant women and those among the transmasculine community (Markova, Sandal, & Pallesen, 2020) (Reisner, et al., 2018).Some of these women are dealing with factors that may limit them from seeking testing. Notable factors include socioeconomic status, beliefs, cultural influences, fear, health illiteracy, limited school attainment, and distrust in healthcare (Kobetz, et al., 2017; Shedlin, Decena, Mangadu, & Martinez, 2011).

A less studied population that has significant barriers to cervical screening exists among women who are victims of sexual violence. Although there is extensive research on multiple

vulnerable populations and the barriers, they might face regarding getting screened, there is a lack of research examining those with a history of sexual violence, especially studies assessing what might prevent victims from undergoing a Pap and HPV test. Some studies have investigated rape victims' confidence and trust in healthcare regarding gynecological examination and routine cervical screening (Farid, 2019). Other studies have examined rape victims' feelings and perspectives towards cervical screening and have indicated that this population is amongst the most vulnerable and are at higher risk of developing cervical cancer (Farid, 2019; Kappler, 2011; Jones, 2013). It is critical to investigate this topic in depth, in order to increase cervical cancer screening among a population at high risk of cervical cancer yet afraid of retraumatization. Further, investigating in depth would also provide more information and clarity to barriers and then identifying and addressing those barriers would increase uptake on cervical cancer screening, increase adherence to routine screening and overall reduce incidence of cervical cancer and early death.

This study took an explorative approach to assess how a history of sexual violence may impact a woman's participation in cervical cancer screening. Before we conducted the multivariable logistic regression analyses, a literature review was thoroughly conducted to look at previous studies conducted so far in our area of interest and look at similar phenomena and other factors that contribute to creating barriers preventing vulnerable populations from seeking preventive cervical screening.

Effect of Sexual Violence

Retraumatization is a conscious or unconscious reminder of past trauma that results in a re-experiencing of the initial traumatic event. It can be triggered by a situation, an attitude or expression, or by certain environments that replicate the dynamics (loss of power/control/safety)

of the original trauma (Duckworth & Follette, 2012). According to the National Sexual Violence Resource Center, NSVRC, in the U.S., 1 in 5 women and 1 in 10 men experienced completed, attempted rape or sexual coercion at some point in their lifetime at some point in their lives (National Sexual Violence Resource Center of America, 2011). Also, 1 in 3 women and 1 in 6 men in the U.S. experienced some form of contact sexual violence in their lifetime (National Sexual Violence Resource Center of America, 2011). Moreover, 81% of women and 35% of men report significant short- or long-term impacts such as Post-Traumatic Stress Disorder (PTSD) (Morgan & Kena, 2019). Also, according to the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5), PTSD involves a set of symptoms that develop in the wake of exposure to specific qualifying events, including sexual assault DSM diagnostic criteria for PTSD include four “clusters” of symptoms experienced in reaction to traumatic events (Dworkin, et al., 2019).

Reexperiencing symptoms involve persistently reliving the sexual assault, including nightmares, flashbacks, and intrusive memories. Avoidance symptoms include avoidance of trauma-related stimuli, such as situations that remind the survivor of the sexual assault, and sexual assault-related emotions, thoughts, and memories (Dworkin, et al., 2019). Anxiety has been cited as one of the barriers when it comes to cervical screening and one study stated anxiety and fear about the procedure was the third most commonly agreed-upon barrier (38.7%) (Akinlotan, et al., 2017), but there is no specific indication stating that anxiety was related to trauma or sexual assault.

Although not every woman who has been sexually victimized develops PTSD, there are certain psychosocial factors (e.g., abusive family members, abusive partners, child sexual abuse, overall levels of stress in women’s environment) that make women particularly vulnerable to developing PTSD and other forms of psychopathology (Chivers-Wilson, 2006). Furthermore, after an assault, the victims experience the Rape Trauma Syndrome (RTS), which affects not only victims of rape, but also victims of all types of sexual violence and would perhaps be better labelled

as Sexual Assault Trauma Syndrome (RAINN, 2008). In addition, some studies mention that from the initial assault trauma onset, secondary trauma can occur when victims seek assistance from medical or healthcare professionals. For individuals who are survivors of sexual assault, routine doctor's visits can bring with them added layers of stress, particularly cervix exams and Pap smears (Farid, 2019). These can be especially uncomfortable for sexual assault survivors because they require physicians to examine the sites where their sexual trauma occurred, which can be a triggering experience. Healthcare providers can face many barriers to screening patients for sexual trauma history, including lack of training, the frustration that they may not be able to help the patient adequately, and difficulty discussing this sensitive topic (Watson, 2016). Due to the negative perceptions of routine gynecological care amongst rape victims, those women are less likely to receive routine Pap smears and, therefore, at higher risk of developing preventable diseases, such as cervical cancer. The sensations associated with cervical exams are frequently referred to as retraumatization triggers for victims and survivors of sexual assault, inducing flashbacks, and other re-experiencing symptoms.

The research question for this study that seeks to find the association between a female's past sexual violence experience and their willingness to undergo Pap and HPV tests is since there is a lesser participation to gynecological exams in the said vulnerable population, yet the association to the fear of retraumatization has not been properly studied yet. We maintain that this association may be significant, and that once properly understood, alternative testing methods may be recommended to increase the female victim's confidence and willingness to undergo cervical cancer preventive screening.

Review of the Literature

I. Overall Studies on Vulnerable Groups of Women in the U.S.

a. Overview

While working on this dissertation, we started by reviewing the overall vulnerable women groups that previous studies were interested in assessing their participation in standard cervical screening, finding their barriers to screening, and improving their Pap and HPV testing experience in the U.S. using a self-screening test.

b. Minorities and Immigrants

i. Randomized Trials on Minorities and Immigrants Women in Florida

One study conducted a randomized controlled trial among 600 Haitian, Hispanic, and African-American women from the South Florida communities of Little Haiti, Hialeah, and South Dade amongst women aged 30–65 who had not completed a Pap smear screening in the past three years (Kobetz, et al., 2017). The participants were randomized into two groups: 1) HPV self-sampling delivered in-person (IP) by a Community Health Worker (CHW; IP+SS) or 2) HPV self-sampling delivered via US mail (SS+Mail). The study's approach was to examine the effectiveness of HPV self-sampling delivered via in person versus by US mail for medically underserved Hispanic, Haitian, and non-Hispanic Black women living in South Florida. Based on evidence that HPV self-sampling has previously been shown to increase cervical cancer screening among ethnic minority and immigrant women, the study's aimed to identify potential barriers that might prevent them from getting cervical screening. The study found that women faced barriers that include lack of trust, lack of knowledge, lack of health insurance and access, and cultural beliefs regarding disease prevention. It also found that mailed HPV self-sampling is an effective strategy to increase cervical cancer screening among underserved immigrant and ethnic minority women (Kobetz, et

al., 2017).

ii. Review of Medical Record Among Minorities Using Safety-Nets Care

A study found that women in safety-net institutions were less likely to seek available cervical screening, and one of the studies has examined HPV testing among patients in a clinic in Miami (Ilangovan, et al., 2016). The study consists of women who were offered HPV self-sampling or traditional Pap smear screening. The acceptability of HPV self-sampling among patients and clinic staff was assessed. If traditional screening was preferred the medical record was reviewed and a total of 180 women were recruited (134 Latinas and 46 Haitian). The study's objective was to know if the study participants would prefer to participate in cervical screening by choosing either the standard of care or using a self-test alternative-this is to evaluate whether an alternative would increase women's participation in cervical screening and reduce their barriers. The author found that for such populations, including immigrants and minorities, access to care, lack of insurance, no usual source of care, and lack of financial resources are repeatedly identified as significant barriers to routine Pap smear screening. From the study's results, the authors observed that of the 180 participants who were offered HPV self-sampling, 121 accepted self-sampling method of testing and all of them had it done (Ilangovan, et al., 2016). The study concluded that HPV self-sampling was feasible and had high acceptability among patients (Ilangovan, et al., 2016).

c. The Marginalized: Transmasculine Community

i. Self-Report Survey and Interview Study

One of the marginalized populations found across the literature reviewed included the transmasculine (TM) community who consist of individuals assigned the feminine gender at birth and have transitioned later in life. A study on TM people and self-sampling acceptability found that neither the 2016 American Congress of Obstetricians and Gynecologists (ACOG) cervical cancer screening recommendations nor the most recent 2012 U.S. Preventive Services Task Force

recommendations for cervical cancer screening address screening among TM individuals specifically (Reisner, et al., 2018). TM individuals are hard to reach and might often require a more advanced screening adaptation. Among the barriers that TM individuals might face, pelvic exams, including a speculum exam for collecting cervical screening specimens, can cause discomfort and worsen feelings of gender dysphoria among transgender individuals (Reisner, et al., 2018). However, in past research, TM individuals have expressed interest in alternative cervical cancer screening methods that do not require a speculum exam.

The study's method consists of 150 TM participants with a cervix (mean age = 27.5 years; SD = 5.7) who completed a one-time study visit comprised of a self-report survey, self-collected vaginal HPV DNA swab, clinician-administered cervical HPV swab, and brief interview on acceptability of clinical procedures (Reisner, et al., 2017). Participants were randomized to complete either self- or provider-collection first to minimize ordering effects. The study revealed in the exit interviews that the self-collected vaginal HPV swab was highly acceptable to TM participants, with over 90% endorsing a preference for a self- over-provider-collected swab (Reisner et al., 2018b). The study results also indicated that many TM participants indicated the importance of having alternative cervical cancer screening options and concluded that self-collected vaginal swabs are highly acceptable to TM as a means to test for HPV.

The same author conducted another study on the TM population but had a different method and purpose. The method of this study was a mixed-methods biobehavioral investigation enrolling 150 sexually active TM to (1) assess the clinical performance and acceptability of a vaginal self-swab for HPV DNA testing compared to provider cervical swab and cervical cytology, and (2) gather acceptability data on self-collected specimens for other Sexually Transmitted Infections, STIs (Reisner, et al., 2017). The study method consists of quantitative assessment, venipuncture

for syphilis testing and HIV testing, randomization, collection of biological specimens/biomarkers, participant and provider satisfaction survey, and qualitative exit interview. The result of this study has indicated that a less-invasive patient-centered strategy may also generalize to other at-risk TM populations that face barriers to routine cervical cancer screening.

ii. Mixed-Methods Study Among Transmasculine Community in Boston

A mixed-methods study (in-depth interviews and survey) study was conducted at Fenway Health, a Federally Qualified Health Center and research facility specializing in primary care for sexual orientation and gender identity minority people in Boston. The TM population, who are individuals who have a masculine spectrum gender identity, but were assigned female sex at birth, face barriers that might prevent them from cervical screening. The study identified that standard screening was a source of physical discomfort, was emotionally invasive, and provoked gender discordance, compared to using an alternative approach that promotes a greater sense of agency and control for the test takers (McDowell, et al., 2017).

iii. Discussion

Studies on TM individuals concluded that TM patients unwilling to undergo a standard Pap/HPV exam found that health providers should be able to present an alternative to TM patients that will make them more comfortable to participate in cervical cancer screening (McDowell, et al., 2017; Reisner, et al., 2017; Reisner, et al., 2018).

