IMMIGRANT ASSIMILATION AND PROFILES OF BREAST CANCER PREVENTION BEHAVIORS AMONG U.S. IMMIGRANTS

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Introduction

Over the past recent decades, numerous cancer awareness campaigns have been launched aiming to improve consciousness about the risks of breast cancer among the population at risk (Adams et al., 2006; White et al., 2017). The National Breast and Cervical Cancer Early Detection Program released in 1991 and the Healthy People 2010 Program, are clear examples of the commitment adopted by the U.S. Government and federal agencies in reducing health disparities, and warrant access to cancer screening tests to the most disadvantaged groups (Adams et al., 2006; Nelson et al., 2009; White et al., 2017). Yet, recent official reports seem to confirm that the message transmitted by cancer awareness campaigns needs to be more effective in reaching certain population groups (Reyes & Miranda, 2016; Zhao, 2010). Nowadays, despite improvements, significant disparities in cancer screenings attendance between U.S.-born natives and foreign-born women persist (White et al., 2017; Yao & Hillemeier, 2014; Zhao, 2010).

Past cancer studies suggest a wide range of factors for understanding the lower cancer screening rates of immigrant women in the U.S. (Andreeva & Unger, 2007; Maly et al., 2011; Reyes & Miranda, 2016). Lack of access to health care services, elevated costs, linguistic barriers, and traditional health beliefs, are some of the recurrent explanations for the observed disparities in the breast cancer prevention between the native-born and foreign-born populations in the U.S. (Nguyen, 2012; Parsa et al., 2006; Wu et al., 2005). However, two clear and consistent findings related to cancer prevention from this dissertation so far have shown that;

firstly, substantial disparities among immigrant groups exist, and secondly, the cancer screening levels of many foreign-born women tend to resemble the ones observed among their U.S. counterparts.

Classical assimilation theories have been widely used by social scientists to model the health seeking behaviors of foreign-born and second generations of immigrants (Castro et al., 2010; Rumbaut, 1997). Much of this research proposes a double pathway linked to immigrant's health. On the one side, scholars agree that as time pass, immigrants will end up espousing the health-seeking behaviors predominant in the host countries (Akresh et al., 2016; Brown & Cosedine, 2006). On the other side, specialists also agree upon the fact that, over the years immigrants will also end up adopting health risk behaviors prevalent among the local population (Akresh et al., 2016; Bray et al., 2004; John et al., 2005). In terms of cancer prevention, classical assimilation theories, assume the existence of a linear relationship between the years of exposure to mainstream culture and the adoption of adequate cancer screening practices (John et al., 2005; Moradi et al., 1998; Rumbaut, 1997). Thereby, under this conceptual framework, it may be expected that, with time, disparities in cancer screenings usage between U.S.-born natives and foreign-born groups will be reduced and become more uniform (Bray et al., 2004; Moradi et al., 1998; Rumbaut, 1997).

Specialists agree about the importance of attending periodical cancer screenings for improving early detection and breast cancer survival (Bleyer & Welch, 2012; Harding et al., 2015; Ward et al., 2008). Still, in terms of cancer prevention, many foreign-born women continue being disadvantaged (Reyes & Miranda, 2016; White et al, 2015; Yao & Hillemeier, 2014). These behaviors pose a challenge to classical assimilation theories. Thereby, as proposed by the Segmented Assimilation Theory, the lower rates in cancer screenings attendance,

prevalent among certain immigrant groups, may be indicative of an incomplete integration to the mainstream culture or a diverse pathway to integration and adaptation to the host country (Castro et al., 2010). Studies have shown that the diverse pathways to assimilation may be strongly associated with disparities in the quality of life and adverse cancer related outcomes (Akresh et al., 2016; Xie & Greenman, 2011).

Thus far, despite the vast amount of cancer related research, a gap in the scientific literature exists; and it is connected with the utilization of the Segmented Assimilation Theory to comprehend the noticeable disparities in the prevention of breast cancer among the immigrant groups in the U.S. (Moradi et al., 1998; Rumbaut, 1997). Nevertheless, measuring breast cancer prevention behaviors may be a challenging process. So far, in this dissertation, due to the limitations of the available data sources, the adoption of these behaviors remained as a latent concept not directly observable. Consequently, this concept has been mainly approached through a set of discernable characteristics of the immigrant women, commonly contemplated by the specialized literature (Lanin et al., 1998; Maly et al., 2011; Reyes & Miranda, 2016). In this manner, in the previous chapters the goals of this dissertation were mainly guided by finding adequate predictors of cancer screenings attendance and on estimating disparities in cancer prevention behaviors among immigrant groups.

The goal of Chapter VI is to create a series of group profiles of the immigrant women more prone to prevent for the disease. Additionally, this study explores if certain individual characteristics, such as the years of residency in the U.S., the language generally used or the familial cancer experiences, are appropriate predictors of class membership. Thus, the findings from Chapter VI add to the existing knowledge by providing a subgrouping analysis of the immigrant women and their behaviors associated with the prevention of breast cancer.

