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Differences in Health-Related Quality of Life Among Breast Cancer Survivors by Hispanic Origin in a Cross-Sectional Study

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DIFFERENCES IN HEALTH-RELATED QUALITY OF LIFE AMONG BREAST CANCER SURVIVORS BY HISPANIC ORIGIN IN A CROSS-SECTIONAL STUDY

by

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ABSTRACT

Breast cancer is the second leading cause of cancer-related death among American women. Research has examined the health-related quality of life (HRQOL) among breast cancer survivors of various races/ethnicities, reporting that Hispanic women have lower levels of HRQOL compared to non-Hispanic whites. Hispanics are not a homogenous population, and subpopulations may have different lifestyles, socioeconomic status, and cultural/personal/social ideals that could affect their HRQOL after treatment of breast cancer. The objective of this study was to examine the differences in HRQOL by Hispanic origin among breast cancer survivors in Central Florida.

Patient data was obtained from the Florida Cancer Data System. Eligible patients were sent an invitation letter along with a response form to indicate interest. Following state-mandated recruitment procedures, a second mailing was sent if no response was received. Surveys were sent to interested participants according to their preferred method, either by mail or online and in English or Spanish. The Functional Assessment of Cancer Therapy – Breast (FACT-B) was utilized to assess five domains of HRQOL: physical, social, emotional, and functional well-being, with a breast cancer subscale. Utilizing the scoring manual, the FACT-B total score and HRQOL domain scores were calculated for each Hispanic subpopulation, with higher scores indicating a better HRQOL.

From September 2023 to February 2024, we received complete surveys from 165 eligible participants, including 18 Colombians, 10 Cubans, 11 Dominicans, 10 Mexicans, 95 Puerto Ricans, and 21 in the other category. The mean FACT-B total score was 102.6 across all origin groups. Cubans reported the highest score (116.3), while Dominicans reported the lowest score (97.8). Factors such as income, education level, marital status, smoking status, alcohol

consumption, laterality, cancer stage, treatment type, and surgery type were all correlated with specific HRQOL domain scores that could be used to explain the disparities in HRQOL among Hispanic breast cancer survivors.

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I. INTRODUCTION

Breast cancer has a worldwide impact. It is the most frequently diagnosed cancer in American women, and the second-leading cause of cancer-related death (DeSantis et al., 2019). However, it has also been found that breast cancer incidence and survival rates can vary depending on race/ethnicity. For example, Black women are 40% more likely to die from breast cancer when compared to White women, and Hispanic women have a 20% lower incidence rate of breast cancer than other groups (National Breast Cancer Foundation, 2020). The varying incidence and survival rates depending on race/ethnicity can influence the health outcomes of individuals after diagnosis and treatment.

Quality of life (QOL) has been a focus of recent research. QOL includes physical, psychological, and social dimensions, and is defined as an "individual's perception of their position in life in various contexts" (The World Health Organization Quality of Life Group, 1995). Health-related quality of life (HRQOL) is an extension of QOL and refers to "a patient's physical and mental health over time" (Centers for Disease Control and Prevention, 2021).

In breast cancer survivors, researchers have examined racial/ethnic differences in HRQOL and reported there are significant differences in QOL after controlling for sociodemographic, clinical, and treatment factors (Janz et al., 2009). One study has found that Hispanic and Latino individuals experience poorer psychological and social well-being, including depression, anxiety, and financial hardship when compared to non-Hispanic Whites, and another study has determined that less acculturated Latinas have poorer functional and emotional well-being (Janz et al., 2009; Samuel et al., 2020). It has also been determined that African American patients experience worse physical and social well-being than European American patients (Rao et al., 2008). These studies

showcase differences in HRQOL and patient experiences after treatment based on their race/ethnicity.

Many research studies conducted thus far do not consider the fact that Hispanics are not a homogenous group and are composed of different origins including Cubans, Puerto Ricans, Mexicans, Central Americans, and South Americans (Enid Zambrana et al., 2021). These origin groups may have unique lifestyles, cultural behaviors, and varying sociodemographic characteristics which result in differing HRQOL (Enid Zambrana et al., 2021).

There is currently very limited research on the HRQOL of specific Hispanic subpopulations. Potential reasons for this lack of research include frequent aggregation of races/ethnicities on surveys and an inability of the participant to identify as a single race/ethnicity (Bilheimer & Sisk, 2008). Hispanic subpopulations may have been categorized together on surveys in the past, limiting our understanding of each subpopulation as their own category (Bilheimer & Sisk, 2008). Identifying disparities between these subpopulations can help promote effective clinical interventions for breast cancer treatment. Healthcare workers and physicians will be able to tailor treatment plans for individuals according to the HRQOL outcomes they may face. This study proposes to examine the differences in HRQOL by Hispanic origin of breast cancer survivors utilizing a cross-sectional study method and patient recruitment procedures from the Florida Cancer Data System (FCDS).

II. RESEARCH OBJECTIVES AND HYPOTHESIS

Research Objectives

The objective of this study was to examine the differences in HRQOL by Hispanic origin among breast cancer survivors living in Central Florida.

Hypothesis

We hypothesized that there are differences in HRQOL by Hispanic origin among breast cancer survivors in Central Florida. Each subpopulation has unique lifestyle and sociodemographic factors that contribute to HRQOL differently. For example, one Hispanic origin group might have a higher score for a specific domain of HRQOL (physical, social, emotional, or functional well-being) than another origin group. An alternative hypothesis is that there are no differences in HRQOL according to Hispanic origin.

III. LITERATURE REVIEW

<u>Breast Cancer Statistics</u>

Cancer is one of the world's leading diseases, with over 200 types of cancers found and nearly two million newly diagnosed cases in the year 2022 (Cancer Research UK, 2020; Siegel et al., 2022). Regardless of race/ethnicity, breast cancer has become the most frequently diagnosed cancer in American women (DeSantis et al., 2019). It was estimated that 1 in 8 women in the United States (US) will be diagnosed with breast cancer in their lifetime (American Cancer Society, 2024). Estimations showed that a woman would be diagnosed with breast cancer every 2 minutes (National Breast Cancer Foundation, 2020). Unfortunately, breast cancer is currently the second-leading cause of cancer-related death among American women (DeSantis et al., 2019). However, depending on the stage of cancer, it is curable. There are currently over 4 million breast cancer survivors living in the US (Breast Cancer Research Foundation, 2023). Survival rates for breast cancer patients vary depending on how far the cancer has spread. For a five-year relative survival rate, localized cancer has a 99% survival rate, regional cancer has an 86% survival rate, and distant cancer has a 30% survival rate (American Cancer Society, 2023). Localized cancer has spreading limited to within the breasts, regional cancer has spreading contained to nearby lymph nodes or structures, and distant cancer indicates spreading of cancer to other parts of the body, including the lungs, liver, and bones (American Cancer Society, 2023).

Breast cancer incidence rates, defined as the rate of diagnosis of breast cancer, vary depending on race/ethnicity (National Breast Cancer Foundation, 2020). For Hispanic women, they have an overall 20% lower incidence rate of breast cancer than other race/ethnicity groups (National Breast Cancer Foundation, 2020). American Indian and Alaska native women have the lowest incidence rate of developing breast cancer (National Breast Cancer Foundation, 2020).

Survival rates for breast cancer also vary according to race/ethnicity. In this US, it has been found that Black women are 40% more likely to die from breast cancer compared to White women (National Breast Cancer Foundation, 2020). Chinese and Japanese women have the highest survival rates for breast cancer (National Breast Cancer Foundation, 2020). Although Hispanic women have a low incidence rate, they tend to be diagnosed at later stages of breast cancer and this results in more aggressive treatment (National Breast Cancer Foundation, 2020). Breast cancer is the leading cause of cancer-related death for Hispanic women (National Breast Cancer Foundation, 2020).

<p style="text-align:center;"><u>Importance of Health-Related Quality of Life</u></p>

Research has been focused on studying the health outcomes of breast cancer patients and QOL has been a major focus of recent research (Alvarez-Pardo et al., 2022; Ganz et al., 2002; Janz et al., 2009; Mokhtari-Hessari & Montazeri, 2020). QOL has been defined by the World Health Organization (WHO) as an "individuals' perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns" (The World Health Organization Quality of Life Group, 1995). According to the WHO, QOL includes physical, psychological, and social dimensions (The World Health Organization Quality of Life Group, 1995).

Defined as an extension of QOL, HRQOL is "an individual's or a group's perceived physical and mental health over time" (Centers for Disease Control and Prevention, 2021). HRQOL in breast cancer patients has enhanced over the past decade, but numerous areas have to be further understood, including the management of pain, issues related to worry, and sexual functioning (Mokhtari-Hessari & Montazeri, 2020).

Focusing on HRQOL in healthcare can improve patient-physician interactions by increasing the patient's ownership of their healthcare and providing healthcare workers with a method of connecting treatment with a patient's HRQOL outcomes (Daundasekara et al., 2020). A study has also found that change in HRQOL is associated with survival in advanced stage cancer patients, regardless of how high or low the baseline HRQOL is (Kypriotakis et al., 2016). Survival of a patient can be predicted by their trajectory for HRQOL, and this can help medical professionals make better informed decisions about patient care and treatment (Kypriotakis et al., 2016).

Researching the physical and emotional health outcomes that patients face after breast cancer treatment can help further health professionals' understanding of effective patient care and treatment options. Interventions to target specific concerns of breast cancer survivors based on HRQOL studies should be implemented in treatment plans to help improve health outcomes (Janz et al., 2009).

<u>Factors Affecting Health-related Quality of Life</u>

Socioeconomic Status, Income, and Education Levels

People from different races and ethnicities living in the US have varying levels of socioeconomic status (SES). SES is a predictor for physical and psychological health outcomes (American Psychological Association, 2017). Communities in the US are usually segregated by SES or race/ethnicity, and minority populations share poor health conditions, reflecting how social status can lead to larger health disparities (American Psychological Association, 2017).