II. Rape Victims Barriers & Participation in Cervical Cancer Screening in the U.S.

a. Overview

Some studies have been conducted to assess under-screened population barriers to cervical cancer screening and self-sample acceptability, but limited studies are yet to be found on rape victims' willingness to get HPV testing and their self-sample acceptability. Looking at significant

databases, including PubMed, PsycINFO, Web of Science, and even searching through Google Scholar, only a few studies have been found to assess rape victims and willingness to get screened. However, the few studies that were retrieved provided information for this study's research questions and study method development. We found five studies and articles that assess rape victims' experience and its impact on their willingness to undergo cervical cancer screening. Among the five findings, we can count two scientific articles on rape and access to gynecological tests in the U.S. (Farid, 2019; Watson-Johnson, Townsend, Basile, & Richardson, 2012).

b. Barriers

i. Statistical Analysis Using Kansas 2014 BRFSS Survey

One of the studies conducted in the U.S. looked at the association between sexual assault among men and women with cancer screening behaviors, including cervical cancer screening. The study method consists of gathering data from the 2014 Kansas Behavioral Risk Factor Surveillance System. This survey is conducted annually via telephone. Kansas, like other states, has optional question modules that are administered as the state chooses to. A total of 13,356 respondents participated in the survey and were 21 years or older (i.e., the age at which cancer screening is first recommended). Of these, 11,207 had complete data for the sexual assault variables. The 2014 Kansas BRFSS included a sexual violence module that assessed the lifetime experience of sexual assault. Logistic regressions were used to calculate odds of ever engaging in specific screening behaviors (clinical breast exam [CBE], mammogram, Pap test, colonoscopy/sigmoidoscopy, fecal occult blood test and prostate-specific antigen [PSA] test) and current compliance with cancer screening recommendations (CBE, mammogram, Pap test, colorectal cancer screening, and PSA test), with lifetime sexual assault as the independent variables. Data from the 2014 Kansas Behavioral Risk Factor Surveillance System (BRFSS) survey and the data analysis consisted of

multivariable analyses as potential confounders using STATA. The study also found that a history of sexual assault was associated with lower odds of compliance with cancer screening procedure with the exception of colorectal cancer screening. Sexual assault was associated with 51% lower odds of PSA screening (AOR = 0.49, 95% CI = [0.25, 0.99]), 27% lower odds of CBE (AOR = 0.73, 95% CI = [0.58, 0.90]), 30% lower odds of completing mammograms (AOR = 0.70, 95% CI = [0.56, 0.87]), and 31% lower odds of Pap testing (AOR = 0.69, 95% CI = [0.56, 0.84]). Results from this study suggested that alternatives to currently recommended procedures, like self-collection of HPV or modified screening procedures may be a promising route to increase current compliance with cancer screening among a population that may avoid these procedures due to pain or fear of retraumatization (Alcalá, Keim-Malpass, & Mitchell, 2018).

ii. Multivariate Logistic Regression on History of Sexual Violence and Cancer

Screening from 2006 BFRSS

Another study also used information from the 2006 BRFSS data collected from 11 states and one U.S. territory to investigate the association between sexual violence victimization, including completed unwanted sex and cancer screening behaviors (Watson-Johnson, Townsend, Basile, & Richardson, 2012). The method used for the study analyzed data from the 2006 Behavioral Risk Factor Surveillance System Violence, SV, (BRFSS) from 11 states and 1 territory (U.S. Virgin Islands) that administered the Sexual Violence module to describe demographic characteristics, quality of life, health status, cancer screening behaviors, healthcare coverage, and use of healthcare services for 58,665 women and men who reported SV victimization compared to women and men who did not. Definition of having a history of SV for this study is adult respondents who answered yes to any of the following questions: (1) unwanted touching of sexual parts of the body within the past 12 months, (2) exposure to unwanted sexual situations that did not involve physical touching within the past 12 months, (3) unwanted sex at any time in their

lives, or (4) ever experiencing attempted unwanted sex. For this study, the statistical significance was determined using chi-square tests and multivariate logistic regression. The results suggested that sexual violence may have a negative association with general healthcare use, including breast cancer screening for women, and recommend that healthcare providers should consider sexual violence as a potential barrier for women who report not being up-to-date with mammography screening. Even though the study assessed the association between sexual violence and breast cancer screening, we found that it provides information on the effect that rape can have on victims' participating to cancer screenings (Watson-Johnson, Townsend, Basile, & Richardson, 2012).

iii. Online Survey via the National Association for People Sexually Abused in Childhood (NAPAC)

Moreover, the third study conducted in the U.S. consists of women visiting the National Association for People Abused in Childhood (NAPAC) website, who had been sexually abused, were invited to complete a survey on cervical screening. The questionnaire included closed questions on demographic characteristics and cervical screening attendance, open questions on barriers to screening, and the opportunity to submit suggestions to improve this experience for women who have been sexually abused. Content analysis was used to code responses to the open questions. This study suggested that intimate gynecological examinations can be incredibly stressful for women who have been abused because of the parallel situation such as perceived loss of control, the power disparity, and the physical sensation of the examination that can be triggering factors for retraumatization. Furthermore, the study identifies barriers to cervical screening attendance that can face rape victims, and some of them include (Cadman, Waller, Ashdown-Barr, & Szarewski, 2012):

- Self-worth: Women who have been abused reported to have feelings of “not physically

normal”, had “signs of abuse or trauma” , feelings of “shame” and “guilt” and there was even the idea that an abused woman's “sense of entitlement to good treatment has been taken away”.

- Power disparity: Abused women reported feeling vulnerable, like someone having control over them being “similar to the control that is suffered during abuse and feeling “like someone who have little choice over the test” and “it is not what I chose to do myself but what someone else is telling me I need to do”.

- Trust and safety: Some of the abused women reported problems disclosing that they had been abused and also how this might impact on disclosure: “too difficult to tell ... feel like nobody would understand safe”.

- Sexual victimization: Study participants compared their previous experiences with cervical screening being “exactly like it used to happen when I was abused” and one of them describe it as “legalized rape”. Abused women commented on the intrusive and invasive nature of the test and how they did not like to be “lying down exposed ... having somebody touch me in that area”.

- Sharing control: Some women wanted to be in control of their body and the procedure and requested to be able to say “stop” and walk away without feeling that they are being judged. Also, some wanted to be more involved in the procedure either by inserting the speculum themselves or doing their own smear with supervision and others requested a self-test that they might do in the privacy of their own home.

- Mechanism of the examination: The position of being laid back during the cervical screening reminded some of the abuse situation: “I hate being on my back while things are done to me” and noted difficulties with penetration “part of the abuse was to force things inside me, and this seems to be the same kind of thing”.

iv. Articles on Sexual Violence and Medical Visit Anxiety

One of the articles that addressed the association between rape victims and their participation in cervical screening also indicated that women who have experienced sexual violence or trauma are more likely to have anxiety about medical visits, particularly seeing a gynecologist and receiving a pelvic exam. The article also mentioned that some rape victims might be affected by post-traumatic stress disorder (PTSD), making them feel as though they are being re-traumatized by a pelvic exam, and a gynecologic visit or pelvic exam may feel insurmountable to them (Farid, 2019). A report on a general literature review from Australia stated that due to the absence of any direct evidence from the systematic review, a general review of the literature was performed to ascertain the effectiveness of cervical screening in women who had been sexually abused as children, 16 studies were identified.

v. Discussion

Across the literature review on studies conducted to assess women victim of rape willing to participate in cervical cancer screening, similar outcomes were found to address rape impact on the victims and improve their screening participation and experience. Results suggest that alternatives to the standard recommended procedures may be a promising approach to increase participation and adherence to cancer screening among populations that may avoid gynecological examination due to fear of retraumatization (Alcalá, Keim-Malpass, & Mitchell, 2018). Also, we found suggestions to improve the experience for sexually abused women; the screening procedure should focus on sharing control, meaning to let victims regain control over their bodies (Cadman, Waller, Ashdown-Barr, & Szarewski, 2012).

Learning how rape can affect women and influence their cancer screening attendance is crucial to increase their access to gynecological care and improve their experience during a cervical examination. Previous studies on the topic help this study design development and provide

direction on the approaches that might yield future studies information.

III. Sexual Violence Trauma and Participating in Cervical Screening

a. Overview

This section is about Papers on sexual violence trauma and its impact to the victims accessing cervical cancer screening, and their fear of retraumatization searched through various databases such as PubMed, WebofScience, PsycInfo, Google Scholar, without a year limitation. A total of relevant articles and dissertations that meet the searching criteria, including rape victims, retraumatization/secondary traumatization, and cervical or cancer screening, yielded three significant readings.

b. Sexual Violence and Trauma

i. Re-Traumatization of Sexual Trauma in Women's Reproductive Health Care

Watson (2016) assessed fear of the rape victims' reproductive preventive care and how health care providers can trigger retraumatization of previous sexual abuse through common women's healthcare practices such as pelvic examinations that resemble a patient's previous traumatic experience. The research Paper use database searches were conducted on PubMed, PsycINFO, ERIC, CINAHL Complete, and Cochrane Library using the following keywords: post-traumatic stress, sexual trauma, and childbirth, prenatal care, or pelvic exam. The author then selected relevant qualitative, quantitative, and review studies based on thematic material addressing presentation of posttraumatic stress symptoms in one or more of the four designated categories of female reproductive health care: gynecological care, prenatal care, labor and delivery, and postpartum care and the publication dates reflected in the literature chosen for this review ranged from 1992 to 2015. The dissertation compared how war veterans might experience a flashback to a conflict after hearing a car backfire; a similar situation might happen with rape

victims who can relive their trauma due to a trigger that mirrors their abuse, and such triggering factors can include lying supine. The study mentioned that PTSD symptoms that can be present in a woman who has been retraumatized were grouped into three categories: intrusion or intrusive-experiencing, avoidance, and arousal. The study also suggests that rape victims can suffer from sequelae, most severe in women who experienced completed, penetrative rape, longer duration of abuse, and childhood sexual abuse.

The study is a meta-analysis that looks at studies with interest in female reproductive care, rape victim and concludes that not only sexually traumatized women experienced gynecological care differently than non-traumatized women, but also that one of the most physical triggers encounters by sexual assault victims is the pelvic exams. It states that avoidance of gynecological care due to sexual assault victims' negative perceptions could lead to a lifetime of preventative care avoidance, and also that insertion of the vaginal speculum and/or fingers during vaginal examinations is often cited as a physical trigger that reminded women of their trauma.

ii. Fear of Secondary Trauma

Another scientific article: "The 'My Body Back' Clinic: a specialist cervical screening and sexually transmitted infection testing clinic for women who have been sexually abused" about sexual violence indicated that 1 in 5 women do not attend the cervical screening; among these are those who have experienced sexual violence (Zelin, Cadman, Amara, Marnoch, & Vosper, 2017). The article consists of women completing questionnaires before and after their appointment and prior to the appointment, they ascertain the women's expectations from the clinic visit, their anxiety levels and confidence in their ability to undergo a smear test. The study shows evidence that suggests sexually abused women may be at increased risk of cervical cancer and avoid healthcare, including cervical screening (Zelin, Cadman, Amara, Marnoch, & Vosper, 2017). Further, from

the study, a freelance journalist interviewed women who had experienced sexual violence, and a research nurse separately carried out a study in this group of women, researching access and uptake of cervical screening. After listening to rape victims and their fear of participating in cervical cancer screening, a clinic was launched to respond to victims' needs and demands (Zelin, Cadman, Amara, Marnoch, & Vosper, 2017). From the article, it was found that sexual assault victims wanted:

1. Disclosure of sexual violence
2. Safety
3. Trust, respect, and shared control
4. Communication-related to sensitivity
5. Understanding of common factors which potentially trigger adverse reactions including the procedure, and the clinic environment, which commonly parallel the situation during the sexual violence or subsequent medical examinations and time and space.