Purpose and Hypotheses

The aims of this chapter are two. The first objective is to characterize immigrant women in the U.S. in accordance to their risk of engaging in breast cancer prevention by creating a series of group profiles based on their sociodemographic characteristics, cancer experiences, and behaviors related to the prevention of the disease. The second objective of this chapter is to evaluate if certain individual characteristics, such as years of residency in the U.S., the language generally used, and familial cancer experiences are significant predictors of class membership. These two specific aims will be addressed by the following questions:

(1) *Are there distinct patterns associated with the probability of engaging in breast cancer prevention behaviors among the immigrant women in the U.S.? In other words, is there a latent class structure that more adequately represents the variation in the behaviors towards the prevention of the disease of immigrant women?*

(2) *If so, what are the main characteristics of the determined classes, and what is the prevalence of cancer screenings attendance among these groups of women?*

(3) *Finally, are the English language proficiency, language generally spoken or familial cancer history, adequate predictors of latent class membership?*

Through this set of questions the combined characteristics of immigrant women more prone to prevent breast cancer can be explored. Additionally, the most relevant factors associated with the prevention of the disease may be identified. Due to the nature of the method to be employed for this specific aim, and the lack of adequate research that might help to guide this specific task, an exploratory analysis will be conducted and no previous hypotheses are going to be stated or

tested. Nevertheless, despite the limitations associated with this method, it is expected that acculturation levels and family cancer experiences become the most determinant factors for the grouping of the sampled women, in accordance to their odds of preventing for the disease.

Data

In order to answer the questions presented above, all analyses in this chapter employ data from the National Health Interview Survey (NHIS) 2000, 2005, 2010, and 2015-pooled sample. The main characteristics and purposes of the NHIS have been thoroughly described in previous chapters. All samples to be used in this study were obtained by using random selection procedures. These methods of selection assure that all participants from the population are represented in this study. Due to the complex design of the IHIS data set, the statistical procedures to be used in descriptive analyses incorporate sample design information. Nonetheless, the main goal is to characterize and identify patterns in the cancer prevention behaviors of immigrant women from the sample. Consequently, for this chapter, the generalization of the identified latent classes to the overall population of immigrants will not be considered.

Justification of the data

The key variables to be measured are the ones related to the previous experiences with cancer and those linked with the acculturation level of immigrants. Throughout the years, the NHIS has been collecting data on family cancer history of the interviewed population. Thereby, the influence exerted by the familial cancer experiences over the prevention of breast cancer of immigrant women might be explored. Additionally, the NHIS gathers detailed information about the years of residency in the U.S., and the language generally spoken. Thus, in terms of cancer

prevention, the applicability of acculturation related variables for the subgrouping of the immigrant women might be evaluated.

Methods/Measures

The chief purpose of this chapter is to identify patterns in the use of cancer screenings among the immigrant women from the sample, and to establish a set of subgroups based on immigrant characteristics and the behaviors associated with the prevention of the disease. As said in previous chapters, this dissertation is guided by the assumption that, among the immigrant women, those who do not effectively prevent for the disease are at higher risk of developing breast cancer. The information provided through the variable ever had a physical breast exam, collected by the NHIS, provides an indirect approach for measuring the prevention and breast cancer risks of immigrant women in the U.S.

Aim #1: To characterize the immigrant women in the U.S. based on their personal characteristics and their odds of adopting cancer prevention behaviors.

Aim #2: To determine if the familial cancer experiences and acculturation related variables are adequate predictors of class membership.

Breast Cancer Prevention

In Chapter VI, the key variable of interest is ever had a physical breast exam. Through this variable, disparities in cancer screenings attendance among women from the sample can be explored. This variable has been recoded as a dichotomous variable (Yes/No). The main characteristics and theoretical justification of this variable were thoroughly described in the past chapters.

Socioeconomic Characteristics

To account for the socioeconomic status of immigrants, the variables included in the analyses are: educational attainment, access to care, and poverty status. The main characteristics and theoretical justification of these variables were thoroughly described in past chapters.

The variable educational attainment identifies respondents by their highest year of school or completed degree. This variable includes the following categories: less than a high school degree, high school degree or having an associate degree, bachelor degree or more. The variable access to care indicates whether individuals have a place (or more than one place) where they usually go when feeling sick or needing a health checkup. People can be assigned into two categories: yes or no. The variable poverty status includes respondents who declared whether their family income was above or below poverty level. This variable has been recoded into the two following categories: at or above poverty threshold, below poverty threshold.

Demographic Characteristics

The variables related to the demographic features of immigrants are: age, naturalized U.S. citizen, and region of birth. The main characteristics and theoretical justification of all of these variables were thoroughly described in past chapters. The variable age identifies respondents by their reported age. The variable naturalized U.S. citizen assesses whether immigrant women have become U.S. citizens. This variable has been recoded as a dichotomous variable (Yes/No). Finally, the variable region of birth reports the place of origin of respondents by coding their reported country of birth into one of twelve categories associated. However, due to the lack of cases in certain categories, in this chapter region of birth has been comprised into four categories. Mexico, Central and South American countries, and the Caribbean Islands, were

included in one category. Europe, which contains Russia and former USSR areas. Asia, which also includes the Indian subcontinent, and South East Asia areas. Other, which includes the African countries and women who reported being born in the Middle East countries, plus all women arrived from any of the other regions from the original dataset.

