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Exploring Direct and Indirect Effects of English Proficiency on Access, Utilization, and Health Status among Californian Adults with Limited English Proficiency (LEP)

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By

Renée E. Pierre-Louis

Submitted in partial fulfillment of the requirements for the degree

Doctor of Philosophy in Health Sciences

Department of Interprofessional Health Sciences and Health Administration

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Seton Hall University

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ACKNOWLEDGMENTS

I began this journey in the Spring of 2010. It has been a long one with many bumps along the way. Now I know for sure what determination can accomplish. The level of persistence, tenacity, and strength required on this journey was enormous; however, I remained stalwart with my focus on a far-reaching goal and my heart trusting in God daily. So, firstly, I give honor and praise to Jesus Christ, my savior, who holds all things together and ordered my steps throughout this journey!

Then, I thank my dissertation committee members. The chair of the committee, Dr. Ning J. Zhang, and the members, Dr. Terrence F. Cahill and Dr. Genevieve Pinto Zipp. Thank you again! I give special thanks to Dr. Zhang, first for introducing me to the concept of using big data to conduct scientific research and then for taking the risk of supporting me in going beyond the traditional way of doing research in the doctoral program in health sciences at Seton Hall University. Indeed, the methodology and approaches in this research were unique and unprecedented in terms of what has been done before in the program. I also thank Dr. Zhang for challenging me to investigate and learn at a deeper level. In conducting this research, I developed hands-on skills in health care analytics - an area that I did not know previously.

I take this opportunity to also acknowledge faculty members who – although they did not serve on my dissertation committee – continuously supported me and showed an interest in my study: Dr. Deborah DeLuca and Dr. Paul F. Franco. Your support is very much appreciated!

Many thanks are extended to my husband, Dr. Fred Pierre-Louis, who supported my intellectual curiosity and always saw the finish line and believed that I could reach it. I am comforted to finally be able to grant his longing wish of “normalcy” returning to our life as a family.

My children Joanne, Michelle, and Daniel have been staunch supporters all along. Particularly, my daughter, Joanne, who often fell asleep during dry runs of my presentations but never complained. I would be remiss by not also thanking my niece, Mégane Viard, who always paid a quick visit to my office when she thought I had been there for too long and timidly inquired about the progress of my research and my overall wellbeing. Also, I thank my sister, Ritha Alexis, who was the trusted off-site guardian of the various versions of the draft of my dissertation. I was always concerned that my aged computer would not make it to the end of the journey. After all, it's only nine years old.

I give special thanks to my friend Afolabi Olomola for the many hours spent discussing my research and helping me make sense out of a very complex topic. I am grateful for friends such as Folabi.

Finally, I thank Melody Rosamilia, a nurse, who took the time to discuss with me the population-adapted tool developed as a result of this research to measure the effects of levels of English proficiency on access, utilization, and self-reported health status. Melody's insights from a health care provider's perspective are appreciated. I also thank friends and family members who contributed to this achievement whether through prayers or words of encouragement. So, I give thanks to all and for all.

The catalyst for my interest in population health and particularly the topic of limited English proficiency ("LEP") is the untimely death of my mother-in-law, who failed to grasp the gravity of her cervical cancer diagnosis at the time her physician communicated it to her because she was LEP. There was a breakdown in communication because the person who was translating for my mother-in-law was also LEP. Unfortunately, my family did not become aware of the situation until after two years when it was too late.

I have watched both my mother and mother-in-law struggle through the health care delivery system as they had to make life and death decisions when the ease of communication with their medical providers was compromised. I miss both dearly and deeply! After having gone through this rigorous program, I am humbled by the realization of how little we know, how much can be discovered, and how much there remains to do in terms of population health management in underserved groups.

I am gratified to have been able to contribute to the field of health research by proposing a method for studying health outcomes in LEPs based on findings from this research. At the same time, I recognize that for continued progress towards a vision of global population health, collaborative efforts among stakeholders are imperative to continuing to develop evidenced-based knowledge that can be used to improve health outcomes.

I am delighted and honored to be able to "join the scholarly conversation" - as Dr. Cahill so often mentions. I pray that the LORD continue to guide me so that the knowledge and experience I have acquired are put to use to glorify his name by serving others.

DEDICATION

To my mother, Céline Exumé, in memoriam. Mom, death cannot break the bonds of love!

To my dad, René Exumé, in memoriam. Dad, you would have been so proud of me. I miss your hearty laughs!

To my husband, Dr. Fred Pierre-Louis, and children, Joanne, Daniel, and Michelle.

To my friends, Afolabi and Adetutu Olomola. Folabi, thanks for the challenging questions and the words of encouragement. Tutu, it is done finally!

To my friend, Christine Herman. Thanks for listening and supporting me!

To Dr. Paul F. Franco. Paul, thank you so much for the many hours you spent discussing this work with me and encouraging me! You were always there for me.

To Donna Preston, my colleague and friend, who always believed I could reach this pinnacle!

To all relatives and friends who helped me get to this place . . . Thanks for everything!

One of my favorite passages of biblical scriptures

Ne le sais-tu pas? Ne l'as-tu pas appris?
C'est le Dieu d'éternité, l'Eternel, qui a créé les extrémités de la terre;
Il ne se fatigue point, il ne se lasse point; on ne peut sonder son intelligence.

Il donne de la force à celui qui est fatigué,
Et il augmente la vigueur de celui qui tombe en défaillance.