The article indicates that the clinic aims to meet the women's demands by ensuring a collaborative experience rather than one where the cervical screening examination has control over the victims.

iii. History of Sexual Violence and Cervical Cancer Screening

The study on history of trauma associated with a reduced likelihood of cervical cancer screening led by Farley tested the hypothesis that a history of sexual trauma was associated with a reduced likelihood of having had medically appropriate cervical cancer screening (Farley, Golding, & Minkoff, 2002). The study consists of a case-control study using mailed self-report questionnaires. The questionnaires were completed by an age-stratified random sample of adult women members of a large health maintenance organization. The sample included 364 women

who had received medically appropriate cervical cancer screening and 372 who had not. The result indicates that women who had been sexually abused in childhood were less likely to have had a Pap smear within the past two years. It also states that childhood sexual abuse remained associated with reduced odds of Pap screening in logistic regression analyses that controlled for clinic location, demographics, attitudes about Pap screening, and posttraumatic stress disorder symptoms. It was determined that the interpersonal climate between a clinician and the patient affects health outcomes. Therefore, it is a critical factor to improve women's comfort with screening and that it is crucial to develop an intervention that will increase the participation of women who have experienced sexual assault.

v. Discussion

These studies on rape victims, fear of retraumatization, and access to preventive women care to inform how rape victims feel and perceive a routine cervical screening to prevent chronic disease. Due to a past dolorous experience, rape victims might fear to come close to triggering factors that might make them react and re-experience their abuse and learning what contributes to the triggering effects can provide tools on how to address their condition and provide an alternative procedure to pelvic exam that will feel less invasive to their body.

c. Rape Victims and Qualitative Study Approach

i. Interviews for Studies on Rape Victims

One of the studies relevant to this study's target population used a qualitative approach on rape survivor and interviewing practices. It stated that face-to-face interviewing is a common data collection technique in violence against women research (Campbell, Adams, Wasco, Ahrens, & Sefl, 2009).

Campbell's study explains that before interviewing rape victims, the interviewer had to

follow two crucial steps: First, interviewers must learn about violence against women itself, and second, involves teaching how to administer the interview protocol itself. The study method consists of structured interviews with primarily open-ended questions of 102 racially diverse rape victims' sample, plus using tape-recording (Campbell, Adams, Wasco, Ahrens, & Sefl, 2009). During the interviews, the interviewers were requested to guide on how to interact with the survivors throughout the interview using emphasized feminist interviewing principles. They outlined six of the essential principles of feminist expectations, which are (Campbell, Adams, Wasco, Ahrens, & Sefl, 2009):

1. The emotional well-being of the survivors was always their paramount concern.
2. Women needed to be given time to tell their stories in their own words.
3. The interviewer needed to show patience and respect while the women's stories unfolded.
4. Interviewers needed to encourage the participants to ask questions, be prepared to answer their questions and engage in dialogue.
5. Interviewers needed to provide information to women that might have helped them understand or normalize their experiences.
6. The emotional tenor of the interview needed to reflect warmth, compassion, and understanding.

The results show that interviewers need to know about rape and its impact on victims. The study participants raised four factors that they wanted the interviewer to know while preparing an interview with a rape victim:

1. They wanted interviewers to know that rape happens to all kinds of women and that survivors show their emotions in different ways,
2. Rape has a devastating impact on multiple facets of women's lives, so interviewers need to

understand that recovery is a long journey, and they will be talking with women at very different stages of that process,

3. Interviewers need to be respectful of the differences between personal knowledge and learned knowledge, but both can help researchers appreciate survivors' lived experiences and,
4. Survivors wanted interviewers to use all this knowledge to help women feel comfortable in the interview.

This literature contributes to public health by showing that sexual violence victims' fear of secondary trauma may impact their cervical screening participation among studies conducted worldwide. From this literature review, we can see that a wide range of methods were used to not only assess the acceptability of an alternative procedure to the standard cervical screening, but also to assess if vulnerable populations, including sexual assault victims and their willingness to get a cervical screening using the standard physician assisted method or using a self-collection tool. Two of the studies reviewed here indicated that their methods included rape victims, both men and women. The first one used the Statistical Analysis Using Kansas 2014 BRFSS Survey in a study on women and men with a history of sexual violence and their participation to various cancer screenings (Alcalá, Keim-Malpass, & Mitchell, 2018). This study was able to explore sexual assault impact on decision to get a standard cancer routine and therefore contributed to the literature on assessing access to preventive care among sexual victims. The second study that focused on sexual victims and used data from the 2006 Behavioral Risk Factor Surveillance System Violence, SV, (BRFSS) (Watson-Johnson, Townsend, Basile, & Richardson, 2012). The study mentioned that except for mammography screening, there were no associations found among the other screening tests such as cervical screening and SV victimization in the multivariate models

(Watson-Johnson, Townsend, Basile, & Richardson, 2012). Watson also added that it is possible that some of the variables included in the multivariate model may have mediated the relationship between SV victimization and adherence to cancer screening, which would explain why their presence in the multivariate model rendered SV victimization insignificant (Watson-Johnson, Townsend, Basile, & Richardson, 2012). More research is needed to explore this hypothesis and understand the potential mediating relationships of the control variables and Sexual Violence victimization in understanding cancer screening behaviors.

This review also indicates a niche for research on the association between sexual violence and the level of participation in cervical screening. Through this literature, we found that some of them yield recommendations that can be considered to prevent a rape victim's fear of retraumatization, therefore giving a way for future studies in improving their access to preventive cervical cancer screenings.

Chapter 2 Summary

Previous studies on sexual violence and participation in cervical cancer have involved either both men and women, have either focus on multiple cancer screening procedures (prostate, breast, and cervical), or have concentrated on one state using a BRFSS survey (Alcalá, Keim-Malpass, & Mitchell, 2018). Other studies focused on childhood sexual violence trauma or conducted interviews approached a missing part that will focus on adult women with past sexual violence and their participation in exclusively cervical screening. Also, the two studies that closely match this study's aim, which is to assess the relationship between rape and cervical screening, are lacking some of the key components that will be included to this study methods and analysis.

The first one is based on the Statistical Analysis Using Kansas 2014 BRFSS Survey study that mentioned that in 2014 only the question about having Pap was included in the question about

having a cervical screening, and that the question about getting screened for HPV was added later in the most recent BRFSS survey (Alcalá, Keim-Malpass, & Mitchell, 2018). This study will use the cervical screening module questions which included both questions on having been tested for Pap and having been tested for HPV. Using both Pap and HPV test for dependent variable will allow our study to cover not only women who think they have received a Pap test, but also those who believe that they instead received a HPV test following 2018 cervical screening guidelines (since both Connecticut and New Mexico BRFSS surveys have been conducted in 2018), that USPSTF has recommended co-testing (Pap testing plus HPV testing) for women aged 25 to 65 years since 2020 (US Preventive Services Task Force, 2018). Second, based on the study that used Multivariate Logistic Regression on History of Sexual Violence and cancer Screening from 2006 BRFSS, as a recommendation and based on their results, they acknowledge that having control variables might mediate getting cervical screening by sexual assault victims (Watson-Johnson, Townsend, Basile, & Richardson, 2012). Therefore, it is recommended that more research is needed to explore this hypothesis and this study will look at control variables such as having a personal doctor and health coverage potential mediating relationships of sexual assault victims and cervical cancer screening behaviors.

CHAPTER 3. METHODOLOGY

Introduction

Rape victims—a population identified as vulnerable due to their past experiences with abuse—not only frequently have post-traumatic stress disorder (PTSD) related to the rape trauma, but also the fear of being retraumatized when they have to partake in activities that might remind them of their abuse (Watson, 2016). A gynecological exam, including cervical cancer screening, may be one of these activities. This study explored the impact that rape has on victims when it comes to get screened for cervical cancer using data from BRFSS to later provide recommendations to understand rape victims' willingness to get screened for cervical cancer.

Statement of the Problem

There is a public health concern of lower participation in cervical screening among sexual assault victims, with fear of secondary trauma associated with rape, i.e. an experience in physical assault, including vaginal/anal penetration being cited as one of the reasons (Chivers-Wilson, 2006; Carbon, 2012). HPV and Pap tests both consist of inserting a speculum into the vagina and collecting cells from the cervix – the lower, narrow end of the uterus that is at the top of your vagina. The fact that cervical screening consists of a foreign object's insertion into the vagina is considered a triggering factor that can cause to relive a traumatic past experience for rape victims (Farid, 2019). Therefore, a Pap and an HPV test can lead to fear of retraumatization and prevent female victims from participating in cervical screening.

Due to a victim's fear of retraumatization, the current study wanted to examine whether past rape trauma would impact a female victim's willingness to undergo cervical cancer cervical screening, i.e., Pap test or HPV test. Furthermore, this study we also explorer the association

between history of sexual violence and the female victim's level of participation in routine cervical screenings. Through this study, unanswered questions from previous studies were at some point addressed and clarity on future recommendations based on previous findings were established.

Research Question and Hypothesis

To examine whether past onset sexual violence might affect a victim's participation in cervical screening, Pap or HPV test, the current study used secondary data from BRFSS, the nation's premier system of health-related telephone surveys that collect state data about U.S. residents regarding their health-related risk behaviors, chronic health conditions, and use of preventive services. The associations between history of sexual violence and the female victim's medical decision-making of getting a Pap/HPV test was investigated while controlling for other major and other predictors: age, educational attainment, income, sex, and race/ethnicity. Therefore, the specific research's question this study addressed was: "Does a history of sexual violence predict participation in routine cervical cancer screening consisting of Pap and HPV testing?"

To find out and understand if there is relationship between the predictor and the outcome, we came up with the following null hypotheses (Alexopoulos, 2010):

1. *There is no statistically significant relationship between sexual violence and likelihood of getting routine cervical screening (Pap and/or HPV).*
2. *There is no statistically significant relationship between last 12-month sexual violence and likelihood of getting routine cervical screening (Pap and/or HPV).*

Alternative hypotheses:

1. *There is a statistically significant relationship between sexual violence and likelihood of getting routine cervical screening (Pap and/or HPV).*
2. *There is a statistically significant relationship between sexual violence and*

likelihood of getting routine cervical screening (Pap and/or HPV).

Research Design

The literature review indicated that previous studies on rape victims and retraumatization did not directly investigate how sexual violence impacts participation in HPV tests. Multivariable logistic regression analysis for this study allowed us to assess the impact of sexual violence and explore how abuse can affect the victims in partaking in a clinician-assisted pelvic exam, specifically a Pap test and/or an HPV test.

A multivariable logistic regression analysis in this study involved multiple variables resulting in two outcomes (HPV test and Pap test), used widely in many industries, such as the public sector and healthcare. Some of the advantages of using logistic analysis include that it considers more than one factor of independent variables that influence the variability of dependent variables, and the conclusion drawn can be more accurate. The multivariable logistic regression for this study was to:

1. Predict associations between variables: must be determined for the purpose of predicting the values of one or more variables based on observations made on the other variables.
2. Construct and test hypotheses: Specific statistical hypotheses, formulated in terms of the parameters of multivariate populations, are tested. This is to be done to validate assumptions and to reinforce prior convictions and,
3. Investigate dependence among variables: The nature of the relationships among variables is of interest to know if all the variables are mutually independent or are one or more variables dependent on the others.

Population and Sample Selection

This study focused on US female sexual violence victims and their participation in cervical cancer screening, specifically those from the states of New Mexico and Connecticut. Data from the BRFSS surveys from these states were merged to obtain adequate sample size for statistical analysis.

Instrumentation and Sources of Data

Using secondary data allowed us to get information that can later be used by researchers interested in learning about rape victims' experience and their perception of pelvic exams (HPV and PAP test). The BRFSS dataset will be used to conduct a regression analysis to determine if there is an association between a history of sexual violence and getting cervical cancer screening, specifically a PAP and HPV test.

The BRFSS survey consists of a core questionnaire with predefined modules that each state must use each year to administer the survey to their population. Additionally, this survey allows each state to add Centers for Disease Control and Prevention, CDC, optional modules that do not appear to finalize annual national survey statistics, and individual states have the option to add questions to their BRFSS questionnaires that are not currently part of the CDC core questionnaire or optional modules (BRFSS Questionnaire, 2009).

The current study used the CDC optional module "Cervical Cancer Screening" and the state-added "Sexual Violence" module. It is crucial to mention that concerning the stated-added sexual violence module, each state has the opportunity to either use the old official CDC Module 17 on sexual violence or adopt a version adapted from the old version. Both types of modules consist of questions that ask about participation in cervical cancer screening tests (HPV and PAP) and questions on sexual violence. The following were the specific questions asked:

Cervical Cancer Screening Module Questions

1. An HPV test is sometimes given with the Pap test for cervical cancer screening. Have you ever had an HPV test? (HUMAN PAPILLOMAVIRUS)
2. How long has it been since you had your last HPV test?
3. Have you ever had a Pap test?
4. How long has it been since you had your last Pap test?