Acculturation

Two variables serve as proxy measures of acculturation: years in the U.S., language generally used. The main characteristics and theoretical justification of these variables have been thoroughly described in past chapters. The variable years in the U.S. includes the following categories: less than a year to less than five years, 5 years to less than 10 years, and 10 years or more. Finally, the variable language generally used has been comprised into two categories: English/Mostly English and Other.

Family Cancer Experience

To test the influence of personal experiences and cancer awareness over the odds of cancer screening attendance of immigrant women, the variable family cancer experience has been included in the analyses. The main characteristics and theoretical justification of this variable were thoroughly described in past chapters. This variable has been recoded as a dichotomous variable (Yes/No).

Statistical Approach

In order to accomplish with the objectives stated, basic descriptive statistics for each one of the variables were computed by using R Studio 3.3.2. All cross tabulation and Chi-Square tests between variables, were performed by using survey design procedures. Primary sampling unit

(PSU), stratification (STRATA), and for unequal weighting probabilities of selection (PERWEIGHT). By adding survey design procedures, the representativeness of the sample over the population of interest is increased, and the inferences derived from sample observations might be expanded to represent the population characteristics (Dillman et al., 2014). Latent class models and latent class regression models were computed by utilizing the "polCA" function included in the "polCA" package in R Studio 3.3.2. The values of the Variance Inflation Factor (VIF) of all predictor variables indicated that multicollinearity was not present in the final models. In order to select the proper number of classes for the final model, seven different models containing from two and up to a seven classes, were tested. The final model, with the optimal number of classes, was chosen based on model fitness and parsimony. Akaike Information Criterion (AIC), Log-Likelihood, Bayesian Information Criterion (BIC), and Pseudo R-Squared Information, are presented and compared in order to identify the optimal model and diagnose the fit of the model.

A two-step analysis approach is executed. The analysis conducted in the first step aims to determine the existence of a latent class structure linked to the cancer screening attendance of immigrant women. The analysis directed in the second step aims to reveal adequate predictors of class membership. The multivariate statistical method selected for the first part of the analysis involves a traditional Latent Class Analysis. This method is based on respondents' responses to a set of observed categorical variables, and it is usually employed to identify a set of discrete and mutually exclusive latent classes of individuals (Lanza et al. 2007). Latent Class models are generally employed to analyze categorical data and have the advantage of making no assumptions about the distributions of the indicators, other than the local independence (Lanza et al. 2007). In addition, Latent Class models are mostly employed for exploratory analyses in which no a priori hypotheses regarding the nature of latent classes are going to be tested (Laudy et al. 2005).

For the second part of the analysis, Latent Class Regression models are estimated. Latent Class Regression models generalize the traditional Latent Class models and allow estimating the effects of covariates on the prediction of class' membership (Kasprzyk, 2010). In this chapter, the interest is not guided in making predictions about the response variable. On the contrary, the main interest lays on the clustering of respondents according to their breast cancer prevention behaviors. As said, Latent Class Analysis allows categorizing and clustering the population of interest into a set of different groups or latent classes based on their personal characteristics. Thus, Latent Class Analysis is the best approach to achieve the goals of this chapter.

Descriptive Analysis Results

Table 6.1 shows the distribution of demographic and socioeconomic characteristics of immigrants and their relationship with the prevention of breast cancer. Most of the relationships between variables were presented and analyzed in the previous chapters. Therefore, only the new variables included in these analyses are described.

Table 6.1 Selected Socio-demographic Characteristics of Immigrant Women by Physical Breast Exam. United States. (n = 8,662)

	Foreign-Born Pop. (%)	Ever Had a Breast Exam Yes (%)	Ever Had a Breast Exam No (%)
Cancer Prevention			
Ever Had a Physical Breast Exam			
No	37.7		
Yes	62.3		
Demographic Characteristics			
Naturalized U.S. Citizen ***			
No	39.9	54.8	45.2
Yes	60.1	67.2	32.8
Age ***			
30-39	29.7	58.3	41.7
40-59	42.1	64.2	35.8
60-79	22.6	64.5	35.5
80-More	5.6	59.5	40.5
Region of Birth ***			
Mexico/Central/South America	51.2	58.3	41.7
Europe	18.1	72.4	27.6
Asia	23.4	59.6	40.4
Other	7.3	73.2	26.8
Socioeconomic Characteristics			
Poverty Status ***			
At or Above Poverty Threshold	77.1	65.8	34.2
Below Poverty Threshold	22.9	50.3	49.7
Educational Attainment ***			
Less H. School D.	30.3	50.3	49.7
H. School D./ Assoc. Degree	41.4	64.5	35.5
Bachelor D./More	28.3	71.7	28.3
Access to Medical Care ***			
No	15.1	47.1	52.9
Yes	84.9	64.9	35.1
Acculturation			
Years in the U.S.***			
Less than 5 Years	8.7	49.4	50.6
5 Years to Less than 10 Years	9.9	55.1	44.9
10 Years or More	81.4	64.5	35.5

Table 6.1 Continued.