A study has reported that low SES and high levels of socioeconomic stress caused negative QOL outcomes in a multi-ethnic population of breast cancer survivors (Ashing-Giwa & Lim, 2009). Measures for SES in this study included household income, education, occupation, and a

Life Stress scale (Ashing-Giwa & Lim, 2009). Another study reported that breast cancer patients from the most disadvantaged class reported the worst outcomes for QOL, further proving the conclusion that income and SES play a role in QOL outcomes (Graells-Sans et al., 2018). Lower levels of education in minority populations can lead to general health risks such as obesity, lack of physical activity, and cigarette smoking, which can affect QOL (Centers for Disease Control and Prevention, 2004). Education levels affect the social well-being of patients, and both low levels of education and unemployment were negatively associated with the QOL of cancer patients (Ramasubbu et al., 2021).

<div align="center">Time since Diagnosis</div>

Survivors of breast cancer have all been diagnosed at various points in the past years, so it is important to consider the time since breast cancer diagnosis as a factor that affects HRQOL after treatment.

One study measured QOL at three different points in the timeline: pre-diagnosis, three months after treatment, and one year after completion of treatment (Montazeri et al., 2008). Patients reported lower emotional functioning and decreased global QOL at the final follow-up (Montazeri et al., 2008). The study's results showed that elevated levels of pain and fatigue were also reported at the final follow-up (Montazeri et al., 2008). Although patients reported overall benefit from the cancer treatment, side effects persisted, affecting QOL after treatment (Montazeri et al., 2008). Another study focused on long-term health outcomes of disease-free patients 5-10 years after breast cancer treatment (Ganz et al., 2002). Physical and emotional well-being were excellent in these patients, and side effects including hot flashes, night sweats, vaginal discharge, and breast sensitivity were less frequent compared to baseline levels (Ganz et al., 2002). One study did not present a significant difference in QOL depending on time since treatment, but it was

reported that women who had treatment >5 years before participation had higher scores on the health scale and lower symptomatology, except for a few items including dyspnea, insomnia, and constipation (Alvarez-Pardo et al., 2022).

Patient Age

Multiple studies have focused on the influence of patient age and type of treatment on the QOL of breast cancer patients (Alvarez-Pardo et al., 2022; Janz et al., 2009). It was found that younger women had poorer sexual function and worse future prospects when compared to older individuals (Alvarez-Pardo et al., 2022). Additionally, younger women experienced mental health issues including depression and concern about infertility and weight gain that could contribute to a lower QOL (Alvarez-Pardo et al., 2022). Younger women may also experience greater disruption in their lives, work schedules, and financial stability, contributing to the prevalence of negative health outcomes in younger women with breast cancer (Janz et al., 2009).

Type of Treatment

There are numerous types of treatment for breast cancer, and all treatment methods have differing HRQOL outcomes. Women who received conservative treatment reported higher QOL than those who received radical mastectomy (Alvarez-Pardo et al., 2022). Another study performed a comparison between treatment methods, and patients who received no systemic adjuvant therapy (including chemotherapy, tamoxifen, and others) had a better QOL than those who received systemic adjuvant therapy (Ganz et al., 2002). Overall, past chemotherapy or radiation therapy was an indicator of poorer QOL (Chagani et al., 2017; Ganz et al., 2002; Janz et al., 2009; Seol et al., 2021).

<u>Differences in HRQOL Among Various Race/Ethnicity Groups</u>

Research articles have studied racial/ethnic differences in QOL, and results prove differences in health outcomes and QOL of patients (Janz et al., 2009; Rao et al., 2008). Among breast cancer patients, results showed significant differences between race/ethnicity and QOL (Janz et al., 2009). Studies showed that lower acculturated Latinas had lower functional and emotional well-being than their White counterparts (Janz et al., 2009). Additionally, it was reported that African American women had higher emotional well-being than White women (Janz et al., 2009). Another study has found that African American cancer patients experience poorer physical and social well-being than European American cancer patients (Rao et al., 2008). A systematic review of recent research has found that Hispanic/Latinos report poorer levels of psychological well-being, including increased rates of depression and anxiety, and lower social well-being in terms of financial hardships and job disruptions when compared to non-Hispanic/Latino Whites (Samuel et al., 2020).

<u>Health-Related Quality of Life Among Hispanic Breast Cancer Survivors</u>

QOL may differ for Hispanic/Latino individuals depending on the country they lived in, as health care varies per nation (Samuel et al., 2020). This could potentially be extended to the specific Hispanic origin of an individual, as HRQOL could possibly vary by Hispanic origin.

Within the Hispanic population, there are groups of individuals from diverse cultures including Cubans, Puerto Ricans, Colombians, Dominicans, and others. Subpopulations are quite diverse, even when comparing the Hispanics living in the United States. Differences can be seen in the average age, education levels, and SES of Hispanic subpopulations (Seth Motel, 2012). For example, in 2012, the median age of Mexicans in the US was 25 years, while the Cuban median age was 40 years (Seth Motel, 2012). Colombians were more likely to have a college degree when

compared to Salvadorans, who were the least likely to have a college degree (Seth Motel, 2012). Nearly 50% of the Hondurans living in the United States lack access to health insurance, compared to only 15% of US Puerto Ricans who lack this access (Seth Motel, 2012). Income levels vary with Hispanic origin as well, with Ecuadorians having the highest annual median household income at nearly $50,000, and Dominicans having the lowest annual median household income at $34,000 (Seth Motel, 2012). These are some potential factors that could affect the HRQOL of Hispanic breast cancer survivors and result in differing QOL between the various Hispanic origins.

Thus far, research regarding QOL of breast cancer survivors of different Hispanic subpopulations has been limited. The reasons for this limited literature could be because certain race/ethnicity groups are often aggregated together with different cultures on surveys, and their responses might be skewed if patients are not able to identify themselves as a single race/ethnicity (Bilheimer & Sisk, 2008). Additionally, information such as SES, language, and acculturation that could contribute to differences in QOL are not typically readily available in health data systems for researchers to access for analysis (Bilheimer & Sisk, 2008). More research in this field and increased specification of race/ethnicity in data collection can help bridge the gap and bring disparities in HRQOL among Hispanic breast cancer survivors to light.

Instruments Used to Measure Quality of Life Among Breast Cancer Survivors

QOL measurements in research studies are used to assess the effects of treatment on a patient's overall well-being, as cancer treatment and diagnosis can result in major challenges in a person's life (Chopra & Kamal, 2012). The method of measuring the QOL of patients after receiving breast cancer treatment varies by study. The instruments used to measure the general QOL of cancer survivors include the Quality of Life – Cancer Survivor (QOL-CS), Functional Assessment of Chronic Illness Therapy-Spiritual Well Being Scale (FACIT-SP), Quality of Life

in Adult Cancer Survivors Scale (QLACS), Functional Assessment of Cancer Therapy-General (FACT-G), and others (Chopra & Kamal, 2012). In breast cancer survivors, the European Organization for Research and Treatment of Cancer-Breast Module (EORTC QLQ-BR23) and Functional Assessment of Cancer Therapy-Breast (FACT-B) have been mostly used in research (Chopra & Kamal, 2012). Both the EORTC QLQ-BR23 and FACT-B instruments measure physical and psychosocial domains (Chopra & Kamal, 2012). Surveys for HRQOL studies typically use multi-item scales and sum domain scores to obtain total values for HRQOL.

<u>Hispanic Populations in Central Florida</u>

In the year 2023, Hispanic and Latino individuals accounted for 27% of the population of the state of Florida (United States Census Bureau, 2023). Data from 2010-2014 (World Media Group LLC, 2024) showed that Hispanic and Latino individuals made up 21% of the population in Central Florida, which included Brevard, Lake, Orange, Osceola, Seminole, and Volusia County. The breakdown of Hispanic origin in Central Florida was 12.6% Mexicans, 49.7% Puerto Ricans, 7.8% Cubans, 5.8% Central Americans, and 14.6% South Americans (World Media Group LLC, 2024). Puerto Ricans made for nearly half of the Central Florida Hispanic population. All the Central Florida counties (Brevard, Lake, Orange, Osceola, Seminole, and Volusia) had the highest percentage of Puerto Ricans as well (41.84%, 40.23%, 49.04%, 58.07%, 47.81%, and 48.82% of the total Hispanic population, respectively) (World Media Group LLC, 2024). There is a clear diverse distribution in Hispanic origin in Central Florida, with a high percentage of individuals of Puerto Rican origin.

IV. METHODS

Study Design

This study was a population-based, cross-sectional survey study. The FACT-B questionnaire was utilized to assess the HRQOL of participants based on their responses. Utilizing contact information in the patient dataset obtained from the FCDS, potential eligible participants were sent invitation letters to gauge their interest in participation. If the letter was signed and sent back with interest to participate, then a second survey with the FACT-B questionnaire and consent document was sent as a hard copy through mail or digitally in the form of a Qualtrics survey. Survey responses were entered into an MS Excel workbook and saved for statistical analysis. The differences in HRQOL were compared across Hispanic origins.

Study Population

The participants of this study were a population-based sample of Hispanic Breast Cancer survivors from the Florida State Cancer Registry. The following conditions set the eligibility criteria for women to qualify to participate: participant consent must be obtained, participant must be >20 years old, participant identified as Hispanic ethnicity, participant was diagnosed with breast cancer at least six months prior to participation in the study, participant resided in one of six counties in Central Florida, and participant could read/speak either English or Spanish.

The dataset and patient information were obtained from the Florida State Cancer Registry. The dataset included information about each patient including their race/ethnicity, Hispanic origin, birth country, cancer stage, treatment, contact details, and others.