Sexual Violence Module Questions

1. Has anyone, not just an intimate partner, EVER forced you into unwanted sexual activity after you said or showed that you did not want them to without your consent? (This includes any type of unwanted sexual activity, not just penetration).
2. In the past 12 months, has anyone HAD SEX with you after you said or showed that you did not want to or without your consent?

To get the datasets with the relevant modules for this study, a thorough search on the CDC websites and each state's public health department indicated that in the last five years, 11 states had integrated both cervical cancer and sexual violence modules during an indicated year. The different states that have used both modules included the following:

1. Arkansas, 2018
2. Maine, 2016
3. California, 2018
4. North Carolina, 2018
5. Oklahoma, 2019
6. New Jersey, 2017
7. New Mexico, 2018
8. Utah, 2018

9. Connecticut, 2018

10. Massachusetts, 2016

11. Montana, 2016

To gain authorization to obtain and use BRFSS states data, emails and phone calls were made to each of the 11 states to request access to the documents (codebook, dataset, and overview) that will be used to perform statistical analysis. Two states agreed to send datasets. After data request applications were filed, the two BRFSS datasets, both for the year 2018, were successfully received. The current study used the Connecticut BRFSS dataset 2018 (BRFSS Questionnaire, 2009) and the New Mexico dataset 2018 (Union, Socorro, Ana, Miguel, & Baca).

The National Statistics on Domestic Violence shows that rates of reported rape, physical violence, and/or stalking in their lifetime by sexual orientation found that 43.8% of lesbian women /26% of gay men, 61.1% of bisexual women / 37.3% of bisexual men, and 35% of heterosexual women / 29% of heterosexual men (National Sexual Violence Resource Center of America, 2011). It also states that the rates of reported sexual violence, physical violence, and/or stalking in their lifetime by race/ethnicity includes 45.1% of non-Hispanic Black women / 40.1% of non-Hispanic Black men, 37.3% of non-Hispanic White women / 30.3% of non-Hispanic White men, 34.4% of Hispanic women / 30% of Hispanic men, and 18.3% of Asian or Pacific Islander women / 13.7% of Asian or Pacific Islander men.

In the New Mexico 20th edition of the statewide sexual assault and domestic violence report, there were 1,524 criminal sexual penetration (rape) victims identified from the 1,443-law enforcement sexual assault reports in 2019 and of these, 1,158 (88%) were female victims (Caponera, 2010). Of the 1,303 reports of criminal sexual penetration that identified victim age, the greatest proportion of all victims was in the age group 13-18 (26%), followed by victims ages 19-25 (17%), 26-35 (16%), 7-12(12%), and 36-45(11%). From 2015- 2019, the age group with

the highest average proportion of rape victims were adults 18 and older (48%) followed by adolescents ages 13-17 (26%) and children under 13 years old (26%). Also, most rape victims identified by law enforcement are Hispanic, an average of 43% each year from 2015-2019, followed by Whites (non-Hispanics) (40%), Native Americans (12%), Blacks (4%) and other races (1%). In Connecticut, the sex crime statistics conviction from 2015-2019 indicates that sex offender convictions have averaged approximately 530 a year for the last five years, but in 2019, it increased to 523, closer to the average for the five-year period. There was a total of 2,651 sex crime convictions in Connecticut from 2015 through 2019 (Kirby, 2020).

The New Mexico BRFSS survey collected sexual violence data on the entire study population (N=6,713) and the Connecticut dataset collected data on half of the study population (N= 4,705). Both datasets also include demographic data, which are part of the core questions and include variables such as sex, age, race/ethnicity, income, and education attainment. Further, both datasets included an optional module on health care access and include the questions on health care coverage and access to a regular health care provider, therefore making the data accessible to conduct our statistical analysis.

While choosing the BRFSS survey and year of interest, this study's essential aspect was to analyze a survey that includes both modules, conducted the same year, and using the same questionnaire for the sexual violence module. After conducting a quick frequency analysis, the Connecticut survey yielded a sample of 351 over 2658 (13.2%) female adults (≥ 18 y) (Split 2), and the New Mexico sample yielded 444 over 3617 (12.3%) female adults who answered 'yes' to the sexual violence question. Connecticut BRFSS respondents were asked whether anyone, not just an intimate partner since they were 18 years old, ever forced them into unwanted sexual activity after they said or showed that they did not want to or without their consent, for example, they were drunk or asleep, or they thought they would be hurt or punished if they refused (BRFSS

Questionnaire, 2009). The New Mexico sexual violence questions were slightly different and asked respondents if anyone ever had sex with them after they said or showed that they did not want them to or without their consent.

Predictors were chosen according to Andersen's model of health service utilization (Andersen & Newman, 1973). We focused on the Individual Determinants of Health Service Utilization; it is an underlying model that assumes that a sequence of conditions contributes to the type of volume of health service a person uses is dependent on the predisposition of the individual to use services; the ability to secure services; and the illness level:

- **Predisposing Component:** The propensity toward use can be predicted by individual characteristics that exist before the onset of specific episodes of illness, but in this study, instead of an illness, we will consider an experience of rape.
- **Enabling Component:** A condition that permits a family to act on a value or satisfy a need regarding health service use is defined as enabling conditions that make health service resources available to the individual.
- **Illness Level:** represents the most immediate cause of health service use.

For this study, the predispositions variables were age, sex, race/ethnicity (non-Hispanic white, non-Hispanic black, and other (data on Hispanic respondents and other racial groups is combined because of small sample sizes). Enabling factors were educational attainment, health insurance coverage, and regular health care providers. Since this study was based on an experience, we did not consider the illness level.

Data Collection and Management

To obtain the dataset for this study, the data providers requested to sign for a data request, and each state provided us the right to use the data for this study's purpose only. We were also

required to use appropriate safeguards to prevent or disclose confidential information other than as provided by agreement. For each state, acquired data were used following the confidentiality and privacy agreements.

Data Analysis Overview

We conducted the logistic regression using SAS software to perform this study analysis. Given the dependent variable is any of the standard cervical screening (Pap and HPV), we wanted to make the dependent variable binary thus we had to eliminate all category 7 (Don't know/Not Sure) and 9 (Refused). After controlling for race, age, health care access, personal doctor, and education, we probably lost some observations, but still had enough for statistical analysis. We also had to transform age, race, education, and health care access to categorical variables. Also, for demographic characteristics, the 2018 survey weights variables were provided by the CDC. Since the sampling weight varies per dataset, we had the Connecticut datasets that used version 2 with the variable named `_LCPWTV2` which was collecting multiple version questionnaires (split 2) and the New Mexico Dataset named `_LLCPWT`, which used the same questionnaire version for all the survey participants (BRFSS Questionnaire, 2009).

The purpose of this research was to assess the likelihood of a sexual violence to participate in cervical screening. We wanted to know if rape victims who suffer from trauma due to history of forced penetration, might impact their decision to get tested for HPV and Pap. The research methodology consisted of conducting a logistic regression analysis, while using the BRFSS survey data that we received from two states, Connecticut, and New Mexico, which both had participated in the 2018 National Survey. Both datasets have included the optional module on sexual violence which asked questions on history of rape that included act of forced penetration that has occurred

without consent. The research question was to know whether rape victims' experience of abuse impacts their decision-making process regarding getting routine cervical cancer screening.

Our null hypotheses were as follows:

1. *There is no statistically significant relationship between sexual violence and likelihood of getting routine cervical screening (Pap and/or HPV).*
2. *There is no statistically significant relationship between last 12-month sexual violence and likelihood of getting routine cervical screening (Pap and/or HPV).*

Alternative Hypotheses:

1. *There is a statistically significant relationship between sexual violence and likelihood of getting routine cervical screening (Pap and/or HPV).*
2. *There is a statistically significant relationship between sexual violence and likelihood of getting routine cervical screening (Pap and/or HPV).*

This chapter provided a narrative of the sample characteristics and demographics of the participants in the study. We also provided validity and reliability of the data in statistical terms for the statistical analysis and discuss the limitations we found while conducting the data analysis and justified how the analysis aligned with the research question and hypotheses and was appropriate for the research design.

Data Analysis Procedures

The analysis first started by combining the datasets. New dichotomized variables with responses of 1 for Yes and 0 for No were to indicate participant's getting each or both Pap and HPV tests were created based on participant's responses to questions for each cervical screening test.

Second, some continuous variables were categorized in the analysis. Age was transformed into four groups based on the National Cancer Institute’s, NCI, recommendation for HPV and Pap tests. In the most recent cervical screening guidelines, the NCI indicated that the recommended range for cervical screening is now recommended from 25 to 65 years of age, and states that there is more interest now in looking at people who had an abnormal screening test result at an older age to see if they require more years of screening or more frequent screening (NCI Staff, 2021). Since 2020, women aged under 21 years old are not recommended anymore to get cervical screening (NCI Staff, 2021). The 2018 guidelines indicated that preferred testing was: between 21 to 24 Pap test every 3 years, between 25 to 29 Pap test every 3 years, between 30 to 65 Pap test every 3 years, HPV test every 5 years, or HPV/Pap cotest every 5 years, and for those aged 65 and above No screening if a series of prior tests were normal (NCI Staff, 2021). Therefore, we recoded age to:

Age Recorded
1-18 to 24
2-25 to 29
3- 30 to 65
4- 66 and up

The rest of recoded variables were changed to the following with ‘REFUSE TO ANSWER’ and ‘DO NOT KNOW’ to missing values and as follow:

HLTHPLN1REVISED (Health plan)

1-YES

0-NO

PERSDOC2RECODED (Personal doctor)

1-YES

0-NO

RACEREVISED

1- White

0- Non-White

EDUCAREVISED (Education attainment)

1-No college

2- College

INCOME2REVISED (Income level)

1-Less than \$75,000

2- \$75,000 or more

HADPAP2REVISED (Ever had a Pap test)

1-YES

0-NO

HPVTESTREVISED (Ever Had a HPV test)

1-YES

0-NO

SEXWCREVISED (ever had forced sex)

1-YES

0-NO

WHSEXWCREVISED (had forced sex the last 12 months)

1-YES

0-NO

Pap_HPV_Test (had PAP/HPV test)

1-YES

0-NO

Furthermore, to combine both **HADPAP2REVISED** and **HPVTESTREVISED**, we used the concatenate method to merge both variables and achieve only the single cervical screening variable that recognize if a survey participant had at least got one test, either Pap or HPV test, and we named the variable **Pap_HP_V_Test**. To obtain the **Pap_HP_V_Test** variable, which can be done by using the multiple if/then statement to recode the variables, we instead used the arithmetic function Absolute Right (Abs) formula as follows: **0.5* (PAPTESTREVISED + HPVTESTREVISED - Abs (PAPTESTREVISED - HPVTESTREVISED))**. The new variable **Pap/HPV** resulted in having code where a **YES** and a **NO** answer becomes a **YES, NO** and **NO** becomes **NO, SYSTEM MISSING** and **YES** becomes **YES** and finally, **SYSTEM MISSING** and **NO** becomes **NO**.

Third, we conducted logistic regressions to test the null and the alternative hypothesis, applying the sampling weight and the stratification variables. During the analysis, we found out that each state provider already applied the sampling weight to each dataset before they were combined into a single dataset for analysis. Also, we checked for the descriptive statistics, using unweighted data for the descriptive and the crosstab, and we found that some variables have many missing data that later render the regression model limited for analysis. We found that the combined data yielded a total of 17,422 participants (NM=6,713; CT=10,709). A total of 795 (8.3%) female survey respondents said that they have been sexually abused in their lifetime. See Table 4 for the summary.

According to the 2018 CDC weighting process, before weighting the data, a variable must be created with the calculated individual weight (BRFSS, Behavioral risk factor surveillance system questionnaire, 2019). In our case, each individual weight was already generated and

provided to us by each public health department. The sampling weight variable was added to the combined dataset and incorporated into the descriptive and regression analyses.