	Foreign-Born Pop. (%)	Ever Had a Breast Exam	
		Yes (%)	No (%)
Acculturation			
Language Generally Speak***			
English/Mostly English	44.1	75.2	24.8
Spanish/Other	55.9	49.3	50.7
Cancer Experience			
Family Cancer Experience ***			
No	79.2	58.9	41.1
Yes	20.8	75.1	24.9

Significance Levels *p<0.05, **p<0.01, ***p<0.001

Survey Design: PSU=PSU STRATA=STRATA WEIGHTS=PERWEIGHT

Source: NHIS 2000-2005-2010-2015

As seen in Table 6.1, over 81% of the women from the sample are long-term residents and have been living in the U.S. for at least ten years. On the contrary, around 9% of the sampled women have immigrated to the country during the most recent years and have been living in the U.S. for less than five years. Likewise, Table 6.1 seems to confirm that the amount of years in the U.S. may be positively associated with the prevention of breast cancer. In this manner, Table 6.1 shows that, over 35% of the immigrants with at least ten years of residency in the country have never received a physical breast exam; still, in comparison with the more recent immigrants, long-term immigrant women are more likely of preventing for the disease. In contrast, even though cancer screening levels seem to be evenly distributed among the more recent immigrants, over 50% of the immigrant women who have been living in the country for less than 5 years have never attended a breast cancer screening test. Thereby, at a quick glance, the results from the analyses appear to provide support to the premises suggested by the Segmented Assimilation Theory (Akresh et al., 2016; Xie & Greenman, 2011). Therefore, in terms of breast cancer prevention, Table 6.1 shows that despite having several years of residency

in the U.S., many immigrant women continue not attending the recommended breast cancer screening tests.

With regard to the language generally used, Table 6.1 shows that close to 56% of the women from the sample speak mostly in either Spanish or other language than English. On the contrary, a little over 44% of the immigrant women from the sample tend to use English as their primary language. Regarding the association between the language generally used and the prevention of breast cancer, results from descriptive analyses seem to be in accordance with what is stated by the previous research. Therefore, for many foreign-born women living in the U.S., being not proficient in English can be a serious barrier to cancer screenings access (Parsa et al., 2006; Sentell & Braun, 2012). Thus, Table 6.1 shows that among the immigrant women from the sample, those who are more proficient in English are more likely of having received a breast cancer exam (75.2%). In clear contrast, close to 51% of the foreign-born women who do not speak in English in their daily lives never have received a breast cancer exam.

Multivariate Analysis Results

Are there distinct patterns associated with the cancer prevention behaviors of immigrant women in the U.S.? In other words, is there a latent class structure that more adequately represents the variation in these behaviors? If so, what are the main characteristics of the determined classes, and what is the prevalence of cancer screenings attendance among these women?

To identify patterns of cancer prevention behaviors among immigrant women and the variables predicting the configuration of these behaviors, latent class models have been computed. Table 6.2 depicts a series of fit statistics intended to ease model comparison and selection. For this study, model selection was guided by the goal of choosing a model that

displays clear and discernible patterns on the cancer screening attendance of immigrant women, but also that it maximizes the information provided by the factors associated with the prevention of the disease.

Table 6.2 Comparison of Fit Statistics by Number of Classes. (n = 8,662)

Number of Classes	Log-Likelihood	G-Squared	AIC	BIC	Pseudo R-Squared
2	-62204	9432	124474	124708	0.65
3	-61094	7212	122288	122641	0.72
4	-60449	5923	121034	121507	0.70
5	-60224	5473	120617	121211	0.68
6	-60056	5137	120315	121029	0.66
7	-59961	4946	120158	120992	0.64

Source: NHIS 2000-2005-2010-2015

In general, in Latent Class Analysis, model selection is guided by the choice of models with the lowest AIC and the lowest BIC. Nonetheless, at the time of choosing the best model, a balance between model fitness, parsimony and interpretation of results should be considered (Collins & Lanza, 2010). As seen in Table 6.2, when comparing models, the 4-classes model, shows a significant reduction in the AIC and BIC values. Nonetheless, estimates may be easier to interpret in models with fewer classes, as is the case of the 3-classes model. In order to provide an extra measure of model fitness and facilitate model selection, a Pseudo R-Squared was computed. As known, Pseudo R-Squared is a measure of model fitness ranging from 0 to 1. The closer this value is to 1, the better the model adjusts to the data (Freese & Long, 2006). However, Pseudo R-Squared statistics are not suitable to relate models and measures derived from a variety of sources. These measures are only valuable for comparing nested models fitted by using the same dataset and for predicting the same outcome variable (Freese & Long, 2006).

Table 6.3 Probability of Having a Physical Breast Exam among Foreign-Born Women. United States. (n = 8,662). (Item-Response Probabilities for Three-Latent Class Model).