Recruitment Methods

Approval from the University of Central Florida Institutional Review Board (UCF IRB) and the Florida Department of Health IRB was received for the study. In the first mailing,

participants were sent an invitation letter, a letter from the Florida Department of Health, and a response form to their home address. The letters indicated the study objectives and information about the questions asked in the survey. The response form allowed participants to either accept or decline interest to participate, and if accepted, indicate their preferred mode of receiving the survey. Participants could choose to receive the survey physically in the mail or as an online Qualtrics survey.

Following state-mandated recruitment procedures, if no response was received within three weeks of the initial mailing, a second invitation letter was sent with a telephone opt-out card that allowed them to decline or opt out. If there was no response to the second invitation within three weeks, a bilingual team member contacted the individual by phone to gauge interest in participation. A phone call could be made to each participant up to four times, and all communication and dates of contact were tracked using a logbook. A detailed overview of the FCDS recruitment procedure followed in this study can be found in Figure 1.

Once interest was received through the response form, the survey was sent in either a physical or digital format along with the consent document. Once participants completed and returned the survey, responses were recorded into a password-protected MS Excel file and completed surveys were stored in a locked file cabinet. Participants received a $25 Amazon gift card via email upon successful completion of the survey.
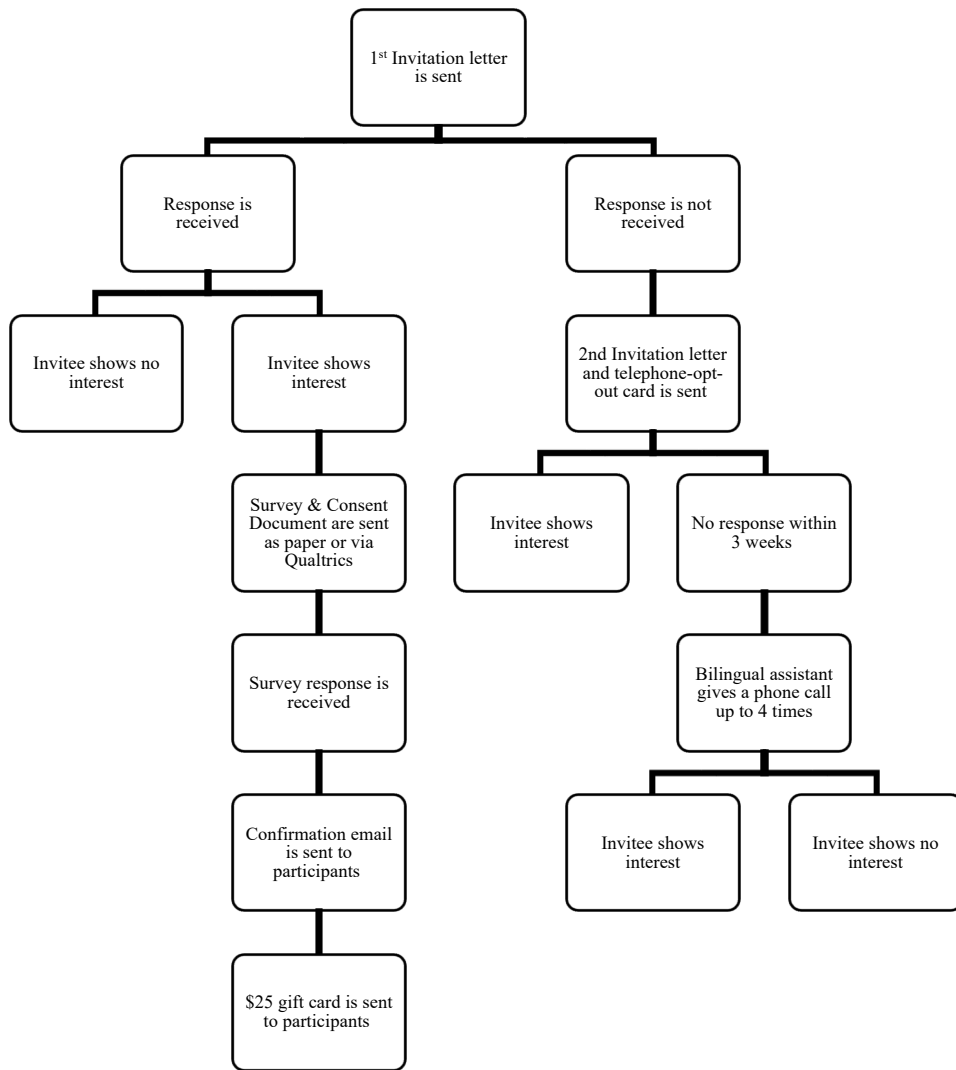
Figure 1. FCDS Recruitment Methods

Data Collection & Measure

Exposure: Hispanic Origin

The exposure in this study was Hispanic origin. When identifying participants, they were grouped by their stated Hispanic origin (Colombians, Cubans, Dominicans, Mexicans, Puerto Ricans, and other). This information was provided for every patient in the dataset obtained from the Florida State Cancer Registry and collected during the survey. If the stated origin was the same in the dataset and in the response given by the patient, they were placed in that category. If the patient reported a different Hispanic origin on the survey than what was provided in the FCDS dataset, the participant was grouped in the category they reported.

Outcome: HRQOL

The outcome measured in this study was the HRQOL of breast cancer survivors. The questionnaire utilized was the Functional Assessment of Cancer Therapy - Breast (FACT-B), a 37-item questionnaire that measured the physical well-being (PWB), social well-being (SWB), emotional well-being (EWB), and functional well-being (FWB), and included a breast-cancer subscale (BCS) (Functional Assessment of Chronic Illness Therapy Group, 2023).

The PWB domain of this questionnaire assessed a patient's daily energy, nausea levels, side effects of treatment, overall pain, and other factors that could hinder their PWB and affect their HRQOL (Functional Assessment of Chronic Illness Therapy Group, 2023). The SWB domain analyzed relationships with family members, friends, and partners, and the amount of support they received from those close to them (Functional Assessment of Chronic Illness Therapy Group, 2023). The EWB domain assessed general emotions, such as sadness, fear of death, lack of hope, and worries about their overall health condition (Functional Assessment of Chronic Illness Therapy Group, 2023). The FWB domain asked questions about their daily lives, such as their

enjoyment of life, ability to work, and acceptance of their illness (Functional Assessment of Chronic Illness Therapy Group, 2023). The BCS domain had questions related to side effects of treatment, such as shortness of breath, how participants felt about their weight, and weight fluctuations (Functional Assessment of Chronic Illness Therapy Group, 2023). Each of the domains was scored according to the scoring manual, and domain scores were totaled to give an overall HRQOL score per participant.

Scoring of the domains of HRQOL was performed utilizing the FACT-B scoring sheet. The FACT-B questionnaire utilized a 5-point Likert-type scale (Functional Assessment of Chronic Illness Therapy Group, 2023). The responses for the questions in each domain were given as: "not at all," "a little bit," "somewhat," "quite a bit," and "very much," and these were scored from 0-4 respectively (Functional Assessment of Chronic Illness Therapy Group, 2023). However, indicating a score of "very much" for pain levels contributes differently to HRQOL than indicating a score of "very much" for satisfaction in life. Therefore, reversals were performed for these questions accordingly. Each domain (PWB, SWB, EWB, FWB, BCS) was calculated and scored separately using the FACT-B scoring manual. This was the subscale score for each domain of well-being. To calculate the FACT-B total score, the five domain scores were totaled. A higher score indicated a higher QOL (Functional Assessment of Chronic Illness Therapy Group, 2023).

Covariates

This study primarily focused on HRQOL outcomes according to the Hispanic subpopulation of participants. However, there are numerous factors that could influence the participants' reported HRQOL in addition to their Hispanic origin. In this study, potential covariates that could influence the HRQOL were current age, current smoking status, alcohol consumption, marital status, education levels, household income, laterality of breast cancer, cancer

stage, type of treatment (radiation therapy/chemotherapy/hormone therapy), and type of surgery (breast-conserving surgery or mastectomy). These were specific demographic and clinical characteristics that could influence the HRQOL and were included in the study as covariates.

The demographic characteristics (current age at participation, current smoking status, alcohol consumption, marital status, education levels, and household income) were obtained as self-reported responses on the survey. The clinical characteristics (laterality of breast cancer, cancer stage, type of treatment, and type of surgery) were obtained from the FCDS dataset. Participants were grouped into categories created for each covariate and scores were averaged for these groups. For example, current age was split into age groups: 20-40 years, 41-60 years, 61-79 years, and greater than 80 years of age. A detailed list of the categories for each covariate can be found in Tables 1 and 2. Mean HRQOL scores were then compared across the categories and analyzed to determine their correlation with HRQOL.

<u>Statistical Analysis</u>

Descriptive statistics were used to summarize the demographic and clinical characteristics across Hispanic origin groups and are reported through frequencies in Tables 1 and 2. HRQOL scores were calculated for each participant, and scores for individuals of the same Hispanic origin were averaged. Analysis of variance (ANOVA) was used to compare mean scores of Hispanic subpopulations for each domain of HRQOL (PWB, SWB, EWB, FWB, BCS, and FACT-B total) in Table 3. Additionally, ANOVA was used to compare mean domain scores across the demographic and clinical characteristic groups, which are reported in Tables 4 and 5. P-values were calculated to determine significant correlations between the Hispanic origin and the HRQOL domain scores, with statistically significant values being $p < 0.05$.

V. RESULTS

Study Participant Characteristics

The study sample consisted of 165 participants who met the eligibility criteria and completed the survey. The distribution of Hispanic origin among participants (N%) was 10.9%, 6.1%, 6.7%, 6.1%, and 57.6% for Colombians, Cubans, Dominicans, Mexicans, and Puerto Ricans, respectively. The "other" category included 12.7% of the participants, which consisted of those from a subpopulation not previously listed, including Venezuelans, Brazilians, Peruvians, and Hondurans.