Furthermore, the missing data and small sample of female sexual violence victims for the 2018, which is the year of the data collection, made the analysis challenging. Some of the logistic regressions analyses did not converge due to the low cell frequency issue on some variables in the model resulting in some of the variables were dropped during the analysis.

Statistical Analysis

Unweighted frequencies and weighted percentage for selected major predictors and other predictors characteristics of the entire adult sample (n=17,422) and crosstabulation of HPV and Pap test participation across socio-demographic characteristics among female participants who reported ever having sexual assaults in their lifetime (**SEXWCREVISED**) are summarized in Table 2. Table 3 also presents crosstabulation of HPV and Pap test participation across socio-demographic characteristics among female participants who reported ever having sexual assaults in the last 12 month, sampled among the lifetime population (**WHSEXWCREVISED**). General sample characteristics are presented in Table 4 with unweighted total frequencies and column frequencies and weighted row percentage for the entire population. P-values were obtained by the second order Rao-Scott Chi-Square test for categorical variables.

We conducted the PROC SURVEYLOGISTIC procedure to examine the effect of sexual violence history on cervical cancer screening participation outcomes of interest in 2 models. Table 5 summarizes results from each model on the outcome Pap, HPV and Pap/HPV tests. Model 1 examines the *effect of lifetime history of sexual violence* on cervical cancer screening and the second model examines the *effect of last 12-month history of sexual violence* on cervical cancer screening.

We used SAS procedures for PROC SURVEYLOGISTIC to produce Adjusted Odds Ratio (AOR), with 95% confidence intervals (CIs). The Taylor series linearization approach with complex design features (i.e., strata, clusters, and sampling weights) provided by BRFSS survey was employed for variance estimation (Heeringa, West, and Berglund, 2017).

Model Building Phase

It is worth mentioning that one of the major predictors “Sexual violence in the last 12 months” had the most missing cases; perhaps subjects have yet to cope with this terrible experience and were not willing to mention it. In a first step, for each response variable, we subjected all the candidate predictors to regression analysis. For each of the response variables, we looked at the convergence notification and decided when to remove or add a predictor to conduct the regression further. While doing the analysis in SAS, we were informed when a selected model was not fitted. These were all signs that the fitting algorithm did not properly converge due to a quasi-separation. In other words, a set of the predictor levels somewhat separated the “Yes” and “No” grouping of the outcome variable. Although, this is purely a numerical problem it made the fitness of the model inappropriate. The large standard error values indicated some instability. For this data set, this problem occurred because 1) after removing the missing rows from the analysis the sample size was small, and/or 2) some predictors had too many categorical levels with low cell frequencies in some of these categories.

Refining the Selected Models

For a given response we selected the best possible according to the following three basic criteria:

- 1) The fitting algorithm must fully converge without any separation (complete or quasi). For quasi-separation, however, SAS issued some warnings to the user in some cases on models

fit. For these reasons, we always examined the magnitude of the coefficient estimates, corresponding standard errors, and estimated event probabilities to determine if the algorithm had fully converged. When the convergence of the fitting algorithm was satisfactory, we assessed the overall quality of the model using criteria 2) and 3) described below.

- 2) We examined the models associated with significant lack-of-fit test p-values (p-value < 0.05) were excluded.
- 3) With models with one of the major predictors statistically non-significant (Females who reported 'Yes' on WHSEXWCREVISED had relatively lower odds in HPV or Pap test participation), we still decided to report the result of the analysis. The fact that WHSEXWCREVISED sample is pulled from the SEXWCREVISED predictor also reduced the sample size.

Ethical Considerations

This is a quantitative research study using only secondary data with a signed and approved agreement from the data provider. The confidentiality of the agreement will be maintained within the dissertation committee. According to The Claremont Graduate University Institutional Review Board, this study qualifies as an exempt study, since the only involvement of human participants will consist of research involving the collection or study of existing data and documents, with the datasets publicly available and the information is recorded in such a manner that the participants cannot be identified.

DRPH Competencies

→DRPH-LM-1: Critically analyze an issue in health leadership, management, or policy and provide recommendations: Health leadership and management can review alternatives that can be used for gynecological exams to increase access to feminine care and improve rape survivors' confidence in a medical procedure.

→FC-DRPH-18: Education & Workforce Development Assess an audience's knowledge and learning needs: Learning from sexual assault survivors can inform how an alternative to gynecological exams can improve their confidence in undertaking the exam and whether using a self-sample collection kit can make future sample collection procedures more comfortable.

→ FC-DRPH-4 Leadership, Management & Governance Propose strategies for health improvement and elimination of health inequities by organizing stakeholders, including researchers, practitioners, community leaders, and other partners: From the results, we can show how future adopted strategies can improve access to gynecological exams for vulnerable populations, including rape survivors.

→ FC-DRPH-5 Communicate public health science to diverse stakeholders, including individuals at all levels of health literacy, for purposes of influencing behavior and policies: Further investigations and programs' implementations on how to improve specific medical examinations might be developed or enhanced for a more beneficial application and bring change to healthcare deliveries.

CHAPTER 4: RESULTS

Descriptive Results

Table 1 shows the crosstabulation of HPV and Pap test participation by females reporting a history of sexual abuse during their lifetime (8.3% of female participants). The table further breaks down test participation by various socio-demographic variables, including age, education proficiency, income, race, healthcare coverage, and attainment of a primary care physician. Females aged 25 – 29 recorded the highest rates of HPV test participation (weighted row % = 82.1%), followed by females aged 30 – 65 (73.2%) and females aged 18 – 24 (57.8%). Respondents aged 66 and above reporting a lifetime history of sexual assault were least likely (40.0%) to seek out HPV testing. These age-related trends differed slightly for Pap testing; for this type of cervical screening, 98.2% – 100% of participants reported seeking Pap testing for all age groups outside of the 18 – 24 years group, which reported a participation rate of 61.9% seeking Pap testing. Age group was a significant predictor of receipt of HPV testing ($p < 0.05$) for those reporting a lifetime history of assault. The Rao-Scott Chi-Square test was unable to yield a value for Pap testing or Pap/HPV as 98.2% – 100% of participants within the age groups of 25 to 29 and between 30 to 65 reported seeking Pap testing or Pap/HPV which resulted in almost no variations of the responses across the cross-tabulated categories.

For those reporting a lifetime history of assault, women identifying as white were significantly more likely to have received a PAP test ($p < 0.05$) or Pap/HPV test ($p < 0.05$) than non-white respondents, but not significantly more likely to have received only an HPV test (p -value = 0.970). Education status, income, health coverage, and acquisition of a personal doctor were not associated with significant variation in test participation for this subset of participants.

Like Table 1, Table 2 shows the crosstabulation of HPV and Pap test participation across females reporting sexual assault within the past 12 months. Due to almost no variation of the responses across the cross-tabulated categories, Rao-Scott Chi-Square tests failed to yield results for test participation categorized by age group and income level and failed to yield marginally significant results for education status (p-values = 0.121 – 0.451). The tests also failed to yield values for Pap testing and HPV/Pap testing participation because of the low cell frequencies, and HPV testing was not found to be significantly higher (p-value=0.998) in this group of participants. Women self-identifying as white (77.1% of participants) were marginally significantly more likely to report HPV test participation (p=0.058). For women reporting a recent history of assault, those with a primary care physician were significantly (p<0.05) more likely to have obtained an HPV test. Our analysis also shows a marginally significant (p-values=0.100) higher likelihood of participating in Pap testing and Pap/HPV testing for women under the care of a primary care physician.

With adjustment for other predictors, our models predict that females reporting ‘Yes’ on SEXWCREVISED will exhibit lower odds of HPV testing participation than participants reporting ‘No’ (p<0.001) (Table 3). For participants in this group reporting ‘Yes’, age group and education attainment (p-values<0.001) are significantly predicted to influence cervical screening participation odds. The odds ratio results change for respondents reporting ‘Yes’ on WHSEXWCREVISED, who are less likely to participate in cervical screening. The age group of participants reporting ‘Yes’ is only marginally significant as a predictor of cervical screening participation (p-value = 0.056).

TABLE 1. Crosstabulation of HPV and Pap test participation across socio-demographic characteristics among female participants who reported ever having sexual assaults in lifetime (**SEXWCREVISED**).

Major Characteristics	HPV TEST	Pap TEST	Pap/HPV Test	P-value
Sample state CT NM	151 (68.6) 215 (68.4)	337 (92.8) 427 (94.2)	340 (93.2) 430 (94.9)	HPV test P = .000 Pap test P = .976 Pap/HPV test P = .592
Age group 18-24 25-29 30-65 66 and above	17 (57.8) 23 (82.1) 279 (73.2) 43 (40.0)	20 (61.9) 33 (100) 523 (98.9) 175 (98.2)	23 (63.5) 33 (100) 525 (99.0) 176 (99.5)	HPV test P = .032 Pap test P = * Pap/HPV test P = *
Education Attainment Yes No	295 (67.3) 70 (72.3)	616 (92.2) 146 (96.0)	620 (67.4) 148 (92.6)	HPV test P = .512 Pap test P = .206 Pap/HPV test P = .159
Income level Less \$75,000 \$75,000 and up.	217 (69.2) 117 (73.8)	462 (94.7) 220 (96.5)	465 (95.0) 222 (96.9)	HPV test P = .475 Pap test P = .498 Pap/HPV test P = .471
Health coverage Yes No	343 (69.7) 22 (54.1)	725 (95.2) 38 (69.5)	731 (95.8) 38 (69.6)	HPV test P = .364 Pap test P = .190 Pap/HPV test P = .183
Personal doctor Yes No	309 (69.3) 57 (65.1)	657 (93.9) 107 (90.5)	662 (94.4) 108 (90.7)	HPV test P = .613 Pap test P = .447 Pap/HPV test P = .401
White (Race) Yes No	243 (68.1) 119 (67.8)	561 (96.9) 197 (85.6)	565 (96.9) 199 (87.0)	HPV test P = .970 Pap test P = .035 Pap/HPV test P = .058
<p>Note: Surveyed 17,422 participants (NM=6,713; CT=10,709). 795 (8.3%) female participants have been sexually abused in their lifetime. Unweighted Frequency (Weighted row %) Rao-Scott Chi-Square. CROSSTAB SEXWCREVISED*predictors*Cervical screening test. * No Rao-Scott Chi-Square Test yielded because of low cell frequencies. ** No value.</p>				

TABLE 2. Crosstabulation of HPV and Pap test participation across socio-demographic characteristics among female participants who reported ever having sexual assaults in the last 12 month among the lifetime population (**WHSEXWCREVISED**).

Characteristics	HPV TEST	Pap TEST	Pap/HPV Test	P-value
Sample state CT NM	3 (82.5) 11 (42.7)	9 (98.1) 15 (67.7)	9 (98.1) 15 (67.7)	HPV test P = .045 Pap test = .022 Pap/HPV test P = .022
Age group 18-24 25-29 30-65 66 and above	2 (65.3) ** 11 (63.9) 1 (100)	3 (75.9) 1 (100) 19 (97.3) 1 (100)	3 (75.9) 1 (100) 19 (97.3) 1 (100)	HPV test P = * Pap test P = * Pap/HPV test P = *
Education attainment Yes No	8 (52.9) 6 (70.3)	14 (71.1) 10 (92.9)	14 (71.1) 10 (92.9)	HPV test P = .451 Pap test P = .121 Pap/HPV test P = .121
Income level Less \$75,000 \$75,000 and up.	11 (45.9) 2 (100)	19 (89.5) 3 (100)	19 (89.5) 3 (100)	HPV test P = * Pap test P = * Pap/HPV test P = *
Health coverage Yes No	10 (64.9) 4 (64.9)	18 (100) 6 (100)	18 (83.9) 6 (100)	HPV test P = .998 Pap test P = * Pap/HPV test P = *
Personal doctor Yes No	10 (78.3) 4 (24.2)	17 (93.5) 7 (60.3)	17 (93.4) 7 (60.3)	HPV P = .022 Pap test P = .100 Pap/HPV test P = .100
White (Race) Yes No	8 (77.1) 6 (36.5)	15 (93.4) 9 (66.8)	15 (93.4) 9 (66.8)	HPV test P = .058 Pap test P = .111 Pap/HPV test P = .111
<p>Note: Surveyed 17,422 participants (NM=6,713; CT=10,709). 795 (8.3%) female participants have been sexually abused in their lifetime. Unweighted Frequency (Weighted row %) Rao-Scott Chi-Square. CROSSTAB SEXWCREVISED*predictors*Cervical screening test. * No Rao-Scott Chi-Square Test yielded because of low cell frequencies. ** No value.</p>				

TABLE 3. General Sample Characteristics. Surveyed 17,422 participants (NM=6,713; CT=10,709).