	Segmented Assimilation	New Immigrant	Classic Assimilation
Cancer Prevention			
Ever Had a Physical Breast Exam			
No	56.82	42.44	26.24
Yes	43.18	57.56	73.76
Demographic Characteristics			
Naturalized U.S. Citizen ***			
No	66.64	81.32	14.25
Yes	33.36	18.68	85.75
Age ***			
30-39	36.00	60.65	19.74
40-59	41.00	34.21	46.57
60-79	19.19	5.01	27.12
80-More	3.81	0.13	6.57
Region of Birth ***			
Mexico/Central/South America	90.2	32.22	46.75
Europe	1.85	12.62	19.40
Asia	6.62	42.65	25.80
Other	1.33	12.51	8.05
Socioeconomic Characteristics			
Poverty Status ***			
At or Above Poverty Threshold	49.06	85.07	88.44
Below Poverty Threshold	50.94	14.93	11.56
Educational Attainment ***			
Less H. School D.	76.09	3.93	14.39
H. School D./ Assoc. Degree	23.91	39.25	52.52
Bachelor D./More	0.00	56.82	33.09
Access to Medical Care ***			
No	25.18	25.92	7.41
Yes	74.82	74.08	92.59
Acculturation			
Years in the U.S.***			
Less than 5 Years	9.47	38.25	0.30
5 Years to Less than 10 Years	12.16	39.06	1.08
10 Years or More	78.37	22.69	98.62

Table 6.3 Continued

	Segmented Assimilation	New Immigrant	Classic Assimilation
Acculturation			
Language Generally Speak***			
English/Mostly English	9.73	32.81	64.62
Other	90.27	67.19	35.83
Cancer Experience			
Family Cancer Experience ***			
No	86.68	86.93	73.6
Yes	13.32	13.07	26.4
	Class 1	Class 2	Class 3
Percent of Sample Size	38.84	13.12	48.04
	3364	1136	4161
Predicted Class Memberships	39.16	11.97	48.87
	3392	1037	4233

Data are unweighted

Source: NHIS 2000-2005-2010-2015

As seen in Table 6.2, of all fitted models, the 3-class model has the highest Pseudo R-Squared (0.72). Thus, this model provides the most reliable predictions of class membership (Freese & Long, 2006). Table 6.3 describes item response probabilities based on respondent characteristics, for a three estimated class model. Labels have been assigned to classes by linking the identified patterns to the main arguments proposed by Assimilation and migration theories. Thereby, Table 6.3 shows that, over 48% of the immigrant women were assigned to be in the class termed as “Classic Assimilation”. This class has the highest probability of class membership. Moreover, close to 39% of women from the sample were estimated to be in the second largest class termed as “Segmented Assimilation”. Finally, the group with the smallest probability of class membership is the class termed as “New Immigrant”, which it comprises over 13% of the women from the sample.

According to Table 6.3, it is estimated that at least close to 43% of the immigrant women from the sample have received a physical breast exam. Nonetheless, findings from previous chapters revealed that, in terms of cancer prevention, marked contrasts among immigrant groups exist. In this line, latent class analysis showed the existence of three clear and distinct patterns related to the cancer prevention behaviors of immigrant women. The demographic composition of these classes indicates a well-defined immigrant assimilation expressed by each profile. Thus, the group termed as "Segmented Assimilation" can be identified as the one at most risk of breast cancer, due to the high percentage of women in this class who never attended a physical breast exam (56.8%). A possible explanation for the lack of cancer screening attendance among the women in this group may be given by the strong link between cancer awareness and familial cancer experiences (Parsa et al., 2006; Wu et al., 2005). As seen in Table 6.3, only 13.3% of women in the "Segmented Assimilation" class have a family cancer experience. As a result, many women in this group may be unaware about the risks of breast cancer, and therefore, to be less prone to actively prevent for the disease.

With regard to the region of birth, Table 6.3 shows that the majority of members included in the "Segmented Assimilation" class are foreign-born women arrived from Latin American countries (90.2%). Previous studies suggest that, in comparison to other racial/ethnic groups, Hispanic immigrants tend to have a lower socioeconomic status, and consequently, they are more likely of facing economic hardships (Portes et al., 2007). Results from latent class models seem to be in line with this statement. As depicted in the table, it is estimated that around 25% of the women included in the "Segmented Assimilation" class have no access to medical care, and over 76% of these women do not have a high school degree. The low educational attainment among women in this group may considerably affect their chances to get highly qualified jobs, and

consequently, their capacity to afford the expenses of cancer screenings and treatment. Finally, Table 6.3 shows that almost 51% of the women in the "Segmented Assimilation" class were estimated to be living in poverty. Therefore, the recurrent economic constraints dictated by their lower socioeconomic status may become a serious obstacle to granting access to cancer screenings and treatment, and it places the immigrant women in this class at an increased risk of breast cancer.

In terms of assimilation to the U.S., Table 6.3 shows that despite the fact that close to 79% of women in the "Segmented Assimilation" class are long-term immigrants with at least ten years of residency in the country, only 33% of them have achieved the U.S. citizenship. This small percentage may be indicative of an irregular situation in terms of the legal statuses of many of the women in this group. Nonetheless, to fully endorsing this statement more research may be needed. As known undocumented immigrants have greater difficulties to obtain access to health care and cancer treatment (Andreeva & Unger, 2007; Maly et al., 2011).To conclude, Table 6.3 displays that over 90% of immigrant in the "Segmented Assimilation" class are estimated to speak mostly in either language than English. Previous cancer research suggests that, for many immigrant women, the lack of English proficiency may be a serious obstacle to increase cancer screenings attendance (Parsa et al., 2006; Wu et al., 2005). Thereby, the estimated features of the "Segmented Assimilation" class set this group apart from the linearity suggested by classical migration theories and show that, in spite of having longer periods of residency in the U.S., many immigrant women remain not preventing for breast cancer.