Les adolescents se fatiguent et se lassent, et les jeunes hommes chancellent;
Mais ceux qui se confient en l'Eternel renouvellent leur force.
Ils prennent le vol comme les aigles; Ils courent, et ne se lassent point,
Ils marchent, et ne se fatiguent point.

(Esaie 40: 28-31, Version Louis Second)

Hast thou not known? hast thou not heard, that the everlasting God, the LORD,
the Creator of the ends of the earth, fainteth not, neither is weary?
there is no searching of his understanding.

He giveth power to the faint;
and to them that have no might he increaseth strength.

Even the youths shall faint and be weary, and the young men shall utterly fall:
But they that wait upon the LORD shall renew their strength;
they shall mount up with wings as eagles; they shall run, and not be weary;
and they shall walk, and not faint.

(Isaiah 40: 28-31 King James Version)

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LIST OF ABBREVIATIONS AND ACRONYMS

ACA	Affordable Care Act
ACS	American Community Survey
AHRQ	Agency for Healthcare Research and Quality
BMHS	Behavioral Model of Health Services Use
CFR	Code of Federal Regulations
CHIS	California Health Interview Survey
CLAS	National Standards for Culturally and Linguistically Appropriate Services in Health and Health Care
CMS	Centers for Medicare & Medicaid Services
E+OL	Speak English and other language(s)
EO	English only
Fed. Reg.	Federal Register
HCAB	Health Care Access Barriers
HD* Calc	Health Disparities Calculator
HHS	U.S. Department of Health and Human Services
IAPCC	Inventory for Assessing the Process of Cultural Competence among Health Professionals
IOM	Institute of Medicine
IRB	Institutional Review Board
KMO	Kaiser-Meyer-Olkin Measure of Sampling Adequacy
LEP	Limited English proficiency, limited English proficient
MAR	Missing at random
MCAR	Missing completely at random

MNAR	Missing not at random
NCHS	National Center for Health Statistics
NCI	National Cancer Institute
OCR	Office for Civil Rights
OMH	U.S. Office of Minority Health
OR	Odds ratio
PPACA	Patient Protection and Affordable Care Act of 2010
PUF	Public use files
SEM	Structural equation modeling
SHRS	Self-rated health status
U.S.C.	United States Codes Annotated
UCLA	University of California, Los Angeles

ABSTRACT

Exploring Direct and Indirect Effects of English Proficiency on Access, Utilization, and Health Status among Californian Adults with Limited English Proficiency (LEP)

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Seton Hall University

2018

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Background and Study Purpose: Findings from previous studies suggest that, in a health care delivery context, individuals with limited English proficiency (LEP) are adversely impacted by lack of patient-provider language concordance. Yet, the concept of LEP has been mostly studied in the context of cultural competence and language has been generally considered a demographic or cultural characteristic. There is a growing body of research concerning LEP and health status; however, it is limited. This study sought to evaluate the effects of LEP on access, utilization, and self-rated health status (SRHS) among LEP respondents to a large health interview survey by comparing LEPs to two groups: English only (EO) and English and another language (E+OL).

Methods*:* The study design was retrospective, cross-sectional, and observational. Quantitative statistical analyses were required. Secondary data from the 2013-2014 California Health Interview Survey was used. N = 40,240 non-institutionalized Californian adults. The predictor was levels of English proficiency. EO was a reference group. The outcomes were access, utilization, and SRHS. Covariates were age, sex, race, income and education.

Results. Logistic regressions showed that compared to the E+OLs, LEPs had: (1) Lower odds ratio on all observed variables measuring access with statistical significance for some variables and others no statistical significance. (2) Lower odds ratio on all observed variables measuring utilization with statistical significance. Further, correlations among the all measurement variables were positive and effect sizes ranged from low to medium. Finally, results from a path analysis for LEPs showed a recursive inverse effect on access ($p < .05$, $B = -0.27$, 95% CI [-0.36, -0.18]), utilization ($p < .05$, $B = -.80$, 95% CI [-0.97, 0-.62]), and SRHS ($p < .05$, $B = -.88$, 95% CI [-1.04, -0.73]). In addition, there was a predictive effect of access on SRHS and access had a mediating effect related to LEP on SRHS ($p = 0.003$, 95% CI [0.01, 0.06]) and a predictive effect of utilization on SRHS and utilization had a mediating effect related to LEP on SRHS ($p < .05$, 95% CI [0.03, 0.06]). Further analysis showed that, when levels of English proficiency was not allowed a direct path to SRHS and access and utilization had respective direct paths to SRHS, path loadings were equal across EOs, E+OLs, and LEPs and were statistically significant across groups (access: $p < .05$; utilization: $p < .05$). These results suggest that levels of English proficiency contribute to the disparities observed among LEPs.

Conclusion: There are disparities in access, utilization, and SRHS among individuals with limited English proficiency. Those disparities can be reduced through decreasing barriers to access and utilization. Based on findings from this study, the LEP Health Outcomes Assessment and Decision model was developed and is being proposed for used in studying perceived health outcomes in LEPs.

***Keywords**:* Access, utilization, limited English proficiency (LEP), self-rated health status, LEP Health Outcomes Assessment and Decision tool, immigrant, cultural competence, structural equation modeling (SEM), path analysis, health disparity.