Data regarding the demographic characteristics of each Hispanic origin group can be found in Table 1. More than half (57.6%) of the participants in the study were of Puerto Rican origin, and majority of the participants (93.3%) were between the ages of 41-79. Most of the participants (95.8%) were not current smokers. A greater percentage of participants (63.7%) either currently consumed alcohol or had consumed alcohol in the past, and 35.2% had no alcohol consumption. More than half of the participants (62.4%) were married, 18.8% were divorced or separated, and 15.8% were widowed or single. Most participants (89.7%) were high school graduates, and nearly half of this population had at least a 4-year college degree. Nearly half of the participants (49.1%) had relatively low household incomes of less than $50,000, and only 15.8% had incomes of above $100,000. Cuban participants were most likely to have the highest income level, with nearly 40% of Cubans participants having incomes greater than $100,000. Mexicans were more likely to have incomes less than $50,000, with 60% of the Mexican participants belonging to this category. Mexicans were also found to have lower levels of education, with only 10% of participants having at least a 4-year college degree.

Data regarding the clinical characteristics for each Hispanic origin group can be found in Table 2. There was an approximately even split in laterality for breast cancer across origins, indicating that participants were mostly equally likely to have cancer in the left or right breast. The only exception was Mexicans, where 80% of participants had laterality of cancer on the right. More than half of all participants (51.5%) had localized cancer. Cubans had the largest proportion of participants with less aggressive cancer, where 70% of participants had localized cancer. Mexicans had the greatest proportion of participants with more aggressive regional cancer, at 40%. Treatment methods were nearly equally split when looking at all participants either receiving or not receiving radiation therapy. However, there were differences observed when looking at the specific Hispanic subpopulations. For radiation therapy, nearly 70% of Mexicans and 71% of participants in the other category reported no radiation therapy, whereas at least 70% of Cubans and 70% of Dominicans reported receiving radiation therapy. There was an approximately even split for receiving or not receiving chemotherapy among all participants. This proportion was relatively consistent across Dominicans, Mexicans, and Puerto Ricans. More Colombians and Cubans (66.7% and 70%, respectively) did not receive chemotherapy, and more participants in the other category (66.7%) received chemotherapy. More than half of all participants received hormone therapy, and this is consistent across all Hispanic origins except Mexicans and those in the other category. For Mexicans, nearly 70% of their participants did not receive hormone therapy. More than half of the participants (52.4%) in the other category did not receive hormone therapy. Almost all participants in the study (97%) received surgery for breast cancer. Of these, 50.3% of participants received breast-conserving surgery and 46.7% received mastectomy.

Data regarding the domain and FACT-B total scores by Hispanic origin can be found in Table 3. Cubans reported the highest mean (± SD) FACT-B total score (116.3 ± 18.3), and Dominicans reported the lowest mean (± SD) FACT-B total score (97.8 ± 32.1). Dominicans consistently reported the lowest scores across all HRQOL domains. The "other" origin group scored the highest for PWB (23.8) and EWB (20.2), Cubans scored the highest for SWB (25.1) and FWB (22.1), and Colombians scored the highest for the BCS domain (26.9). Large variabilities and standard deviation were likely due to a small sample size for specific subpopulation groups.

A breakdown of the mean scores for each domain of well-being (PWB, SWB, EWB, FWB, and BCS) and the FACT-B total score for each Hispanic origin group can be seen in Figures 2-7. The p-values for PWB, SWB, EWB, FWB, BCS, and FACT-B total were 0.0655, 0.0114, 0.1744, 0.0653, 0.2141, and 0.0243 respectively. The SWB domain and FACT-B total score had statistically significant p-values: 0.0114 and 0.0243, respectively.

FACT-B Domain Scores by Participant Characteristics

The mean (±SD) FACT-B total score of all study participants was 104.2 (± 25.8). The range of potential FACT-B total scores was 0 – 148. For all participants, the mean domain scores for PWB, SWB, EWB, FWB, and BCS were 21.2, 21.1, 18.4, 19.3, and 24.2 respectively.

Data regarding the HRQOL domain scores of participants according to their demographic characteristics are detailed in Table 3. With older age groups, the HRQOL domain scores increased as well. Older participants (≥80 years old) reported higher HRQOL domain scores on average for all domains than younger participants (20-40 years old). Interestingly, we observed the highest FACT-B total score for participants that were diagnosed one year prior to participation, and the lowest score for participants diagnosed 10 years ago. There was no consistent trend observed for

participants diagnosed 2-9 years prior to participation, with some increases and decreases in HRQOL. Participants who reported no smoking status had consistently higher scores for all domains of HRQOL. Participants with current alcohol consumption reported higher HRQOL scores across all domains compared to those with no alcohol consumption. Widowed participants showed the highest mean FACT-B total score (117.8) and consistently higher scores for all domains of HRQOL. Married participants showed higher SWB, EWB, and FACT-B total scores compared to single participants, and divorced/separated participants showed lower PWB, FWB, and BCS scores compared to single participants. The highest FACT-B total score was observed in those with at least a 4-year college degree (107.5), followed by those who completed less than high school (103.3), and lastly those with a high school diploma or some college (100.9). Participants with the highest levels of education reported higher domain scores in all categories except for EWB, in which participants who have completed less than high school scored the highest. FACT-B total scores increased with household income levels, and participants with incomes greater than $100,000 scored consistently higher in all domains of well-being.

Data regarding the HRQOL domain scores of participants according to their clinical characteristics are detailed in Table 4. Participants showed higher scores for all HRQOL domains and FACT-B total if laterality of breast cancer was on the left. Participants with less invasive in-situ or localized cancer had higher FACT-B total scores (116.2 and 103.5 respectively) than participants with regional cancer (96.0). Interestingly, participants with distant site cancer had relatively high FACT-B total scores (113.3). Participants with in-situ cancer reported the highest mean PWB, FWB, and BCS domain scores, and participants with distant cancer reported the highest SWB and EWB domain scores. Participants who did not receive radiation therapy had higher scores for all domains and FACT-B total than participants who completed radiation therapy,

although the difference was minimal. Participants who did not receive chemotherapy had significantly higher scores for FACT-B total and all HRQOL domains, except SWB, than participants who received chemotherapy. On the other hand, opposite observations were reported for participants receiving hormone therapy. Participants who received hormone therapy reported higher FACT-B total and HRQOL scores across all domains than participants who did not receive hormone therapy. Participants who received breast-conserving surgery reported the highest PWB, SWB, FWB, and FACT-B total score, and participants who received no surgery reported the highest EWB and BCS domain scores. Participants who received mastectomy reported the lowest FACT-B total score (101.2) when compared to those who received breast-conserving surgery or no surgery.

Table 1. Demographic characteristics of study participants by Hispanic origin.

Characteristic	Hispanic Origin						
	Total	Colombian	Cuban	Dominican	Mexican	PR	Other
	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)
No. of participants	165 (100)	18 (10.9)	10 (6.1)	11 (6.7)	10 (6.1)	95 (57.6)	21 (12.7)
Current Age							
20 - 40	7 (4.2)	1 (5.6)	0 (0.0)	1 (9.1)	0 (0.0)	4 (4.2)	1 (4.8)
41 - 60	73 (44.2)	8 (44.4)	4 (40.0)	5 (45.5)	6 (60.0)	42 (44.2)	8 (38.1)
61 - 79	81 (49.1)	9 (50.0)	6 (60.0)	5 (45.5)	4 (40.0)	45 (47.4)	12 (57.1)
≥ 80	4 (2.4)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	4 (4.2)	0 (0.0)
Current Smoking							
No	158 (95.8)	17 (94.4)	9 (90.0)	11 (100.0)	10 (100.0)	90 (94.7)	21 (100.0)
Yes	5 (3.0)	1 (5.6)	1 (10.0)	0 (0.0)	0 (0.0)	3 (3.2)	0 (0.0)
Unknown	2 (1.2)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	2 (2.1)	0 (0.0)
Alcohol Consumption							
No	58 (35.2)	7 (38.9)	3 (30.0)	3 (27.3)	4 (40.0)	36 (37.9)	5 (23.8)
Consumed in past	60 (36.4)	7 (38.9)	2 (40.0)	6 (54.5)	4 (40.0)	34 (35.8)	7 (33.3)
Yes	45 (27.3)	4 (22.2)	4 (40.0)	2 (18.2)	2 (20.0)	24 (25.3)	9 (42.9)
Unknown	2 (1.2)	0 (0.0)	1 (10.0)	0 (0.0)	0 (0.0)	1 (1.1)	0 (0.0)
Marital status							
Married	103 (62.4)	11 (61.1)	7 (70.0)	6 (54.6)	6 (60.0)	55 (57.9)	18 (85.7)
Divorced/separated	31 (18.8)	3 (16.7)	2 (20.0)	3 (27.3)	2 (20.0)	19 (20.0)	2 (9.5)
Widowed	8 (4.9)	1 (5.6)	0 (0.0)	2 (18.2)	0 (0.0)	5 (5.3)	0 (0.0)
Single	18 (10.9)	3 (16.7)	0 (0.0)	0 (0.0)	1 (10.0)	13 (13.7)	1 (4.8)
Unknown	5 (3.0)	0 (0.0)	1 (10.0)	0 (0.0)	1 (10.0)	3 (3.2)	0 (0.0)
Education							
Less than HS	17 (10.3)	3 (16.7)	2 (20.0)	1 (9.1)	4 (40.0)	5 (5.3)	2 (9.5)
HS/some college	72 (43.6)	8 (44.4)	3 (30.0)	6 (54.6)	5 (50.0)	42 (44.2)	8 (38.1)
4-year college +	76 (46.1)	7 (38.9)	5 (50.0)	4 (36.4)	1 (10.0)	48 (50.5)	11 (52.4)
Household income							
$0 - $49,999	81 (49.1)	10 (55.6)	3 (30.0)	5 (45.5)	6 (60.0)	49 (51.6)	8 (38.1)
$50,000 - $99,999	35 (21.2)	4 (22.2)	0 (0.0)	2 (18.2)	3 (30.0)	23 (24.2)	3 (14.3)
$100,000 or more	26 (15.8)	3 (16.7)	4 (40.0)	2 (18.2)	1 (10.0)	11 (11.6)	5 (23.8)
Prefer not to answer	23 (13.9)	1 (5.6)	3 (30.0)	2 (18.2)	0 (0.0)	12 (12.6)	5 (23.8)

HS = High School; PR = Puerto Rican
Due to rounding of decimal values, percentages may not sum to 100.