The second estimated class has been termed as "New Immigrant" because it represents the profile of recent flows of immigrants to the U.S. As depicted in Table 6.3, a high percentage of women in the "New Immigrant" class has never attended a physical breast exam (42.4%).

Additionally, the table shows that only a small proportion of the women in this class have a familial cancer experience (13.07%). As before, the lack of cancer screenings attendance, observed among women in this group, may be partially explained by a scarce awareness about the risks of breast cancer. Nonetheless, despite familial cancer experiences, to get a better understanding of the cancer prevention behaviors prevalent among women in the "New Immigrant" class, additional factors should be considered (Maly et al., 2011; Reyes & Miranda, 2016).

As seen in Table 6.3, more than 55% of the members in this group are immigrant women arrived from Asian, African or Middle East countries. Research has shown that, more traditional gender roles limit women's decisions and gender relations, and have implications for their daily lives as well as their health prevention behaviors. In line with this argument, cancer studies reveal that among women from Asian and Muslim countries, the distrust of non-traditional medicine is high, and many of these women reject being screened and touched by a male physician (Wu et al. 2005; Kobeissi et al. 2014). Thereby, even after migration, the traditional cultural values, generally observed within patriarchal societies, can highly influence and delay the adoption of breast cancer prevention behaviors of the immigrant women at risk of the disease (Wu et al., 2005; Parsa et al., 2006; Kobeissi et al., 2014).

Table 6.3 shows that a high proportion of women in the "New Immigrant" class, have recently moved to the U.S. As seen, over 38% of the women in this group have been living in the country for less than 5 years. Nonetheless, in general the cancer screening levels of women in the "New Immigrant" class are considerably higher than the ones observed in the 'Segmented Assimilation" class (57.56% and 43.18%, respectively). As it was shown, this former class is characterized for having a high proportion of members with more than ten years of residency in

the country. Thus, the findings from the model confirm the ambivalent relationship between the years lived in the U.S. and the adoption of cancer prevention behaviors (Breen et al., 2010). Despite that, an elevated number of women in the “New Immigrant” class have recently moved to the U.S., still, they are more likely of having access to cancer screenings and prevent for the disease.

Table 6.3 shows that in general, members included in the “New Immigrant” class are characterized for having high education levels. As seen in the table, around 57% of the women in this class have at least a bachelor degree and only 3.9% of them do not have a High School diploma. Nevertheless, Table 6.3 displays that, less than 19% of the women in the “New Immigrant” class have obtained the U.S. citizenship and close to 26% of them do not have access to medical care. Despite these numbers, it is estimated that less than 15% of the women in this class are living in poverty. Finally, Table 6.3 shows that, in comparison to the other classes, the "New Immigrant” class, has a younger age structure. As depicted, up to a 61% of women in this class are less than 40 years old. To conclude, latent class analyses revealed that the low cancer screening levels of the “New Immigrant” class might not be entirely determined by the socioeconomic status of its members. On the contrary, the high percentage of women in this group, who have never attended a physical breast exam, could be partially determined by their shorter length of residency in the U.S. and the persistent influence of strong cultural values not yet challenged by assimilation processes (Lee et al., 2014; Marfani et al., 2013).

The third estimated class has been termed as “Classic Assimilation”. As seen in Table 6.3, over 26% of women in this class have never received a physical breast exam. Moreover, the table shows that in the Classic Assimilation” class, the percentage of women who have a familial cancer history is much higher in comparison with the other two classes (26.4%). Preliminary

results have shown that, among the immigrant women from the sample, a strong connection between familial cancer history and cancer screening attendance exists. Thereby, in the "Classic Assimilation" class, the higher proportion of women who are experienced with the consequences of cancer may partially explain the significant differences in cancer screenings attendance between the three estimated classes.

Table 6.3 shows that women in the "Classic Assimilation" class are more diverse with regard to their nationality or region of origin. As estimated, a high proportion of women in this class, were born in Latin American countries (46.8%). Nevertheless, over 45% of these women are immigrants from more developed regions such as Europe, Canada or certain Asian countries. With regard to the socioeconomic characteristics, Table 6.3 shows that over half of the women in the "Classic Assimilation" class have only a High School diploma or an Associate degree (52.5%). Still, women in this class are more likely of living above the poverty line and having a regular access to medical care (88.4% and 92.6%, respectively). Thus, in comparison with the other classes, the higher reception of cancer screening tests among members of the "Classic Assimilation" class, it may be also explained by their better economic status and the ability to afford the expenses of health prevention cares.

Finally, acculturation related variables provide an overall vision of the integration processes in the U.S. carried by the members included in the "Classic Assimilation" class. As seen in Table 6.3, most of the members of this class are long-term immigrants, who have obtained the U.S. citizenship (85.8%). Additionally, women in the "Classic Assimilation" class are more likely of speaking in English, and are characterized for having lived in the country for at least ten years (64.6% and 98.6%, respectively). The length of residency of immigrants in the "Classic Assimilation" class seems to be consistent with their estimated age. Table 6.3 shows

that, less than 20% of the members in this class are young adults, and close 34% of them are estimated to be at least 60 years old. Thereby, as dictated by research experience, the estimated features of members in the "Classic Assimilation" class tend to be positively associated with a higher reception of breast cancer screenings (Nguyen, 2012; Parsa et al., 2006; Wu et al., 2005). In this manner, in comparison with the other estimated classes, women in this group may be at a lower risk of the disease.