Chapter I

INTRODUCTION

Although English is the official language in the U.S., data from surveys conducted by the U.S. Census Bureau ("Census Bureau") show that there exists substantial linguistic diversity within the U.S. population. For example, the Census Bureau reported that at the end of 2015 at least 350 languages were spoken in U.S. homes (U.S. Census Bureau, 2015). Further, it has been reported that in the New York metropolitan area alone "close to 200 different languages are spoken and more than a third of the population speaks a language other than English at home" (U.S. Census Bureau, 2013). Concurrent with the rising prevalence of linguistic diversity is a continuous rise in the prevalence of individuals living in the U.S. who have reported their ability to speak English as either "less than well" or "not at all" (U.S. Census Bureau, 2015). Such individuals have been characterized as having "limited English proficiency" ("LEP")[1] (Jacobs, Chen, Karliner, Agger-Gupta, & Mutha, 2006).

Most LEPs in the U.S. are foreign born. Surprisingly, however, there are LEPs who were born in the U.S. In 2013, 4,675,000 individuals age 5 and older were identified as LEPs who were born in the U.S. (18.7% of all LEPs) (U.S. Census Bureau, 2015) (see Table 1). In 2015, nearly 19 percent (4.7 million) of the LEP population reported having been born in the U.S. Most of those LEPs were born to immigrant parents (Zong & Batalova, 2015). There are also individuals in the U.S. who speak English and another language at home. As of 2013, approximately 61.6 million individuals fit into that category and comprised individuals who are both foreign- and U.S.-born (Zong & Batalova, 2015).

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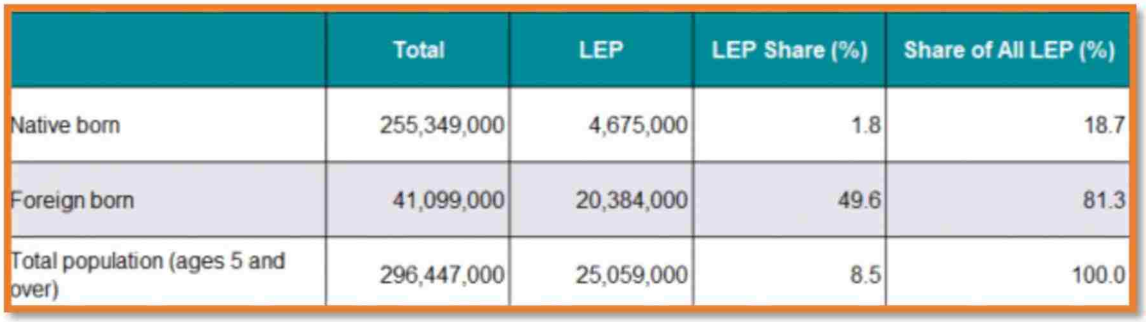
[1] In this document, LEP refers to either "limited English proficiency," "limited English proficient," and "individual(s) with limited English proficiency" as the context dictates.

Table 1

LEP in the U.S. by Nativity



	Total	LEP	LEP Share (%)	Share of All LEP (%)
Native born	255,349,000	4,675,000	1.8	18.7
Foreign born	41,099,000	20,384,000	49.6	81.3
Total population (ages 5 and over)	296,447,000	25,059,000	8.5	100.0

Note: From American Community Survey, U.S. Census Bureau (2014). Reprint from publicly available information retrieved from http://www.census.gov/programs-surveys/acs/

LEP has been previously defined in various fields. For example, in the health research literature, Jacobs et al. (2006) defined LEP as a person's inability or limited ability to speak, read, write, or understand the English language. More recently, however, in its Final Rule to implement the nationality-based anti-discrimination provision of the Patient Protection and Affordable Care Act of 2010 ("PPACA") (42 U.S.C. § 18001 et seq.), the U.S. Department of Health and Human Services (HHS) provided a regulatory definition of an individual with LEP. In the Final Rule, LEP is defined as an "*individual whose primary language for communication is not English* [emphasis added] and who has a limited ability to read, write, speak, or understand English" (42 CFR Part 92.4; Fed. Reg., 2016). Also, the Census Bureau has defined the term LEP as referring to "any person age 5 and older who reported speaking English less than "very well" (U.S. Census Bureau, 2015).

Data from the American Community Survey (ACS) (American Community Survey, 2016)[2] support the notion that the U.S. population continues to grow linguistically more diverse

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[2] The ACS is an ongoing survey that provides information about the U.S. as a nation and people who live in the U.S.

(Shin & Kominski, 2010). Moreover, it is predicted that by 2060, the U.S. will be a "majority minority" nation with more than half the population coming from racial or ethnic minority backgrounds and that the foreign born percentage will increase from 13.3% in 2014 to 18.8% (see Figure 1). In view of these predictions, coupled with historical precedents, it has become imperative that the LEP population be studied in health research (Koh, Gracia, & Alvarez, 2014).