Table 2. Clinical characteristics of study participants by Hispanic origin.

Characteristic	Hispanic Origin						
	Total	Colombian	Cuban	Dominican	Mexican	PR	Other
	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)
No. of participants	165 (100)	18 (10.91)	10 (6.06)	11 (6.67)	10 (6.06)	95 (57.58)	21 (12.73)
Laterality							
Right	90 (54.6)	9 (50.0)	6 (60.0)	7 (63.6)	8 (80.0)	52 (54.7)	8 (38.1)
Left	75 (45.5)	9 (50.0)	4 (40.0)	4 (36.4)	2 (20.0)	43 (45.3)	13 (61.9)
Cancer Stages							
In-situ	33 (20.0)	6 (33.3)	3 (30.0)	4 (36.4)	2 (20.0)	15 (15.8)	3 (14.3)
Localized	85 (51.5)	10 (55.6)	7 (70.0)	4 (36.4)	4 (40.0)	50 (52.6)	10 (47.6)
Regional	44 (26.7)	2 (11.1)	0 (0.0)	3 (27.3)	4 (40.0)	29 (30.5)	6 (28.6)
Distant	3 (1.8)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (1.1)	2 (9.5)
Radiation Therapy							
No	88 (53.3)	9 (50.0)	3 (30.0)	3 (27.3)	7 (70.0)	51 (53.7)	15 (71.4)
Yes	72 (43.6)	9 (50.0)	7 (70.0)	8 (72.7)	3 (30.0)	40 (42.1)	5 (23.8)
Unknown	5 (3.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	4 (4.2)	1 (4.8)
Chemotherapy							
No	86 (52.1)	12 (66.7)	7 (70.0)	6 (54.6)	5 (50.0)	49 (51.6)	7 (33.3)
Yes	79 (47.9)	6 (33.3)	3 (30.0)	5 (45.5)	5 (50.0)	46 (48.4)	14 (66.7)
Hormone Therapy							
No	66 (40.0)	6 (33.3)	4 (40.0)	3 (27.3)	7 (70.0)	35 (36.8)	11 (52.4)
Yes	93 (56.4)	12 (66.7)	6 (60.0)	8 (72.7)	2 (20.0)	56 (59.0)	9 (42.9)
Unknown	6 (3.6)	0 (0.0)	0 (0.0)	0 (0.0)	1 (10.0)	4 (4.2)	1 (4.8)
Surgery							
No Surgery	5 (3.0)	2 (11.1)	0 (0.0)	0 (0.0)	0 (0.0)	1 (1.1)	2 (9.5)
BCS	83 (50.3)	10 (55.6)	9 (90.0)	5 (45.5)	4 (40.0)	49 (51.6)	6 (28.6)
Mastectomy	77 (46.7)	6 (33.3)	1 (10.0)	6 (54.6)	6 (60.0)	45 (47.4)	13 (61.9)

PR = Puerto Rican; BCS = Breast-conserving Surgery
Due to rounding of decimal values, percentages may not sum to 100.

Table 3. Comparison of HRQOL Domains across Hispanic origins.

Characteristic	Quality of Life Scores (Mean ± SD)					
	FACT-B Domain Scores					
	Total	PWB	SWB	EWB	FWB	BCS
All Participants	104.2 (25.8)	21.2 (6.4)	21.1 (5.9)	18.4 (4.9)	19.3 (6.2)	24.2 (8.5)
Hispanic origin						
Colombian	109.5 (25.5)	22.8 (6.6)	19.7 (7.0)	19.6 (5.6)	20.4 (5.4)	26.9 (8.3)
Cuban	116.3 (18.3)	23.0 (6.3)	25.1 (2.2)	20.0 (2.9)	22.1 (4.2)	26.1 (6.7)
Dominican	97.8 (32.1)	18.6 (9.0)	19.8 (5.1)	17.2 (5.3)	17.4 (7.0)	24.9 (11.2)
Mexican	110.6 (23.9)	22.8 (5.1)	23.8 (4.3)	18.6 (4.5)	19.8 (6.2)	25.6 (8.2)
Puerto Rican	99.2 (26.1)	20.2 (6.3)	20.2 (6.2)	17.7 (5.1)	18.3 (6.6)	22.8 (8.4)
Other	116.6 (19.0)	23.8 (4.6)	24.0 (3.5)	20.2 (3.2)	22.1 (4.3)	26.6 (7.8)
p-value	0.0243	0.0655	0.0114	0.1744	0.0653	0.2141

Domain Score ranges: FACT-B Total (0 – 148), PWB (0 – 28), SWB (0 – 28), EWB (0 – 24), FWB (0 – 28), BCS (0 – 40)

Figure 2. Chart depicting the mean PWB domain scores of Hispanic origins.

Each bar represents the mean domain score for PWB of a specific Hispanic origin. Error bars are used to indicate the standard deviation of the mean scores. The "other" category includes individuals from Brazil, Venezuela, Peru and Honduras.
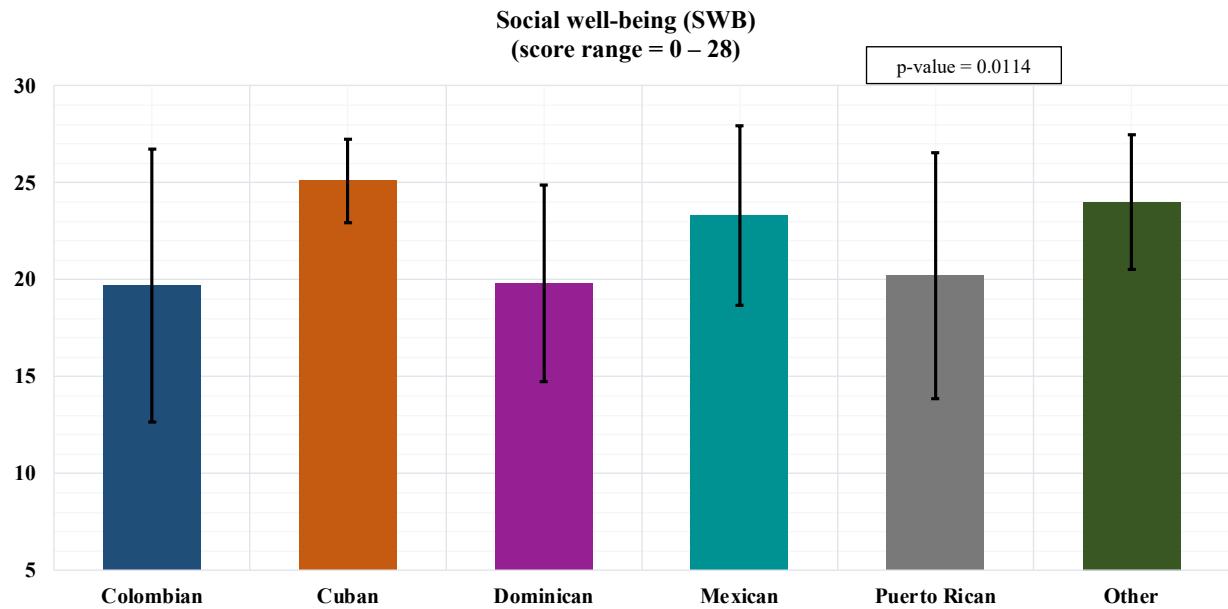
Figure 3. Chart depicting the mean SWB domain scores of Hispanic origins.

Each bar represents the mean domain score for SWB of a specific Hispanic origin. Error bars are used to indicate the standard deviation of the mean scores. The "other" category includes individuals from Brazil, Venezuela, Peru and Honduras.
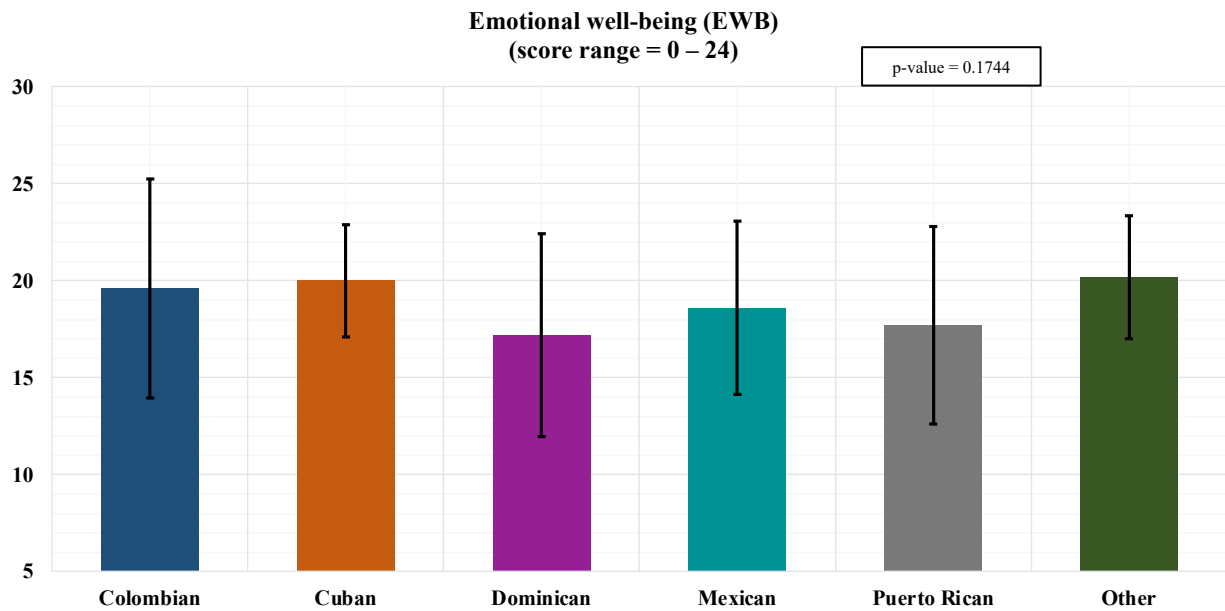
Figure 4. Chart depicting the mean EWB domain scores of Hispanic origins.