Latent Class Regression Models

Are the English language proficiency, language generally spoken or familial cancer history, adequate predictors of latent class membership?

In this part of the analysis, Latent Class Regression models have been fitted aiming to identify whether certain immigrant characteristics can be utilized as significant predictors of class membership. Table 6.4 shows the odds ratios results from estimated models. Odds ratios are interpreted as the increase in the likelihood of membership in a particular class in comparison to a reference class (Kasprzyk, 2010; Linzer & Lewis, 2011). At first, estimates from the models revealed that both assimilation related variables as well as variables related to the familial cancer experiences are strong and significant predictors of class membership. Secondly, as was expected, results from regression models have shown to be in line with the estimates from the latent class models previously presented.

As seen in Table 6.4, among the immigrant women from the sample, those who have received a physical breast exam have almost four times the odds of being in the "Classic Assimilation" class than being in the "Segmented Assimilation" class. With regard to cancer experiences, the table shows that among sampled women, those who lack familial cancer

experiences have 66% lower odds of being in the "Classic Assimilation" class than being in the "Segmented Assimilation" class.

Table 6.4 Latent Class Regression Models for the Probability of Class Membership. (n = 8,662).

Variables	New Immigrant vs Segmented Assimilation	Classic Assimilation vs Segmented Assimilation
Ever Had a Physical Breast Exam		
No	1.00	1.00
Yes	2.17***	3.86***
Years in the U.S.		
Less than 5 Years	1.00	1.00
5 Years to Less than 10 Years	+4.00***	0.63***
10 Years or More	-4.00***	1.39***
Language Generally Speak		
Other	1.00	1.00
English/Mostly English	3.09***	+4.00***
Family Cancer Experience		
Yes	1.00	1.00
No	1.08	0.34***

Data are unweighted

Source: NHIS 2000-2005-2010-2015

In relation to assimilation related variables, Table 6.4 shows that among the women from the sample, those who have been living in the U.S. for at least ten years have 39% higher odds of being in the "Classic Assimilation" class versus being in the "Segmented Assimilation" class. On the contrary, the table shows that immigrant women with less than 10 years of residency in the country have 37% lower odds of being in the "Classic Assimilation" class versus being in the "Segmented Assimilation" class. Finally, as depicted in Table 6.4 among the immigrant women from the sample, those who speak generally in English have four times the odds of being in the "Classic Assimilation" class versus being in the "Segmented Assimilation" class. Thereby, by the means of Latent Class Regression models, a better understanding of the influence of

covariates over the dependent latent variable (class membership) was achieved and influential factors for this grouping have been identified.

Conclusions

Over the past recent decades, numerous public awareness campaigns have been conducted, producing effective results and raising consciousness about the risks of breast cancer in communities across the U.S. (Adams et al., 2006; White et al., 2017). Because of the efforts of health promotion campaigns, in a few years lapse, a significant increase in the breast cancer screening rates among the population at risk has been achieved (Jacobsen & Jacobsen, 2011). Nevertheless, despite improvements, low levels in the cancer screening attendance persist among certain immigrant groups (Reyes & Miranda, 2016; Zhao, 2010). Most experts agree that early detection and regular attendance for cancer screening tests are the chief strategies to reduce the heavy load of breast cancer (Bleyer & Welch, 2012; Harding et al., 2015). However, the limited access to basic health care services, more noticeable among foreign-born groups, poses a major challenge for the accomplishment of cancer related goals (Maly et al., 2011; Tejeda et al., 2013; Ward et al., 2008). Thereby, is highly likely that the historical disparities in breast cancer outcomes between U.S.-born and foreign-born women remain the same for the next coming years (White et al., 2017; Yao & Hillemeier, 2014; Zhao, 2010).

Numerous authors have applied the classical assimilation theories to comprehend and model the health prevention behaviors of immigrant populations (Castro et al., 2010; Rumbaut, 1997). Accordingly, it is expected that after a process of assimilation to the mainstream culture, immigrants will eventually end up embracing the health preventive behaviors more prevalent in the host countries (Akresh et al., 2016; Brown & Cosedine, 2006). Nonetheless, one of the main criticisms of this approach is that the assimilation trajectories of immigrants may be vastly

diverse; and these trajectories can be highly influenced by the human and social capital of its agents (Eitle et al., 2009; Xie & Greenman, 2011; Portes & Zhou, 1993). In this line, migration research has shown that not only the labor and educational trajectories of women are disrupted, but even their role within families may be also affected after migrating (Boyle et al., 2008; Cooke, 2008; Parrado et al., 2005; Shauman, 2007). For instance, women's autonomy in decisions about health and cancer preventive cares can be set aside or postpone over time (Gorman et al., 2010; Osamor & Grady, 2016; Shauman, 2007). Thus, the empirical experience confirms that the relationship between the years lived in the host country and the engagement in appropriate cancer screening practices may be not linear (Akresh et al., 2016; Gonzalez Castro et al., 2010).