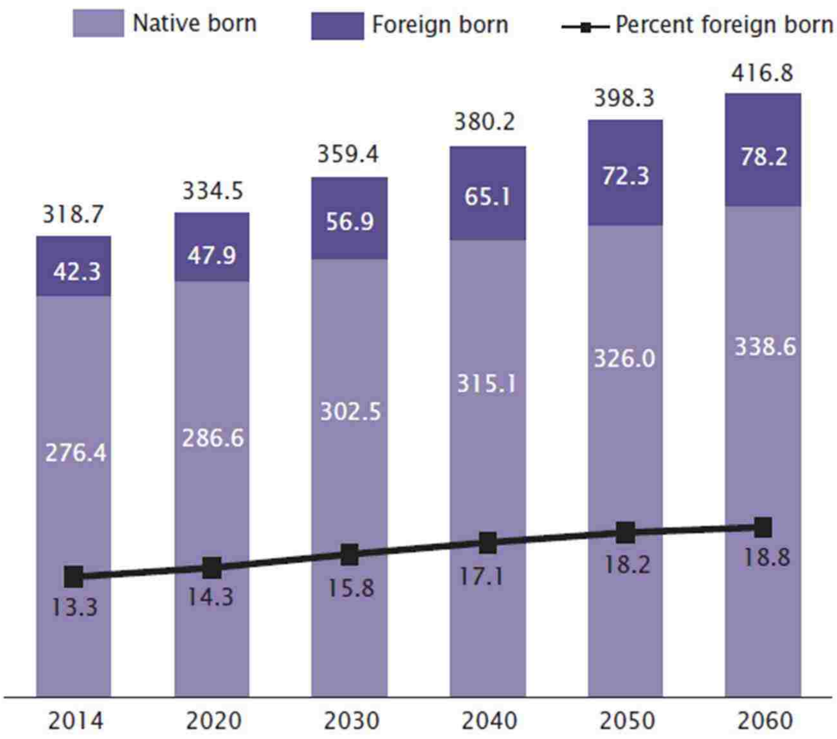

Figure 1. Projection of population changes by nationality. U.S. Population by Nativity: 2014 to 2060 – population in thousands. Source: U.S. Census Bureau, 2014 National Projections. Reprint from publicly available information accessed from https://www.census.gov/content/dam/Census/library/publications/2015/demo/p25-1143.pdf

Background of the Problem

The current high prevalence in the number of spoken languages in the U.S. is associated with historically continuous increases in immigration rates. Parallel to increases in immigration rates are increases in the prevalence of LEP. For example, decennial census data show that in 1989 the foreign-born population in the U.S. was estimated at 8,464,760. Out of that population, approximately 7,295,325 (86%) spoke a language other than English at home. Between 1990 and 2000, the foreign-born population increased to 13,178,275 (by a margin of 55% from the 1989 census estimates). Out of that population, 11,272,745 (85.6%) spoke a language other than English at home and 7,739,850 of the 11,272,745 foreign-born (69%) reported speaking English "less than very well" (U.S. Census Bureau, 2013).

Ten years later, by 2010, the number of foreign-born who reported speaking English "less than very well" had increased to approximately 25.2 million (U.S. Census Bureau, 2013).[3] In 2012, 8.1% of the U.S. population reported speaking English "less than well" (U.S. Census Bureau, 2013). In 2014, 20.9% of the population reported speaking a language other than English at home and out of that population, 58.8% reported speaking English “very well” and 41.2% reported speaking English less than “very well” (see Table 2) (American Community Survey, 2016). By 2015, however, more than 25.9 million people, 9 percent of the overall U.S. population ages 5 and older, reported being LEP (Batalova & Zong, 2016).

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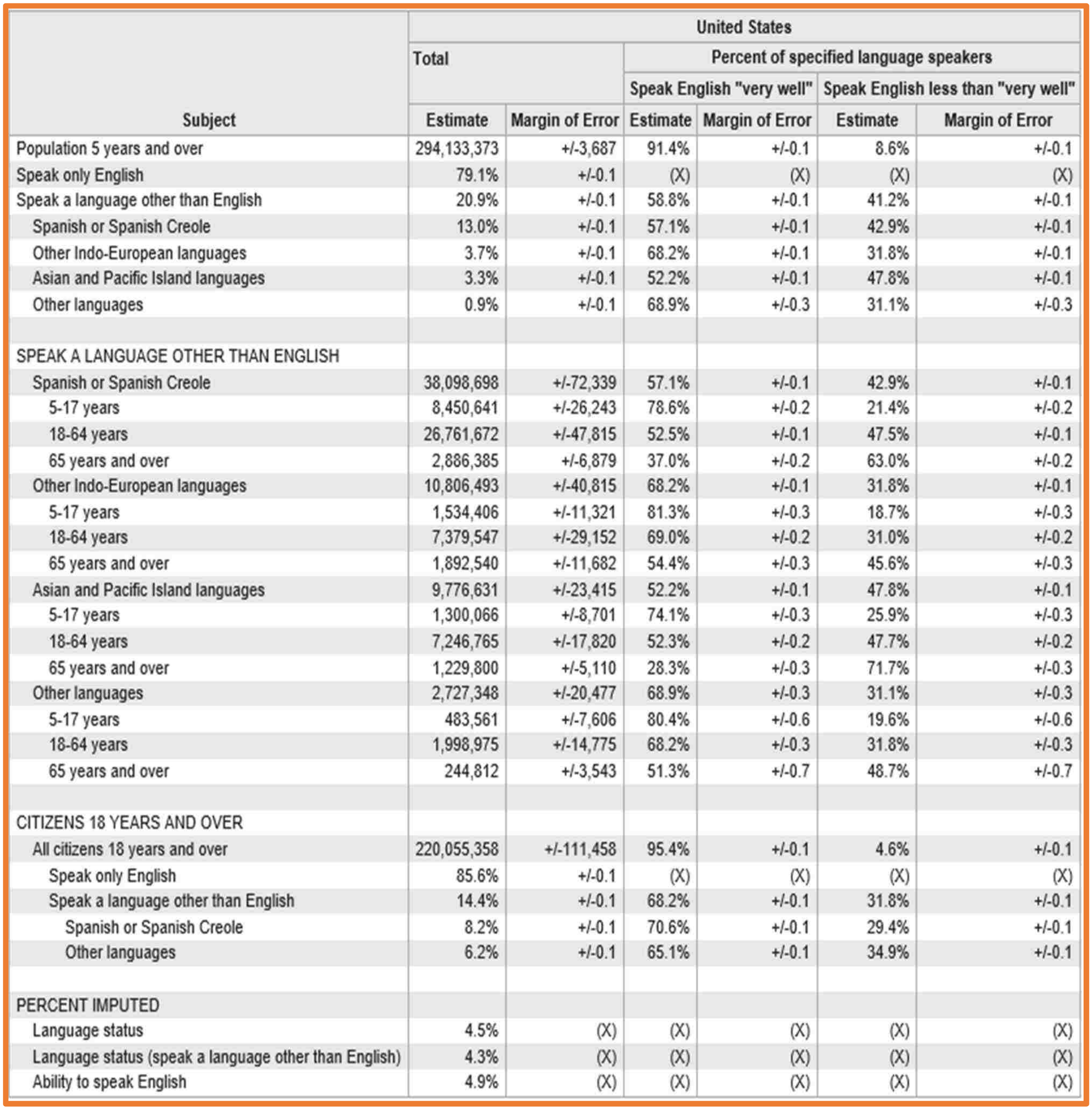
[3] In 2006, the number of undocumented immigrants living in the U.S. was estimated at 13.8% of the U.S. population, of which 5.5% were estimated to lack English proficiency skills (Resnik & Jones, 2006).