Each bar represents the mean domain score for EWB of a specific Hispanic origin. Error bars are used to indicate the standard deviation of the mean scores. The "other" category includes individuals from Brazil, Venezuela, Peru and Honduras.

Functional well-being (FWB)
(score range = 0 – 28)

p-value = 0.0653
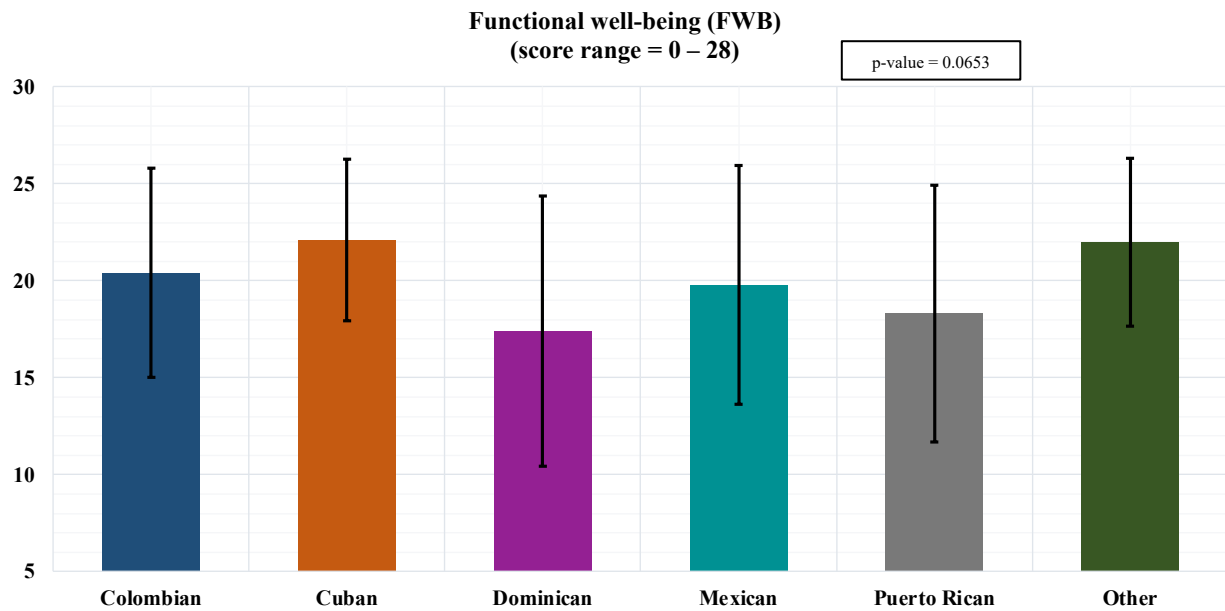
Figure 5. Chart depicting the mean FWB domain scores of Hispanic origins.

Each bar represents the mean domain score for FWB of a specific Hispanic origin. Error bars are used to indicate the standard deviation of the mean scores. The "other" category includes individuals from Brazil, Venezuela, Peru and Honduras.
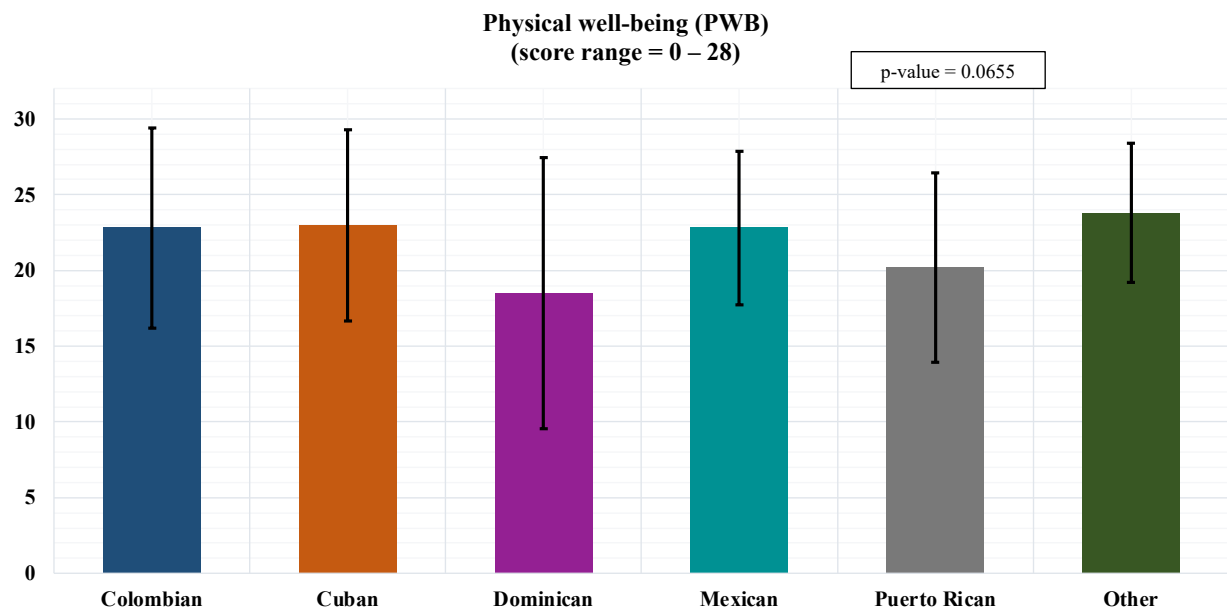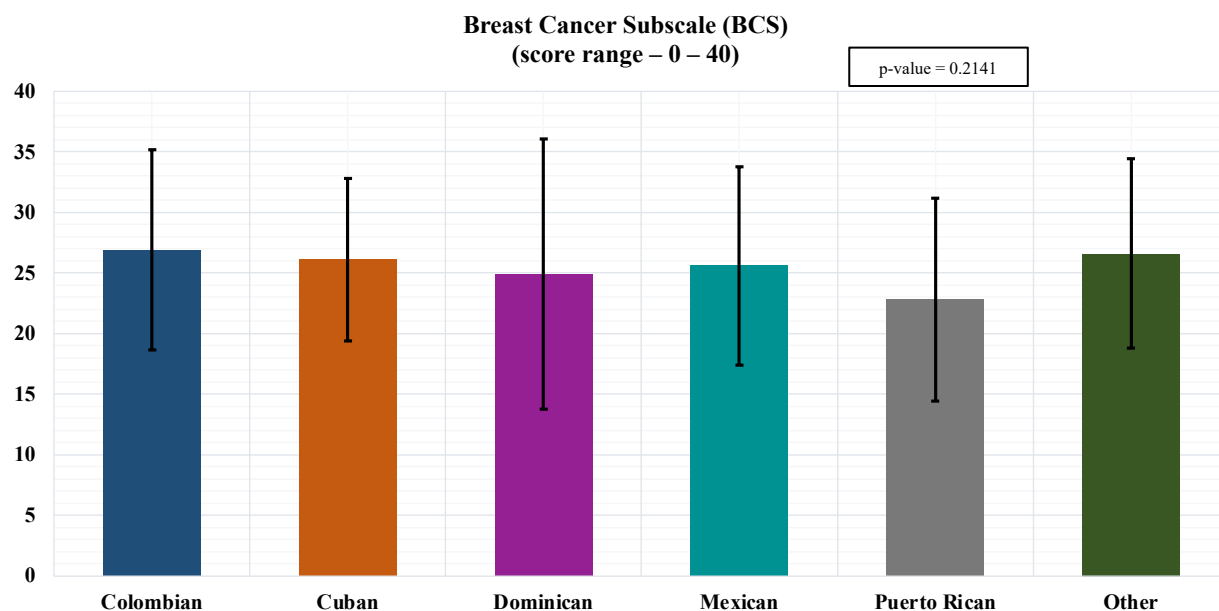
Figure 6. Chart depicting the mean BCS domain scores of Hispanic origins.

Each bar represents the mean domain score for BCS of a specific Hispanic origin. Error bars are used to indicate the standard deviation of the mean scores. The "other" category includes individuals from Brazil, Venezuela, Peru and Honduras.

FACT-B Total
(score range = 0 – 148)

p-value = 0.0243

Figure 7. Chart depicting the mean FACT-B total scores of Hispanic origins.