Major Characteristics	Overall	SV=Yes	SV=No	p-value	12 month SV=Yes	12 month SV=No	p-value
State CT NM	5402 6713	396 (8.7) 502 (8.2)	4248 (91.3) 5253 (91.8)	.518	16 (6.8) 22 (6.8)	380 (93.3) 480 (93.2)	.971
Age group 18-24 25-29 30-65 66 and above	603 492 6750 4019	51 (11.3) 40 (9.5) 601 (9.5) 192 (4.0)	437 (88.7) 351 (90.5) 5170 (90.5) 3380 (95.9)	.000	11 (22.7) 1 (1.7) 25 (4.4) 1 (0.2)	40 (77.3) 39 (98.3) 576 (95.6) 191 (99.8)	.056
Education attainment Yes No	7893 4179	710 (10.1) 185 (5.9)	6187 (89.9) 3285 (94.0)	<.000	24 (4.1) 14 (13.9)	686 (95.9) 171 (86.0)	.111
Income level Less \$75,000 \$75,000 and up.	6586 3566	544 (8.9) 249 (7.8)	5183 (91.0) 2967 (92.2)	.202	25 (6.3) 4 (6.4)	519 (93.7) 245 (93.6)	.975
Health coverage Yes No	11319 762	848 (8.6) 49 (7.9)	8903 (91.4) 577 (92.0)	.774	31 (6.8) 7 (6.1)	817 (93.2) 42 (93.9)	.849
Personal doctor Yes No	9906 2187	765 (8.8) 133 (7.7)	7820 (91.2) 1663 (92.3)	.387	25 (6.3) 13 (8.6)	740 (93.7) 120 (91.4)	.518
White (Race) Yes No	7665 4151	633 (9.2) 256 (7.6)	6127 (90.8) 3170 (92.4)	.102	22 (6.7) 16 (6.9)	611 (93.3) 240 (93.0)	.945
HPV TEST Yes No	2056 2608	366 (19.4) 220 (9.2)	1532 (80.6) 2157 (90.8)	<.000	14 (5.6) 11 (6.7)	352 (94.4) 209 (93.4)	.812
Pap TEST Yes No	5871 383	764 (14.4) 28 (10.6)	4644 (85.6) 306 (89.4)	.217	24 (4.8) 6 (11.4)	740 (95.2) 22 (88.6)	.246
Pap/HPV test Yes No	5897 374	770 (14.5) 24 (10.1)	4661 (85.5) 303 (89.9)	.159	24 (4.7) 6 (12.3)	746 (95.3) 18 (87.7)	.216
<p>Note: Surveyed 17,422 participants (NM=6,713; CT=10,709). 795 (8.3%) female participants have been sexually abused in their lifetime. Unweighted Frequency (Weighted row %) Rao-Scott Chi-Square.</p>							

Table 4 shows the adjusted odds ratios (AOR), along with their significance and uncertainty bounds, for predicted association between reported sexual assault and cervical screening participation. Female participants who reported a lifetime history of sexual violence are significantly ($p < 0.001$) more likely (AOR = 2.08, CI = 1.46 – 2.95) to receive HPV test cervical screening compared to participants who did not report past sexual assault. We also found that women who reported sexual violence in their lifetime were twice as likely (p -value = 0.036) to

participate in Pap testing (AOR = 2.15, CI = 1.05 – 4.41), and when it comes to Pap/HPV testing, the same group of women were twice as likely (p-value = 0.045) to take part in either one or both types of cervical screening tests (AOR = 2.3, CI = 1.01 – 5.25). Sexual violence falls away as a statistically significant predictor (p = 0.818) of HPV test participation when respondents were subsetted to only include those reporting sexual violence within the past 12 months; in fact, women reporting recent sexual assault are less likely to have receive cervical testing than those not reporting recent assault (AOR = 0.84, CI = 0.19 – 3.60).

Our models predict that education attainment is a significant predictor for cervical screening for participants with a recent and lifetime history of sexual violence; participants without a college degree reporting a more recent history of violence are predicted to be 4 times as likely (AOR = 4.18, CI = 1.14 – 15.2) to receive Pap/HPV and to receive Pap testing (AOR = 3.39, CI = 1.03 – 11.1) than those with college-level education attainment. This predictor changes when applied to those participants with a lifetime history of sexual assault; here, those with no college attainment of education are less likely to have received Pap/HPV screening (AOR = 0.62, CI = 0.41 – 0.95).

Self-identification as white follows a similar pattern as education attainment in predicting cervical screening participation. Our models predict that participants with a recent history of sexual assault were having significantly (p=0.004) greater odds (AOR = 7.74, CI = 1.88 – 31.7) of receiving Pap testing compared to the expanded group of participants reporting a lifetime history of assault (AOR = 0.57, CI = 0.37 – 0.88; p=0.012). White women reporting recent sexual assault were having significantly (p-value=0.009) lower odds to receive Pap/HPV testing (AOR = 0.22, CI = 0.07 – 0.69) than non-white women reporting recent assault.

For women reporting recent sexual violence, attainment of health coverage was found to be a significant (p-values = 0.002 – 0.003) predictor of receipt of Pap testing and Pap/HPV testing. Those reporting recent assault were more likely to have received combined HPV/Pap testing (AOR = 9.01, CI = 2.13 – 38.0) if they reported having health coverage, but less likely (AOR = 0.20, CI = 0.06 – 0.59) to have received only Pap testing, than those without health coverage.

For participants reporting a lifetime history of sexual violence, our model identified age group as another significant predictor ($p < 0.001$) of cervical screening participation, with participants aged 25 – 29 years more than 5 times more to undergo an HPV test (AOR = 5.71, CI = 3.07 – 10.6), more likely to receive a Pap test (AOR = 15.92, CI = 6.52 – 38.8), and more likely to receive Pap/HPV testing (AOR = 13.34, CI = 5.75 – 30.94) than those in the 18 – 24 years group. Participants aged 30 – 65 years were predicted to be over 3 times more likely to receive HPV testing (AOR = 3.22, CI = 2.14 – 4.84). They were also more more likely to receive Pap testing (AOR = 38.34, CI = 23.6 – 62.1), and to undergo Pap/HPV testing (AOR = 45.18, CI = 27.75 – 73.55) than participants in the 18 – 24 years age group. Participants aged 66 years or older were more likely to undergo Pap testing (AOR = 16.73, CI = 10.3 – 27.1) or Pap/HPV testing (AOR = 20.22, CI = 12.85 – 31.83) compared to participants aged 18 – 24 years, but only about half as likely (AOR = 0.53, CI = 0.34 – 0.83) to receive HPV testing. We must restate that due to the low cell frequency issue of the variables included in the models, results with the observed large odds ratios were not reliable and should be interpreted cautiously.

TABLE 4. Predicting association between sexual violence and participating in cervical screening using multivariable logistic regression.
 Surveyed 17,422 participants (NM=6,713; CT=10,709).

Outcomes	HPV TEST		Pap TEST		Pap/HPV TEST	
	Adjusted Odds Ratio (95% CI)	P-value	Adjusted Odds Ratio (95% CI)	P-value	Adjusted Odds Ratio (95% CI)	P-value
Major Characteristics						
Sexual violence in the last 12 month	0.84 (0.19-3.60)	0.818	0.23 (0.04-1.10)	.065	0.19 (0.03-0.98)	.047
Health coverage Yes Vs No	-	-	0.20 (0.06-0.59)	.003	9.01 (2.13-38.0)	.002
Education attainment No-college vs College	-	-	3.39 (1.03-11.1)	.043	4.18 (1.14-15.2)	.030
White Vs Non-White	-	-	7.74 (1.88-31.7)	.004	0.22 (0.07-0.69)	.009
Sexual violence in lifetime	2.08 (1.46-2.95)	<.000	2.15 (1.05-4.41)	.036	2.31 (1.01-5.25)	.045
Age group		<.000		<.000		<.000
25-29 yrs old vs. 18-24 yrs old	5.71 (3.07-10.6)		15.92 (6.52-38.8)		13.34 (5.75-30.94)	
30-65 yrs old vs. 18-24 yrs old	3.22 (2.14-4.84)		38.34 (23.6-62.1)		45.18 (27.75-73.55)	
66 yrs or older vs. 18-24 yrs old	0.53 (0.34-0.83)		16.73 (10.3-27.1)		20.22 (12.85-31.83)	
White Vs Non-White	-	-	0.57 (0.37-0.88)	.012	-	-
Education attainment No College vs College					0.62 (0.41-0.95)	.028
<p>Note: Major predicting variables in the logistic regressions are sexual violence (SEXWCREVISED) and last 12 month sexual violence (WHSEXWCREVISED) (sexual violence and last 12 month sexual violence “No” is the reference group). Other predictors (categorical) controlled in the logistic regression models are education, White (Race), coverage, personal doctor, income, and age. However, only displayed in the table are the predictors that fit the models and were at some point statistically significant. Those large odds ratios and wide confidence intervals were due to low cell frequencies.</p>						

CHAPTER 5: INTERPRETATION AND SUMMARY

It is critical to include innovative approaches to public health programs dissemination and to increase access to preventive programs to vulnerable populations. Hard to reach populations are part of the group of people who lack access to public health programs designed to improve their access to care, but who also might find it harder to participate in certain programs such as cancer screenings because of past dolorous experiences that might prevent them from taking part in receiving healthcare delivery.

This study was critical in exploring one of the vulnerable populations, the sexual violence victims, and their willingness to participate in cancer screening such as Pap and HPV testing. Studies found that vulnerable communities (e.g., minorities, immigrants, transmasculine) were already facing limited participation in cervical screening and those studies found that using an alternative to the standard cervical screening was well appreciated and willingness to participate was observed among the participants. One missing vulnerable group is the female rape victims, who while they might be facing barriers that prevent them from getting screened for the HPV virus, on top of that, are dealing with a history of sexual assault trauma, and there is a need to assess the willingness of those women to get tested, as well as to assess their perception of using a self-collected kit and the impact it can have on their decision to get routinely screened for cervical cancer.

This study was designed to assess rape victims' participation in cervical screening. We aim to fill a research gap by addressing a few different aspects integrated within the explorative nature of our study by also examining self-collection kit acceptability among the sexual violence vulnerable groups, and their participation in cervical screening both Pap and HPV. Since the initial goal is to assess the rape victim's participation to HPV and Pap tests, we decided that using a

secondary data was the most appropriate source of data. While searching for resources, we only found the BRFSS national survey which comprises the same the variables of interest on demographic, cervical cancer screening and sexual violence. Doing a multi regression analysis is great for conducting a hypothesis testing and for an explorative study like this one.

As stated at the beginning of this study, the problem was that sexual assault is a traumatic event that can affect sexual assault victims' mindsets and influence their everyday decision making (Chivers-Wilson, 2006). Because of past trauma, rape victims often find themselves feeling vulnerable in situations like cervical screening, that they deem too invasive or reminiscent of an abuse experience (Farid, 2019). The purpose of this study was to identify whether a sexual assault might impact a female victim's willingness to undergo a gynecological examination which includes Pap and HPV testing. Associations between history of sexual assault and female victim level of participation in routine cervical screenings were also examined. The central research question was to know if, rape victims' experience of abuse impacts their decision-making process regarding getting routine cervical cancer screening, and the main issue being researched was to know if experience with past trauma related to sexual violence has an impact in their decision to get a Pap test or HPV test.