Table 2

Languages Spoken at Home in the U.S. - 2010-2014



	United States					
	Total		Percent of specified language speakers			
			Speak English "very well"		Speak English less than "very well"	
Subject	Estimate	Margin of Error	Estimate	Margin of Error	Estimate	Margin of Error
Population 5 years and over	294,133,373	+/-3,687	91.4%	+/-0.1	8.6%	+/-0.1
Speak only English	79.1%	+/-0.1	(X)	(X)	(X)	(X)
Speak a language other than English	20.9%	+/-0.1	58.8%	+/-0.1	41.2%	+/-0.1
Spanish or Spanish Creole	13.0%	+/-0.1	57.1%	+/-0.1	42.9%	+/-0.1
Other Indo-European languages	3.7%	+/-0.1	68.2%	+/-0.1	31.8%	+/-0.1
Asian and Pacific Island languages	3.3%	+/-0.1	52.2%	+/-0.1	47.8%	+/-0.1
Other languages	0.9%	+/-0.1	68.9%	+/-0.3	31.1%	+/-0.3
SPEAK A LANGUAGE OTHER THAN ENGLISH						
Spanish or Spanish Creole	38,098,698	+/-72,339	57.1%	+/-0.1	42.9%	+/-0.1
5-17 years	8,450,641	+/-26,243	78.6%	+/-0.2	21.4%	+/-0.2
18-64 years	26,761,672	+/-47,815	52.5%	+/-0.1	47.5%	+/-0.1
65 years and over	2,886,385	+/-6,879	37.0%	+/-0.2	63.0%	+/-0.2
Other Indo-European languages	10,806,493	+/-40,815	68.2%	+/-0.1	31.8%	+/-0.1
5-17 years	1,534,406	+/-11,321	81.3%	+/-0.3	18.7%	+/-0.3
18-64 years	7,379,547	+/-29,152	69.0%	+/-0.2	31.0%	+/-0.2
65 years and over	1,892,540	+/-11,682	54.4%	+/-0.3	45.6%	+/-0.3
Asian and Pacific Island languages	9,776,631	+/-23,415	52.2%	+/-0.1	47.8%	+/-0.1
5-17 years	1,300,066	+/-8,701	74.1%	+/-0.3	25.9%	+/-0.3
18-64 years	7,246,765	+/-17,820	52.3%	+/-0.2	47.7%	+/-0.2
65 years and over	1,229,800	+/-5,110	28.3%	+/-0.3	71.7%	+/-0.3
Other languages	2,727,348	+/-20,477	68.9%	+/-0.3	31.1%	+/-0.3
5-17 years	483,561	+/-7,606	80.4%	+/-0.6	19.6%	+/-0.6
18-64 years	1,998,975	+/-14,775	68.2%	+/-0.3	31.8%	+/-0.3
65 years and over	244,812	+/-3,543	51.3%	+/-0.7	48.7%	+/-0.7
CITIZENS 18 YEARS AND OVER						
All citizens 18 years and over	220,055,358	+/-111,458	95.4%	+/-0.1	4.6%	+/-0.1
Speak only English	85.6%	+/-0.1	(X)	(X)	(X)	(X)
Speak a language other than English	14.4%	+/-0.1	68.2%	+/-0.1	31.8%	+/-0.1
Spanish or Spanish Creole	8.2%	+/-0.1	70.6%	+/-0.1	29.4%	+/-0.1
Other languages	6.2%	+/-0.1	65.1%	+/-0.1	34.9%	+/-0.1
PERCENT IMPUTED						
Language status	4.5%	(X)	(X)	(X)	(X)	(X)
Language status (speak a language other than English)	4.3%	(X)	(X)	(X)	(X)	(X)
Ability to speak English	4.9%	(X)	(X)	(X)	(X)	(X)

Note: American Community Survey 5-Year Estimates: Percentages of languages spoken at home and English proficiency. U.S. Census Bureau, 2010-2014. Reprint from publicly available information retrieved from http://www.census.gov/programs-surveys/acs/

In 2017, the Census Bureau released 1-year population estimates for 2015 and 2016 concerning "limited English-speaking households," which the Census Bureau defined as a household in which "no member 14 years and over speaks only English or speaks a non-English language and speaks English "very well" (American Community Survey, 2017). The estimates show a rise in English proficiency (see Table 3). A decrease of 50,570 in the estimated number of households from 5,333,630 in 2015 to 5,283,060 in 2016. Compared to historical estimates, which were at the individual level, the 2017 estimates are at the household level; therefore, there are no clear estimates concerning the prevalence of LEPs at the individual level. It is however known that California and Florida are areas with high prevalence of LEPs (see Figure 2).