Each bar represents the mean FACT-B total score of a specific Hispanic origin. Error bars are used to indicate the standard deviation of the mean scores. The "other" category includes individuals from Brazil, Venezuela, Peru and Honduras.
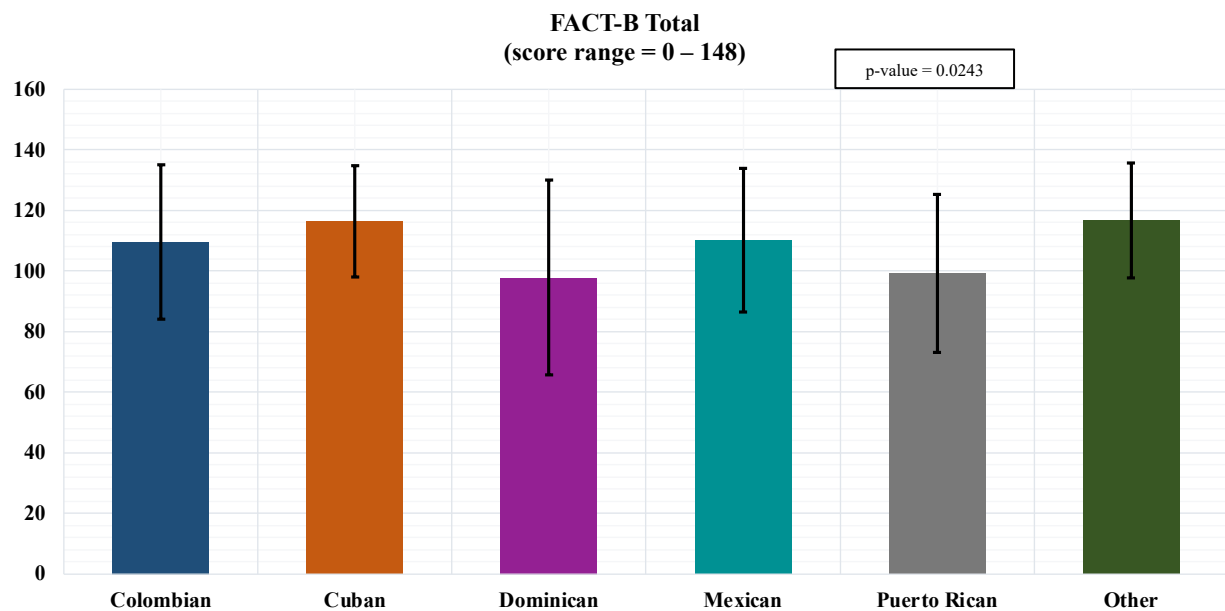
Table 4. Comparison of HRQOL Domains across patient demographic characteristics.

Characteristic	Quality of Life Scores (Mean ± SD)					
	FACT-B Domain Scores					
	Total	PWB	SWB	EWB	FWB	BCS
All Participants	104.2 (25.8)	21.2 (6.4)	21.1 (5.9)	18.4 (4.9)	19.3 (6.2)	24.2 (8.5)
Current Age						
20 - 40	85.0 (26.7)	18.9 (5.9)	20.4 (5.4)	13.6 (3.6)	16.7 (6.4)	15.4 (11.5)
41 - 60	100.8 (27.6)	20.1 (6.9)	21.1 (6.3)	17.9 (5.0)	18.7 (6.7)	23.1 (8.0)
61 - 79	108.2 (23.5)	22.1 (5.9)	21.5 (5.3)	19.1 (4.7)	19.9 (5.8)	25.6 (8.1)
≥ 80	118.6 (9.7)	25.8 (1.3)	16.6 (10.1)	22.0 (1.4)	23.0 (4.9)	31.3 (5.6)
Years since Diagnosis						
1	115.2 (32.7)	21.0 (11.5)	25.2 (3.6)	20.2 (6.4)	21.0 (8.1)	27.8 (8.8)
2	105.9 (25.2)	21.6 (5.7)	20.5 (6.7)	19.1 (4.7)	19.4 (6.9)	25.5 (7.6)
3	101.1 (22.4)	19.9 (5.8)	21.0 (5.9)	18.4 (4.9)	18.8 (5.7)	23.1 (7.3)
4	105.2 (28.1)	21.8 (6.9)	21.7 (5.0)	18.6 (4.9)	19.9 (6.0)	23.3 (9.8)
5	108.9 (22.4)	22.4 (5.6)	21.6 (4.8)	19.0 (4.2)	20.2 (5.6)	25.7 (7.8)
6	105.4 (30.2)	21.9 (6.5)	21.1 (7.5)	17.8 (5.9)	19.3 (6.6)	25.2 (8.2)
7	93.1 (23.3)	18.1 (6.6)	18.9 (6.5)	17.2 (5.1)	15.8 (6.1)	23.1 (9.2)
8	106.8 (31.4)	23.7 (5.5)	19.7 (7.6)	16.6 (4.8)	22.0 (7.1)	24.9 (11.3)
9	105.3 (32.4)	21.3 (9.0)	25.7 (2.1)	18.3 (5.7)	19.7 (6.5)	20.3 (10.8)
10	74.0 (0.0)	16.0 (0.0)	18.0 (0.0)	14.0 (0.0)	8.0 (0.0)	18.0 (0.0)
Current Smoking						
No	105.1 (25.0)	21.4 (6.3)	21.2 (6.0)	18.6 (4.5)	19.4 (6.1)	24.5 (8.3)
Yes	92.3 (34.9)	18.6 (6.3)	21.0 (6.0)	14.4 (9.6)	18.7 (5.7)	19.6 (10.7)
Unknown	62.4 (37.4)	12.0 (9.9)	19.9 (0.1)	9.5 (6.4)	8.0 (8.5)	13.0 (12.7)
Alcohol Consumption						
No	99.9 (25.5)	20.3 (6.4)	20.7 (5.9)	18.3 (5.0)	17.8 (6.1)	22.9 (7.4)
Consumed in past	102.9 (26.7)	21.0 (6.9)	20.5 (6.4)	17.8 (5.0)	19.2 (6.2)	24.4 (9.4)
Yes	113.4 (21.3)	23.2 (4.8)	22.5 (5.3)	19.8 (3.9)	21.6 (5.5)	26.3 (7.7)
Marital status						
Married	104.9 (26.6)	21.3 (6.5)	21.6 (5.8)	18.4 (4.9)	19.7 (6.3)	24.0 (8.6)
Divorced/separated	99.9 (23.3)	20.0 (6.5)	20.8 (5.4)	18.5 (4.2)	17.4 (6.0)	23.3 (8.2)
Widowed	117.8 (14.2)	23.4 (4.1)	20.9 (7.7)	21.1 (3.4)	22.6 (4.7)	29.8 (4.0)
Single	101.5 (24.1)	21.8 (5.4)	18.6 (7.0)	17.1 (5.4)	19.0 (5.4)	25.1 (7.9)
Unknown	104.8 (42.1)	21.0 (10.1)	24.6 (2.9)	18.8 (8.0)	17.2 (9.7)	23.2 (12.3)
Education						
Less than HS	103.3 (23.4)	21.1 (5.6)	21.5 (4.6)	18.8 (4.1)	17.6 (5.6)	24.4 (7.9)
HS/some college	100.9 (27.7)	20.9 (6.5)	20.4 (6.3)	18.1 (5.1)	18.8 (6.5)	22.8 (9.4)
4-year college grad +	107.5 (24.3)	21.5 (6.5)	21.7 (5.7)	18.5 (4.8)	20.1 (6.0)	25.6 (7.5)
Household income						
$0 - $49,999	97.6 (28.0)	19.6 (7.1)	20.4 (6.1)	17.7 (5.2)	17.3 (6.7)	22.6 (8.7)
$50,000 - $99,999	107.6 (21.4)	22.1 (5.1)	21.5 (5.5)	19.0 (4.5)	20.0 (5.3)	25.0 (7.9)
$100,000 or more	120.3 (20.7)	24.5 (4.9)	23.2 (5.4)	20.2 (3.4)	23.8 (4.5)	28.6 (6.8)
Prefer not to answer	104.2 (20.7)	21.6 (5.4)	21.0 (6.2)	17.7 (5.2)	20.1 (4.6)	23.8 (8.9)

HS = High school
Domain Score ranges: FACT-B Total (0 – 148), PWB (0 – 28), SWB (0 – 28), EWB (0 – 24), FWB (0 – 28), BCS (0 – 40)

Table 5. Comparison of HRQOL Domains across patient clinical characteristics.

| Characteristic | Quality of Life Scores (Mean ± SD) | | | | | |
| | FACT-B Domain Scores | | | | | |
	Total	PWB	SWB	EWB	FWB	BCS
All Participants	104.2 (25.8)	21.2 (6.4)	21.1 (5.9)	18.4 (4.9)	19.3 (6.2)	24.2 (8.5)
Laterality						
Right	101.7 (26.5)	20.6 (6.6)	20.9 (6.5)	18.3 (5.0)	18.4 (6.3)	23.6 (8.2)
Left	107.2 (24.7)	21.9 (6.1)	21.4 (5.2)	18.6 (4.7)	20.3 (6.1)	25.0 (8.8)
Cancer Stage						
In-situ	116.2 (19.0)	25.3 (3.4)	20.7 (6.7)	19.7 (3.8)	21.8 (4.9)	28.8 (6.4)
Localized	103.5 (26.0)	20.2 (6.9)	21.4 (5.3)	18.6 (4.8)	19.0 (6.4)	24.3 (8.2)
Regional	96.0 (27.1)	19.7 (6.0)	20.7 (6.6)	16.9 (5.6)	17.8 (6.4)	20.8 (8.8)
Distant	113.3 (21.6)	24.3 (3.2)	24.3 (3.2)	20.7 (3.1)	21.3 (5.9)	22.7 (10.1)
Radiation Therapy						
No	104.7 (25.3)	21.2 (6.1)	21.2 (6.2)	18.4 (5.3)	19.3 (5.8)	24.6 (7.9)
Yes	102.3 (26.8)	20.8 (6.9)	21.1 (5.6)	18.2 (4.4)	18.9 (6.7)	23.3 (9.2)
Unknown	123.0 (9.2)	26.2 (1.5)	21.3 (7.1)	21.0 (1.8)	23.6 (4.9)	30.8 (4.3)
Chemotherapy						
No	109.0 (25.1)	22.1 (6.4)	21.0 (6.4)	19.4 (4.5)	20.2 (6.1)	26.4 (7.8)
Yes	99.0 (25.7)	20.2 (6.3)	21.3 (5.3)	17.3 (5.0)	18.3 (6.3)	21.9 (8.6)
Hormone Therapy						
No	100.0 (30.2)	20.1 (7.2)	20.7 (6.9)	17.8 (5.6)	17.8 (7.1)	23.7 (9.4)
Yes	106.5 (22.4)	21.8 (5.8)	21.6 (5.1)	18.8 (4.4)	20.2 (5.5)	24.2 (7.7)
Unknown	114.4 (14.4)	24.2 (4.0)	19.5 (6.3)	19.2 (2.6)	21.2 (6.0)	30.3 (7.0)
Surgery Site						
No Surgery	102.2 (27.2)	19.8 (7.7)	18.2 (8.5)	18.8 (6.7)	19.0 (6.1)	26.4 (3.7)
BCS	107.1 (25.3)	21.6 (6.4)	21.8 (5.4)	18.6 (4.7)	20.0 (6.1)	25.1 (8.7)
Mastectomy	101.2 (26.2)	20.8 (6.4)	20.7 (6.2)	18.1 (5.0)	18.5 (6.4)	23.1 (8.4)