Summary of Findings

From the literature review, we found another study that used BRFSS data to conduct their analyses. The study used the BRFSS 2006, with survey from 11 states and 1 territory that have included the sexual violence module (Watson-Johnson, Townsend, Basile, & Richardson, 2012). This is the first multistate population-based study to examine the association between self-reported sexual violence history and adherence to screening recommendations for breast and cervical cancer (Watson-Johnson, Townsend, Basile, & Richardson, 2012). Of all respondents reporting a history

of sexual violence, 75.7% were women (Watson-Johnson, Townsend, Basile, & Richardson, 2012). For the study, they used four questions which they considered to be the definition of sexual violence, meaning that respondents who answered yes to any of the following questions (Watson-Johnson, Townsend, Basile, & Richardson, 2012):

1. Unwanted touching of sexual parts of the body within the past 12 months
2. Exposure to unwanted sexual situations that did not involve physical touching within the past 12 months
3. Unwanted sex at any time in their lives,
4. Or ever experiencing attempted unwanted sex.

Then, the study examined the relationship between history of sexual violence and being up-to-date with a Pap test for cervical cancer within the previous 3 years among women aged ≥ 18 years, based on the USPSTF (Watson-Johnson, Townsend, Basile, & Richardson, 2012).

For the other study, which only focused on the PAP test, the dependent variables were comprised of measures of current compliance with cancer and lifetime screening based on 2014 screening recommendations by USPSTF (Alcalá, Keim-Malpass, & Mitchell, 2018). The Kansas 2014 survey respondents were coded as victim of sexual violence if they answered “Yes” to the following questions asked:

1. If they had ever received a particular screening procedure and then asked to indicate the number of years since they had received the procedure to determine if they were currently compliant with screening recommendations
2. If they ever had sex with you after you said or showed that you didn’t want them to or without consent?” (Unwanted sex included “putting anything into your vagina [if

female], anus, or mouth or making you do these things to them after you said or showed that you didn't want to" and included being unable to consent for any reason.

Further, compared to the previous studies using BRFSS, we wanted to explore the association between sexual assault that occurred in their lifetime with each of cervical screening Pap and HPV, and Pap/HPV. Our results after conducting the logistic regressions allow us to identify key information and to compare how participation in the Pap or HPV exam can be explored and understood. We used three different models to grasp all the information that can enable us to summarize our data and to test our hypothesis. With our main predictors at this point which are 'lifetime sexual violence (SEXWCREVISED) and 'last 12-month sexual violence (WHSEXWCREVISED), we were able to observe critical differences between those who reported having been a sexual violence victim in their lifetime, and different levels of age and income. Because the survey was weighted to be representative of the adult population of Connecticut and New Mexico, demographic characteristics are consistent with the study population.

Pap Testing and Sexual Violence

Our results have indicated that women who experienced sexual violence in their lifetime are approximately 2.5 times more likely to do the Pap test than women who did not experience sexual violence, meaning that the data provides strong evidence that lack of participation in Pap test might be associated with effect of sexual violence on victims' decisions to participate to cervical screening. From this result, we found out that sexual victim's status does not adversely impact their decisions to get the Pap test, instead, they seem to be more willing to get screened than women who did not experience sexual assault. This result can be compared to Alcala's BRFSS study who found that victims of sexual assault in their lifetime sexual assault was not associated with odds of Pap test at 95% CI and suggested that the sexual assault had a negative impact on

current compliance- but not with the pattern for lifetime screening with higher odds of screening for some cancer screening which includes the Pap test (Alcalá, Keim-Malpass, & Mitchell, 2018).

We also found that among sexual violence that happened the last 12 months, the participant had a 77% lower likelihood to get a Pap test even though it was not statistically significant, but education, health coverage and race were significant. We might suggest that the more recent a sexual assault is, it might make it more challenging for the victim to seek cervical screening when time is due for the recommended screening. We can also suggest that maybe the last 12 months does not correspond to the due time for the Pap test as recommended by the USPTF which might explain the lower participation likelihood. Further, Alcalá's study also found that even if odds of lifetime cancer screening for Pap were not associated with odds of Pap test, odds of lifetime cancer screening for cervical cancers increasing age was associated with higher odds of cancer screening (Alcalá, Keim-Malpass, & Mitchell, 2018), which seems to be similar to our results showing that although lifetime sexual assault victims are more willing to get Pap testing, we found that the group of women aged between 30 to 65 years old were the most likely to get Pap testing (AOR = 38.34) compared to women aged between 18 to 24 age old. However, this might be explained by the USPTF guidelines, that recommended in 2018 that women aged between 25 to 65 to get Pap testing every 3 years (NCI Staff, 2020).

Another study found no significant differences in cervical cancer screening test use between sexual assault victims and non-victims (Watson-Johnson, Townsend, Basile, & Richardson, 2012). Instead, the study found that women who reported sexual assault victims were slightly more likely to be up to date with the Pap test compared to nonvictims (85.6% vs. 84.3%, respectively). Compared to Alcalá's study who examined the association between sexual assault victims aged 21 years and above and current versus lifetime cervical screenings, Watson-Johnson

examined the association between sexual assault victims and being up to date with the Pap test for cervical cancer within the previous 3 years among women aged at least 18 years (Watson-Johnson, Townsend, Basile, & Richardson, 2012). Watson-Johnson explained that women who have experienced sexual violence undergo a sexual assault forensic examination immediately making Pap tests a part of their personal health maintenance (Watson-Johnson, Townsend, Basile, & Richardson, 2012). However, our results suggest that lifetime sexual assault victims are more likely to get screened for Pap test controlling for age and education.

Alcala across his study models identified education as the most consistent predictor of cancer screening (Alcalá, Keim-Malpass, & Mitchell, 2018) and indicated higher educational attainment was associated with higher odds of lifetime cancer screening and current compliance with cancer screening guidelines. In our case, education is also statistically significant and associated with lifetime and last 12-month sexual violence and Pap and Pap/HPV. Our results also indicated that in lifetime sexual violence, no-college women had a 38% lower likelihood to get Pap/HPV testing, but also indicated that with the last 12-month sexual violence, education is also associated with no-college attainment and a higher likelihood to get Pap and Pap/HPV testing. Our results indicate that long-term compliance might be associated with education on preventive care and that current compliance likely observed with the last 12-month sexual violence group may correspond to an initial exam that might have happened after the sexual assault occurred.

HPV Testing and Sexual Violence

None of the previous studies that addresses sexual assault victims using BRFSS and cervical screening participations explore the HPV screening test. In our study, controlling for age only, we found that women who did experience lifetime sexual violence are approximately 2 times

more likely to do an HPV test than women who did not experience sexual violence, meaning the data provides strong evidence that lack of participation in HPV testing is less prevalent among women who have experienced sexual violence compared to women who did not experience sexual violence. Checking for the controlling variable, we found out the results provide strong evidence that participation in HPV testing is more prevalent among women between ages 25 to 29 and 30 to 65. The results of the population aged between 25 to 65 corroborate the 2018 cervical screening guidelines that required women in that age group to get tested for HPV alone or jointly with Pap every 5 years (NCI Staff, 2020). Additionally, women aged between 30 to 65 and those aged between 18 to 24 in 2018 were recommended to get HPV test every 5 years, or HPV/Pap cotest every 5 years (NCI Staff, 2020). The age group between 18 to 21 and 65 and older were not required to get tested for either HPV or Pap, especially if prior test were normal (NCI Staff, 2020) which might explain why these groups of age are less likely to get screened than the other age groups.

Cervical Cancer and Sexual Violence

The third model was used to explore the association between sexual assault and cervical cancer screening consisted of age, education, race, and health coverage. Based on previous studies that have used the BRFSS dataset and the sexual violence module, one of them was able to get a larger sample (2006 BRFSS survey) that was conducted on 11 states and 1 territory, while the second study used an only a BRFSS data from one state (Watson-Johnson, Townsend, Basile, & Richardson, 2012) but used a gender inclusive approach and conducted analysis on multiple cancer screening tests (mammogram, Pap, prostate, Pap test).

Discussion

This study advances the research on participations to cervical screening for cervical cancer prevention by performing data analysis that comes to add on previous studies that have assessed the relationship between history of sexual assault with unconsented penetration and participation in Pap/HPV screening tests. Pap along with HPV testing are both screening approaches that can be used by itself or together to collect specimens that can identify cells responsible for cervical cancer. By using both tests, we can assess participation in either one of the tests, both tests, which tests was the most taken, and if neither of both tests were undergone. The second test that explored the relationship between the sexual violence victims and their participations in cervical screening mentioned further study on looking at the direct effect of health plan coverage- we added this component in our study to advance the field, in addition to the effect of having a personal doctor, age, and race. We were interested in examining access to a health plan because cervical screening is covered by any health coverage including both Medi-Cal and Medicaid as a preventive women care measures. However, from the analysis, it was a predictor that only explained last 12-month sexual victims' participation to HPV testing and was not part of the rest of the models. We decided to look at other predictors' effect and since we considered that having a health plan coverage and at least one personal doctor might influence participation in Pap/HPV test, both factors were instead dropped from most of the models during the analysis as they ultimately were not relevant to our study's approach.

Following the CDC guidelines (*New ACS Cervical Cancer Screening Guideline - National Cancer Institute, n.d.*) indicating when a woman should get screened, we were wondering if being covered and having access to a personal doctor will impact sexual assault victims but found otherwise that health coverage was dropped from all of our analysis. Our first alternative

hypothesis states that there is a statistically significant relationship between an individual being a victim of sexual violence (rape) and getting routine cervical cancer screening (Pap and/or HPV) and we found that sexual assault victims were more likely to get tested than women who have not experienced rape, indicating that sexual assault impacts the victim's participation to cervical screenings. This is critical because it indicates that indeed trauma-related sexual assault positively impacts the victims to get tested for cervical cancer.

Looking further, we wanted to understand access to cervical screening to find if the HPV and the Pap tests were available to those who wanted to get tested whether they have health coverage and if not, if they had the opportunity to get tested through a third party for women with limited financial means. For Medicare, we found that as part of the pelvic exam, Medicare covers a clinical breast exam to check for breast cancer. Medicare part B covers Pap tests and pelvic exams to check for cervical and vaginal cancers and if one is at a high risk for cervical or vaginal cancer, or of child-bearing age and had an abnormal Pap test in the past 36 months, Medicare covers these screening tests once every 12 months (*Cervical Cancer Screening Coverage*, n.d.). Medicare Part B also covers Human Papillomavirus (HPV) tests (as part of a Pap test) once every 5 years if aged 30-65 without HPV symptoms (*Cervical Cancer Screening Coverage*, n.d.). Furthermore, there is no pay required for the lab Pap test, the lab HPV with Pap test, the Pap test specimen collection, and the pelvic and breast exams if one's doctor or other qualified healthcare provider has an agreement to be paid directly by Medicare (*Cervical Cancer Screening Coverage*, n.d.). However, to be eligible Medicare, an individual must be entitled to receive benefit based on their own earnings or those of a spouse, parent, or child (CMS, 2021), which are quarters of coverage earned through payment of payroll taxes under the Federal Insurance Contributions Act (FICA) during the person's working years (CMS, 2021). It may happen that your doctor or other

health care provider recommends to get services more often than Medicare covers and if this happens, out of pocket payment may be requested for some or all of the costs (*Cervical Cancer Screening Coverage*, n.d.).

Also, through Connecticut Medicaid, the Connecticut Early Detection and Prevention Program (CEDPP): Breast and Cervical Cancer, offers free statewide screening program for early detection of cervical cancer, a program for uninsured or underinsured low income women that allows them to get tested for Pap only for women ages 21-64 (*Connecticut Early Detection and Prevention Program (CEDPP): Breast and Cervical Cancer - United Way of Connecticut - 211 and ELibrary - Health Care Payment Assistance/Health Insurance, Health Issues*, n.d.).