Table 3

One-year Estimates of American Limited English-speaking Households

	2015	**2016**
Total all households in the U.S.	**118,208,250** (± all households 155,130)	**118,860,065** (± all households: 154,606)
Limited English-speaking households (All households)	**5,333,630** (± all households 34,272)	**5,283,060**[4] (± all households: 17,068)
Percent limited English-speaking households (Estimate)	4.5	4.5
Percent limited English-speaking households; Margin of Error (Estimate)	0.1	0.1

Note: Researcher-developed table. Adapted from the 2012-2016 ACS, 1-year estimates. U.S. Department of Commerce, Economics and Statistics Administration, U.S. Census Bureau. Retrieved from https://www.census.gov/topics/population/language-use/about/faqs.html

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[4] This is a decrease of 50,570 households from 2015.

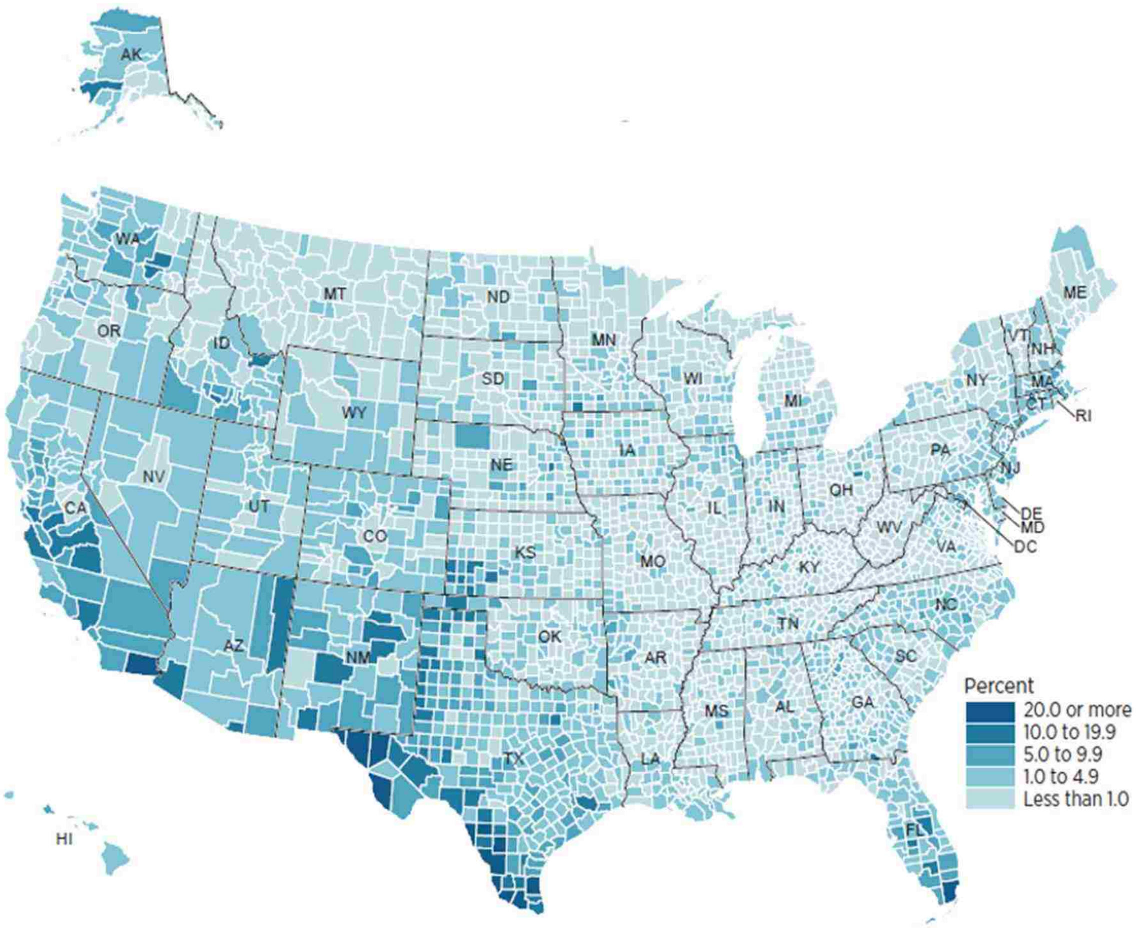

Figure 2. Limited English Speaking Households as a Percentage of County Total. U.S. Department of Commerce, Economics and Statistics Administration. Source: 2012-2016 American Community Survey, 5-year estimates (www.census.gov/programs-surveys/acs/). Retrieved from https://www.census.gov/content/dam/Census/library/visualizations/2017/comm/english.pdf

The advent and prevalence of lack of English proficiency among residents of the U.S. have had significant impacts on the health care system. This has prompted the U.S. Office of Minority Health ("OMH") to issue guidelines to health care institutions for providing care that is culturally and linguistically competent in order to comply with applicable federal laws and regulations (Office of Minority Health, 2001, 2013). More recently, the Joint Commission[5] has

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[5] The Joint Commission is an independent organization that accredits and certifies nearly 21,000 health care organizations and programs in the U.S. on performance regarding quality of care.

also provided guidance to health care institutions concerning the provision of culturally- and linguistically-competent care to LEP patients (Joint Commission, 2015).