BCS = Breast-conserving surgery
Domain Score ranges: FACT-B Total (0 – 148), PWB (0 – 28), SWB (0 – 28), EWB (0 – 24), FWB (0 – 28), BCS (0 – 40)

VI. DISCUSSION

This study used participant responses to the FACT-B questionnaire to determine HRQOL scores of Hispanic breast cancer survivors in Central Florida. The results of this study showed that Cuban breast cancer survivors reported the highest FACT-B total score, with the highest scores in SWB and FWB, indicating a high HRQOL in this Hispanic subpopulation. Dominican breast cancer survivors reported the lowest scores for FACT-B total and all HRQOL domains, indicating the lowest HRQOL in this specific study population. According to specific patient demographic and clinical characteristics, we were able to observe significant trends in the HRQOL of participants. We observed higher HRQOL domain scores with increases in the age of participants. Participants with no smoking status reported the highest HRQOL scores, as well as those with current alcohol consumption. Specific trends were associated with the marital status of participants, with widowed participants scoring the highest in all HRQOL domains. Married participants showed greater SWB and EWB scores than single individuals, and divorced participants showed lower PWB, FWB, and BCS scores than single individuals. Additionally, participants with the highest levels of education and household incomes were reported to have the highest score in most HRQOL domains. Participants reported higher mean HRQOL scores if laterality of cancer was on the left. Having less aggressive forms of cancer led to higher HRQOL scores. Generally higher HRQOL scores resulted from either not receiving radiation therapy or chemotherapy, or receiving hormone therapy or breast-conserving surgery.

The primary findings of this study were the observations of varying HRQOL scores in participants from different Hispanic origins. Cubans were observed to have the highest SWB, FWB, and FACT-B total score. While limited literature has studied the specific association of higher HRQOL in Cuban breast cancer survivors, there are various factors affecting Cubans'

lifestyle that could influence their HRQOL. The results of the study showed that Cubans had the highest household income levels of all origin groups, with nearly 40% of Cuban participants having incomes greater than $100,000. This is consistent with current literature, which support the finding that higher income levels and better SES are associated with better health outcomes, physical and mental health, and HRQOL in cancer survivors (Maxwell et al., 2024; Park & Look, 2018; Su et al., 2021). Additionally, nearly 50% of the Cubans in this study reported having at least a 4-year college degree, which indicates higher levels of education in this study population. This is consistent with a study which reports that shorter education results in impaired HRQOL in cancer survivors (Levinsen et al., 2023). Income and education levels are huge influences on HRQOL, and higher levels of both could be the reason for better HRQOL in Cuban participants. Dominicans reported the lowest mean scores for the FACT-B total score and all HRQOL domains. Dominicans had the second largest percentage of participants in the lowest household income range, as nearly 46% of their study population belongs to this category. They also reported relatively lower education levels, as more than half of Dominican participants had only graduated high school or completed some college. As higher income and education levels correlated to higher HRQOL in Cuban participants, the same reasoning can be applied to the lower income and education levels that Dominican participants report as an explanation for their lower HRQOL scores.

Secondary findings for this study include observations about relationships between certain demographic and clinical characteristics and HRQOL. One significant observation was as the age group the participant belonged to increased, the HRQOL scores increased as well. This is consistent with current literature which reports that younger breast cancer survivors experience mental health issues and have concerns regarding weight gain and infertility that contribute to

lower QOL (Alvarez-Pardo et al., 2022). Another study showed that younger women with breast cancer were found to have more psychosocial effects and major deficits for emotional and social functioning when compared to older women, and these differences contribute to the lower QOL observed (Arndt et al., 2004). Participants with no smoking status reported higher QOL than participants who currently smoked. This is consistent with current literature which reports that smoking is greatly correlated with lower HRQOL in cancer survivors (Nolazco et al., 2023). Negative health behavior like smoking often leads to other unhealthy habits such as poor diet choices and lack of physical activity, which could influence the morbidity and mortality of cancer patients (Nolazco et al., 2023). Participants with current alcohol consumption reported higher levels of HRQOL compared to patients that did not consume alcohol. This is consistent with current literature which reports that alcohol consumption related to less anxiety and depression over time in colorectal cancer survivors, leading to better HRQOL (Revesz et al., 2022). While no literature supports these findings specific for breast cancer survivors, this can potentially be extended towards all cancer patients. The results show that married and divorced/separated participants show higher HRQOL in specific domains than single participants. Current literature supports the finding that married participants show better outcomes for breast cancer-specific and overall survival (Krajc et al., 2023; Zhu & Lei, 2023). Another study highlights the importance of social support on cancer treatment and survival, stating that unmarried participants are at higher risk of metastatic cancer and death (Aizer et al., 2013). Interestingly, this study's results report that widowed participants showed the highest levels of HRQOL. However, the study population of widowed participants was very small (N=8). Further studies must be conducted to explore the HRQOL of widowed breast cancer survivors to further support this finding. Participants with higher levels of education and household incomes reported higher levels of HRQOL overall.

Current literature supports these findings, as both higher income and education are associated with better health and HRQOL (Levinsen et al., 2023; Maxwell et al., 2024).

There were also significant associations between certain clinical characteristics and the observed HRQOL of participants. One notable finding is that participants with laterality of breast cancer in the left side showed higher levels of HRQOL. Interestingly, breast cancer on the left side is found to be more frequent in women and is also found to be more aggressive and associated with worse outcomes (Abdou et al., 2022; Tulinius et al., 1990). More research should be conducted to determine the associations between laterality of breast cancer and HRQOL. Participants with in-situ or localized cancer had higher HRQOL than those with regional cancer. This is supported by current literature which reports that there is substantial impairment in the QOL of individuals who had cancer detected in later and more aggressive stages (Pourrahmat et al., 2021). The results of this study show that Cubans had the highest proportion of participants with less aggressive localized breast cancer, which could explain their high levels of HRQOL. Participants who did not receive radiation therapy and those who did not receive chemotherapy showed higher levels of QOL. Literature supports these findings, as cancer patients who received either of these types of treatment reported worse QOL outcomes and negative health side effects (Chagani et al., 2017; Seol et al., 2021). Contrary to chemotherapy and radiation therapy, participants who received hormone therapy reported higher levels of HRQOL than those who did not receive hormone therapy. This is supported by current literature, which states that patients treated with hormone therapy showed improved QOL in clinical practice (Adamowicz & Baczkowska-Waliszewska, 2020). Regarding the type of surgery received, participants who received breast-conserving surgery reported higher levels of HRQOL than those who received mastectomy. This is consistent with current literature (Alvarez-Pardo et al., 2022).

One aspect that could potentially affect the HRQOL of Hispanic individuals in the US is their acculturation level. Upon arrival in US, Hispanic immigrants tend to adopt lifestyle, health, and cultural behaviors that persist in this country, and this leads to both negative and positive health outcomes (Cedillo et al., 2021; Lara et al., 2005). Research in breast cancer patients shows that less acculturated Latinas reported lower levels of QOL (Janz et al., 2009). Future studies could analyze the acculturation time and observe any potential effects on HRQOL.

This study is one of the first to study the specific HRQOL outcomes of Hispanic breast cancer survivors by their Hispanic origin. This study has some limitations. First, there is not an even distribution in study population among the Hispanic subpopulations studied. The distribution for Colombians, Cubans, Dominicans, Mexicans, Puerto Ricans, and others was n=18, n=10, n=11, n=10, n=95, and n=21 respectively. Nearly 60% of the study population was Puerto Rican, and only 12.12% was Cuban or Mexican. Therefore, it is hard to standardize results for the entire Hispanic community of breast cancer survivors in Central Florida. More data from the underrepresented study populations must be analyzed for further results. Additionally, this is a cross-sectional study, therefore no cause-and-effect relationship can be established from the data. Furthermore, multivariable linear regression analysis should be performed to analyze the independent effect of Hispanic origin on the HRQOL of breast cancer survivors after controlling for confounding factors like income, education levels, and other variables.

VII. CONCLUSION

There were differences observed in HRQOL among breast cancer survivors by Hispanic origin. For example, Cubans reported the highest levels of HRQOL of all origin groups, and Dominicans reported the lowest levels of HRQOL. Factors such as varying income and education levels could be determined as a potential cause for this observed disparity. Additional factors such as smoking status, alcohol consumption, marital status, laterality of cancer, cancer stage, treatment type, and surgery type all proved to have correlations with the HRQOL of Hispanic breast cancer survivors. These findings can inform healthcare professionals of factors that might influence HRQOL of patients and help them make informed decisions regarding the treatment plan and care of Hispanic breast cancer patients.

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