Further, through the NBCCEDP, the CDC helps low-income, uninsured, and underinsured women gain access to timely breast and cervical cancer screening, diagnostic, and treatment services (*Cervical Cancer Prevention and Screening: Financial Issues*, n.d.). The cervical screening through the program, is administered within each state and the Centers for Disease Control and Prevention (CDC) provides support to each state program and includes both Pap and HPV tests (*Cervical Cancer Prevention and Screening: Financial Issues*, n.d.).

Moreover, coverage of cervical cancer screening tests is mandated by the Affordable Care Act (ACA) and if the insurance plan started on or after September 23, 2010, it is required to cover the recommended cervical cancer screening tests which included both Pap and HPV (*Cervical Cancer Prevention and Screening: Financial Issues*, n.d.). Even the self-insured (or self-funded) plans that pay employee health care costs from their own funds, these plans are governed by the Affordable Care Act (ACA), so most are required to cover cervical cancer screening (*Cervical Cancer Prevention and Screening: Financial Issues*, n.d.). We can also explain the difference in getting Pap and HPV test by remembering that the 2018 cervical screening guidelines

recommendations were to get Pap test only every 3 years for those aged between 21 to 29 years, and only recommended HPV test starting at age 30 to 65 every 5 years, or in co-test with Pap every 5 years (*New ACS Cervical Cancer Screening Guideline - National Cancer Institute, n.d.*).

Limitations

This study was conducted using datasets that were provided by the public health departments that have agreed to let us have access to the survey's responses. We were able to have access to two datasets from Connecticut and from New Mexico. To improve the dataset's representativeness, we decided to merge both datasets. Also, to increase frequencies, we considered the weight added to each participant and already computed by each state. However, working only on two datasets, and focusing on a limited target population which are the sexual assault victims, and dealing with the missing values, we must discuss some factors that might have contributed to this study's limitations.

One of the limitations we dealt with was the small target population sample. Because of the small sample, we ended with some logistic regression analysis that did not converge. The model summaries will indicate that iteration has been reached and that final solution cannot be reached. During the analysis, we eliminated some controlling variables such as plan coverage and having access to a personal doctor. Not being able to complete an analysis that could have provided us with a deeper understanding on the victim's participation in cervical screening and help us to explore the effect of having medical insurance coverage and access to a personal doctor during the decision of getting tested for Pap/HPV tests. Representativeness is one limitation that arises because the BRFSS survey only surveys a part of the population in each state per year. We are only using two surveys, which are from the states of New Mexico and Connecticut and those surveyed are limited to only residents who had landline telephones. BRFSS surveys are cross-

sectional in nature hence, we are unable to determine the causal relationship between rape victims and the use of cervical screening tests. Another limitation is that, per the results, they have indicated that sexual assault victims are mostly willing to participate in cervical cancer screening- but because this study is based on a national survey, we are lacking deep information on what makes them willing to participate in the Pap and HPV test. We do not know what factors contribute to their participation in an exam that have been proven by other studies to be reminiscent of past trauma, and therefore, prevents them from participating in the Pap/HPV test. Further, temporality is one of the limitations that pertains to our study. Not knowing when exactly the sexual violence occurred and when the cervical screening took place limits our study approach. It makes it challenging to understand if not getting test either for Pap or HPV is a result of history of sexual violence or just following guidelines to cervical screening recommendations and waiting time.

However, for this study, the methodology which consisted of combining the dataset to improve the sample size of our populations of interest and adding weight helped to increase each variable frequency and increased the reliability and validity of our results. Working with a small sample size and willing to generalize the results, our approach was the most appropriate and in conformity with the CDC BRFSS' survey analysis.

Recommendations and Future Directions

Many studies have used either quantitative or qualitative approaches to assess if vulnerable populations were presented with an alternative to the standard, but still found gap in the literatures that indicates that more can still be done to improve access to those who suffer from trauma-related sexual violence with forced physical penetration. No profound assessment on the sexual assault victims and their utilization of alternative cervical screenings were ever conducted. The alternative

in this case is the utilization of a self-collected sampling in lieu of using a clinician assisted cervical screening. There has been no in-depth information on how using a self-collection impacts their confidence, their willingness to undergo cervical screening, and the differences that they believe may or may not influence their choice to get screened without any medical professional assistance. So far, studies have explored the willingness to use self-collected HPV kit among vulnerable populations such as the transmasculine community, the immigrant population, minorities and the low income groups, but when it comes to rape victims, studies have reviewed data such as the national survey BRFSS from different years (Alcalá, Keim-Malpass, & Mitchell, 2018; Watson-Johnson, Townsend, Basile, & Richardson, 2012), and have recommended that use of alternatives to cervical screenings should be beneficial to raise cervical screening uptakes, but also to allow women with fear and trust issues to be willing to participate in routine cervical screening.

There are multiple key recommendations we can make: partnering with rape victims directly to obtain further insight to inform and improve research, using mixed methods to strengthen information gathering and permits researchers to understand how a self-kit impacts rape victims, and finally, to design policies and expand the field of study to not only explore self-collection kits but also examine access, utilization, education, and acceptability.

The first recommendation will be to hear from the female rape victims firsthand and receive insightful information. This study relies on secondary data BRFSS which is the only national data where we can find questionnaires on the demographics, the cervical cancer screenings, and questions on sexual violence. Further studies on rape victims and cervical screening participations should consider doing qualitative studies. Doing focus groups or performing interviews are great approaches to research that can yield perceptive information only available from rape victims. With an interview, we will be able to know how they feel when using a self-collection kit versus

the standard physician screening, and to know if this can have an impact on them participating in the screening and importantly, why. The literature is lacking rape victims' voices in what might help them to take part to routine cervical screening and improvement that a kit might bring their way in deciding which screening method they prefer and how it might affect their confidence in routine screening participation.

The second recommendation will consist not only of conducting qualitative interviews or focus groups, but also having further studies in mixed methods approaches. A mixed-method study with both qualitative and quantitative sharing the same power, also called concurrent triangulation design where results are used at the same time during the interpretation phase. A mixed method might help to get information that a qualitative approach alone might not be able to explore, but also enhances the studies' generalizability. Using both a qualitative method, e.g., interviews, and a quantitative method such as an experimental design with participants allocated to different groups in an experiment. Using a mixed method will also provide tools to the researchers to balance both methods' strengths and help outweigh the weaknesses that each method encompasses. We should not forget that rape victims are among the vulnerable group that can be hard to reach due to the protected status they benefit under federal and state laws and policies, but also because of the history of trauma that might prevent them from feeling fully comfortable while participating in a qualitative study, therefore, adding a quantitative approach can only help outweigh the disadvantages that might come while interviewing or conducting focus groups with the sexual violence participants. Using a mixed method will also help to resolve the issue of temporality, history of rape and history of due date for a cervical screening depending on their due date based on the USPTF recommendations. During interviews, researchers will be able to know when the rape happened, how they were, and when was their last visit (if any) for their cervical screening

and to know for those who have experience with the standard cervical screening if after a rape their willingness to participate in routine screening was affected, and later measure the impact of self-collected kit on the rape victim's participation's willingness. For this recommendation, a self-collection kit should be made available to the participants. Previous studies that have recommended using an HPV self-collecting device also have proposed using the latest kit which they believe will bring the most comfort to women facing willingness issues to participate in cervical screening. The literature indicates that a self-sample collection kit can reduce barriers that vulnerable women might face such as fear, challenging socio-economic status, and stigma (Rocha et Al., 2015). Further, different testing in different countries have indicated that self-sampling gives women the opportunity to get tested for HPV who might not feel comfortable lying on a table in a physician's office (Mahomed et Al., 2014). Retraumatization is a barrier that can be difficult to overcome for rape victims and was not cited in the literature as a barrier that a self-sampling kit can address. A self-collection can become an essential component/part of the healthcare system, and further studies on sexual and reproductive health can empower individuals and achieve public health goals to promote equitable and fearless access to care for women with history of trauma (Women Who Have Option of Using HPV self-sampling Kits More Likely to Seek Cervical Cancer Screening, New Analysis Finds| Department of International Health | Johns Hopkins Bloomberg School of Public Health, n.d.).

Conducting future mixed method study including a self-sample kit will yield information on how to improve access to cervical screening for women with history of rape but using a self-collection kit recommended by the literature is highly recommended. One of the recommended self-collected kits for HPV testing is one of the brushes made by the ROVERS Medical Devices, a company based in the Netherlands. This company designs and manufactures cancer screening

tools but also self-sampling devices. One of their brushes, the ‘Evalyn’ brush is used and cited in many studies across the world and has received a lot of attention from researchers especially in related studies (Ejegod et al., 2018) and used for the HPV Self-Collection Pilot Study conducted by Dr. Surendranath Shastri in Houston, Texas (Texas State HPV Self-Collection Pilot Study, n.d.). The Evalyn brush is an innovative brush, contrary to its predecessors, a newly designed HPV self-collected brush to ease its use for women and an easy, safe, and reliable method of collecting vaginal/cervical specimens without discomfort. The brush features soft and flexible hairs that can collect sufficient cell material, irrespective of the age or health of the woman concerned (Evalyn® Brush - Rovers Medical Devices, n.d.). Some of the benefits of this brush are: built-in features to assure correct sample taking, standardized method for taking samples results in the highest number of valid samples across all age groups (one time right, no repeat sampling), and a comprehensive solution for self-sampling collecting, shipping, and processing in the laboratory (Evalyn® Brush - Rovers Medical Devices, n.d.). Also, one of the benefits is that each brush comes with a unique RFID identification (Radio Frequency Identification) chip, equipped with a barcode to link each sample to a woman’s ID securing the patient information (Evalyn® Brush - Rovers Medical Devices, n.d.). The Evalyn brush have been used in previous studies that were studying HPV self-sampling acceptability among women living in rural areas in Africa (Brandt et al., 2019), the applicability and accuracy among responder women population aged 30 to 60 years old (Ketelaars et al., 2017), on a pilot cross-sectional study involving 116 women over 21 years of age with an abnormal Pap smear (Lorenzi et al., 2019), and finally was also used for an online survey in Fall 2017 with a national sample of women in the United States (n = 605) ages 21-65 years where a multivariable linear regression identified correlates of women's willingness to use an HPV self-sample at home (Bishop et al., 2019). Studies have indicated that while using the Evalyn brush for

their study, future efforts should consider the potential impact that a device type may have on women's use of an HPV self-sample. Future studies, using a mixed-method approach with an experimental strand using an Evalyn brush will help explore willingness to participate in cervical screening among those who suffered from trauma, specifically related to a sexual assault history with forced penetration.

The third recommendation is to design policies and expand the field of study to examine access, utilization, education, and acceptability. The recommendation is to assess if the conditions under the sexual violence differently impacted rape victim's willingness, and if a self-collection kit can make an impact on the participation in cervical screening. In other words, further research on how the rape occurs can yield deep information on how impactful a self-collection can be effective or not. Thinking about women living in crisis environments such as civil conflicts (religious, ethnic, clan) war and displaced or living in refugee camps, who might not only be dealing with the trauma of a rape, but the difficult living conditions and the trauma that a civil conflict can bring, studies assessing women living in this kind of situation and presented with an alternative to get screened for gynecology women preventive screening might yield insightful information that will be useful for the literature and for future recommendations on studies about vulnerable populations and their participation to cervical screening. In other words, policies can help to provides health care professionals to offer alternatives to patients who might present barriers when seeking for routine cervical screening.

Conclusion

We compared our results to works of Watson-Johnson and Alcalá and found that sexual assault that have occurred in the lifetime have an impact on the victim's decision to participate in cervical screening. Compared to the previous studies that explored sexual assault victims'

participation, these women are more than willing to get screened for either cervical cancer test, whether it is Pap or HPV. We hypothesized that because of their history of trauma and the fear of retraumatization, sexual assault victims might not make the decision to participate in Pap/HPV testing, but our statistical analysis results instead show that the sexual assault victims are more likely to participate in Pap and HPV testing only if sexual violence occurred in their lifetime.

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