As said, with regard to cancer prevention, in general, immigrants in the U.S. are systematically disadvantaged (White et al., 2017; Yao & Hillemeier, 2014; Zhao, 2010). Thus, it is difficult to fully agree with the assumptions of classic assimilation theories, when many immigrant women with long years of residency in the country remain outside of the medical system and are insensible about the risks of breast cancer (Nguyen, 2012; Parsa et al., 2006; Wu et al., 2005). However, the applicability of classical theories for modeling the cancer prevention behaviors of immigrant populations should not be totally disregarded. Two major findings from previous chapters revealed that; first, substantial disparities among foreign-born groups exist. Second, the cancer prevention behaviors of many immigrant women resemble the ones regularly followed by their U.S. counterparts. In conclusion, despite the vast amount of literature on cancer prevention, a research gap still exists. Therefore, to better understand the persistent disparities in the use of cancer screening tests, between and within immigrant groups, more research may be required.

As known, for many immigrant women the lack of access to medical care has as its direct outcome the underperformance in breast cancer screening tests (White et al., 2017; Yao & Hillemeier, 2014; Zhao, 2010). Hence, as it is proposed by the Segmented Assimilation theory, the systematic deprivation of an adequate cancer prevention and treatment may be indicative of a different pathway to integration into the main society (Castro et al., 2010). In this line, studies have shown that the diverse pathways to assimilation may be strongly associated with disparities in the quality of life and adverse cancer related outcomes (Akresh et al., 2016; Xie & Greenman, 2011). In the migrant health literature, to the best knowledge of the author of this paper, the current is one of the few studies utilizing the Segmented Assimilation Theory for framing the cancer prevention behaviors of immigrant women in the U.S. In this regard, the findings of this dissertation have provided strong evidence for supporting the assumptions on health seeking behaviors from both theories, the Classical and the Segmented Assimilation.

Results from Latent Class models suggest three subgroups of immigrant women characterized by their use of cancer screening tests and disparate socio-demographic characteristics. The first estimated group was termed Segmented Assimilation Class. Members of the Segmented Assimilation Class are estimated to be at a higher risk of breast cancer due to their low probability of having attended a physical breast exam. In addition, one of the main characteristics of members of this class is the tendency to face increased barriers to medical care dictated by their lower socioeconomic status. Thereby, members of the Segmented Assimilation Class are identified for coming from Latin American countries, for living in poverty and having a lower educational attainment. Finally, it is estimated that a high percentage of members of this class have been living in the U.S. for a long time, still, only a third of them have obtained the U.S. citizenship. To conclude, the estimated features and cancer prevention behaviors of

members included in the first group show a high degree of similarity with the trajectories and assumptions on health prevention behaviors suggested by the Segmented Assimilation Theory.

The second estimated group was termed New Immigrant Class. The estimated features of members included in the New Immigrant Class are quite the opposite of the ones representing the ideal type of the assimilation theories. On the contrary, the characteristics of members included in the New Immigrant Class share similitudes with the socio-demographic profiles of the more recent settlers in the history of the U.S. In comparison to the other estimated groups, members of the New Immigrant Class are mainly characterized by coming from neither one of the traditional migration flows and for having a higher social status. Most of the members of the New Immigrant Class are immigrants from Asia, and in a lower scale, they have come from Latin American and other non-traditional countries. Likewise, estimates from models show that most of the members of this class are recent newcomers and of younger ages. Finally, members in the New Immigrant Class may be identified for having low cancer screening attendance, and among many of them, by not having access to medical insurance. Still, in comparison to the other classes, most of the members of the New Immigrant Class are highly educated, and consequently they have a wider spectrum of work related possibilities and socioeconomic resources that protects them from poverty.

The third estimated group was termed Classic Assimilation Class. In contrary to the previous classes, members of the Classic Assimilation Class are identified for being at a lower risk of breast cancer, due to the higher rates in cancer screening attendance. Thereby, the features of members in this class are more in line with the assumptions on health behaviors proposed by the Classic Assimilation theory. With regard to sociodemographic characteristics, it is estimated that members of the Classic Assimilation Class are more diverse in terms of country of origin,

and they possess a greater access to economic resources and medical services. Finally, it is estimated that the majority of members in the Classic Assimilation Class are immigrants who have been living in the country for an extensive period and have obtained the U.S. citizenship through naturalization. Thus, in terms of cancer prevention behaviors, members of the Classic Assimilation Class show a high degree of assimilation to the U.S. by having the cancer screening levels and attendance rates more similar to the ones displayed by the U.S.-born natives.

Lastly, results from Latent Class Regression models confirmed that, factors related to the English language proficiency and cancer experiences are significantly associated with the cancer screening attendance of sampled women. In this line, estimates from models have shown that the English language proficiency, the language generally used and familial cancer experiences are adequate predictors of class membership, and they can be effectively used for the grouping of the immigrant women in accordance to their cancer prevention behaviors. To conclude, the overall results from Chapter VI have shown that, in general, the health behaviors assumed by the Classic and the Segmented Assimilation Theories are applicable to model the cancer prevention behaviors of immigrant women in the U.S. Next, in Chapter VII, this study will focus on summarizing the empirical findings and to provide insights on policy implications, based on the dissertation' results.

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