As a result of these standards, LEP, as a phenomenon, has been the driving force for a paradigm shift within the health care system with regard to knowledge and structures that are needed to accommodate the provision of safe and effective health care while complying with standards. For example, there is a growing use of interpreter services at hospitals. As of 2010, however, findings from a survey of hospitals show that only 13% of those surveyed met all four of the language-related standards in the OMH guidelines, whereas 19% met none (Diamond, Wilson-Stronks, & Jacobs, 2010). Moreover, while health care institutions have to implement more processes and structures, they are simultaneous faced with the daunting challenge of managing cost and the inaccessibility and inconvenience of using professional interpreters while providing safe and equitable care (Gadon, Balch, & Jacobs, 2007).

Figures 3 and 4 are illustrative of immigration patterns and linguistic diversity in the U.S. Figure 3 depicts a historical continuous increase in immigration rates to the U.S. since 1850 with a recent sharp increase in trends – although there was a short period of a slight decrease immediately prior to the recent sharp increase. Figure 4 shows that between 1980 and 2014 there was a decrease in the number of immigrants who were proficient in English - although the Census Bureau reported that in 2016 there was a slight decrease in LEP. The decrease in the prevalence of proficiency in English between 1980 and 2014 shown in Figure 4 might be explained by the continued sharp increase in immigration illustrated in Figure 3.

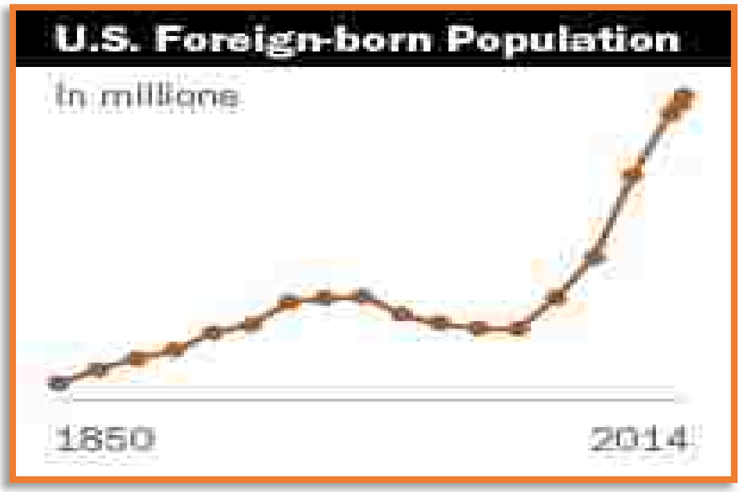

Figure 3. Patterns of Immigration to the U.S. Source: U.S. Census Bureau, 2015. Reprint from publicly available information retrieved from https://www.census.gov/acs/www/data/data-tables-and-tools/index.php

Figure 4. English Proficiency Trends. Trends in English proficiency in the U.S. Source: Census Bureau, 2015. Reprint from publicly available information retrieved from https://www.census.gov/acs/www/data/data-tables-and-tools/index.php

English language proficiency has traditionally been studied mostly in fields related to social sciences. For example, there are a fair number of research studies concerning English language proficiency in the fields of education and the workplace (Thomas, R. J., 1991). More recently, however, there has been a growing recognition for the need for culturally- and linguistically-competent healthcare institutions to provide quality health services to an increasingly growing and linguistically-diverse population to potentially reduce racial and ethnic health disparities (Anderson, Scrimshaw, Fullilove, Fielding, & Normand, 2003; Betancourt, Green, Carrillo, & Park, 2005; Campinha-Bacote & Campinha-Bacote, 2009). Additionally, one of the reasons the U.S. Census Bureau collects data on language use - although most people in the United States speak English and most governmental functions are in English - is so that the government may know what languages to use, and where, to get information to people about public health matters (American Community Survey, 2017).

The historically continuous increase in immigration rates and positive association with the prevalence of LEP discussed in the introduction of this dissertation are well documented. In addition, contemporary empirical evidence supports that the phenomenon continues to trend upward. Research needs that have been previously identified with respect to the problem of LEPs include more research in the ways in which language barriers affect health and health care (Jacobs et al., 2006). Studies therefore that aim at exploring areas that have not been well understood with respect to providing care to LEPs could provide a greater understanding of the health care and services needs of that population and also add to the body of scientific knowledge concerning the topic.

Statement of the Problem

Patients with LEP might be receiving lower quality of care due to lack of patient-provider language concordance; therefore, LEP patients could be at a higher risk of serious adverse health events. In view of the documented prevalence of languages used among populations living in the

U.S and the documented lack of proficiency in English among certain native and foreign-born, the magnitude of this problem will continue to increase if it is not addressed more adequately.

While the magnitude of the problem continues to increase, it is only recently that researchers have begun studying patient-provider language concordance as a factor of patient safety. Currently, there is a dearth of studies that have isolated English language competence as an independent factor of disparity in patient-reported health status. Research therefore concerning this topic will contribute new knowledge and enable greater understanding of the implications of LEP on patients.

In addition to the documented harmful health impacts of lack of English proficiency on patients, an unnecessary and costly burden is imposed on the U.S. health care system. This is in terms of increases in health care spending through higher resource utilization in providing treatment for incidences caused by delay in seeking care (Zhang, Hong, Takeuchi, & Mossakowski, 2012). Those incidents might otherwise be preventable.

Findings from a survey of 60 hospitals by the Joint Commission with regard to servicing LEPs suggest that "[t]here may be a gap between current practice and the ideal set forth by the CLAS[6] national standards" (Wilson-Stronks & Galvez, 2007, p. 67). With regard to ethnically- and linguistically-diverse patients, the hospitals surveyed reported challenges in three key areas: (1) the provision of language services, (2) the process for obtaining informed consent, and (3) the collection and use of patient-level demographic data (Wilson-Stronks & Galvez, 2007).

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[6] "CLAS" are national standards for providing culturally- and linguistically appropriate health care to patients set forth by the Office of Minority Health of CMS.

Purpose of the Study

While it has been documented that both culture and English language competency might impact health outcomes in LEPs, many of the studies in the literature reviewed evaluated a single or homogenous group in culture and language or small groups (for the most part consisting of participants of two ethnicities and languages). Also, in many studies reviewed, although the participants were of diverse ethnicities, they spoke a common language. A lack of linguistic diversity was therefore lacking in those studies. Also, diversity in cultures among groups is often not explored as a factor. For example, studies of Latinos might include various ethnic groups from Latin America, Puerto Rico, and the Caribbean. Participants in those studies have a common language – Spanish; however, they have vastly different cultures. It is important to point out this distinction because findings from some of the studies reviewed are supportive of the notion that LEP is associated with health outcomes and some others are non-supportive. For example, according to Ross, Nuñez-Smith, Forsyth, and Rosenbaum (2008), culture as opposed to language competence may play a role in adherence to doctors' recommendations.

The purpose of this study was to use secondary data from a large health survey that contains culturally-, ethnically-, and linguistically-diverse population groups to: (1) explore a difference in access to access to and utilization of health care and services and self-rated health status ("SRHS") among respondents to the health survey based on English proficiency, (2) examine correlations between access, utilization, and SRHS among respondents, and (3) explore multivariate recursive direct and indirect path relationships among LEP, access, utilization, and SRHS by fitting a hypothesized model to the data.

Significance of the Study

In the literature reviewed, proficiency in English, rather than culture, more accurately predicted health status among LEPs. Serious adverse health impacts have been documented with respect to patients with LEP, which include (a) mortality (Prentice & Pizer, 2007), (b) patient medication errors (Regenstein et al., 2012), (c) misunderstanding of prescription labels resulting in adverse drug events and non-adherence (Masland, Kang, & Ma, 2011), and (d) increased hospital costs through higher resource utilization when medical care is delayed (Zhang et al., 2012). Additionally, there is supportive evidence in the literature that subjective measures of health status are in congruence with objective measures (Wu et al., 2013).

Despite, however, the continued increase in the population of LEPs and the documented harmful health impacts on that population, it is only in the recent past that there has been a growing number of studies in the health research field that has examined a relationship between English language proficiency as an independent factor and its relationship to SRHS status. More specifically, in the literature reviewed, there is a lack of studies that have examined the direct relationship of LEP on access, utilization, and SRHS. Also, as discussed in the introduction of the dissertation, the need for more studies concerning the association of LEP and health outcomes has been identified (Jacobs et al., 2006).

According to Zanchetta and Poureslami (2006), the concept of English language proficiency underlies that of cultural competence. The concept of English language proficiency in health care, however, is unique and deserves more attention because of the substantial impacts lack of English proficiency has on the welfare of patients. In addition, there are impacts on the health care system in terms of providing safe and effective care to LEPs and also in terms of increased health care spending associated with delays in seeking health care (Zhang et al., 2012).

As traditionally studied, English language proficiency is unequally weighted when it is considered as one of the factors of cultural competence. A greater appreciation for the complex paradigm of language competency and its impact on health outcomes would be better elicited if it is examined independently in relation to health outcomes among LEPs. English language proficiency is of such importance in relation to providing quality health care to LEPs and ensuring patient safety that its impacts on access, utilization, and SRHS merit to be studied independent of other determinants of health status. Knowing that LEPs are at risk of experiencing adverse events in relation to their health provides a compelling reason for seeking to gain a greater understanding of factors that impede access to care for that population. Such understanding would enable a greater appreciation for unmet needs stemming from the growth of linguistic diversity with an associated lack of proficiency in English among foreign-born and could inform additional ways to address such needs - thereby minimizing safety risks for LEP patients.

A lack of studies that have isolated English language competency as an independent factor of health disparity has fostered a concurrent lack of appreciation for the magnitude of the problem and has allowed it to remain inadequately addressed for a long time. Language data have been continually collected by the Census Bureau through decennial censuses; however, in the past, there was considerable variation across the censuses in terms of the wording of survey items and coding of responses and the population subsets who answered the questions (Ortman & Shin, 2011 paraphrasing Stevens, 1999). Beginning in 1980, however, to satisfy the legislative mandate of the minority language assistance provision of the Voting Rights Act of

1965, as amended (Voting Rights Act of 1965, 1965), the Census Bureau began collecting more accurate data about language use and ability among people five years of age and older by using three questions in its survey. The first question is: “Does this person speak a language other than English at home?” The second question is asked of people who answer “yes” to the first question: “What is this language?” The third question is “how well does this person speak English” with four categories of answers provided: “very well,” “well,” “not well,” and “not at all” (Ortman & Shin, 2011).

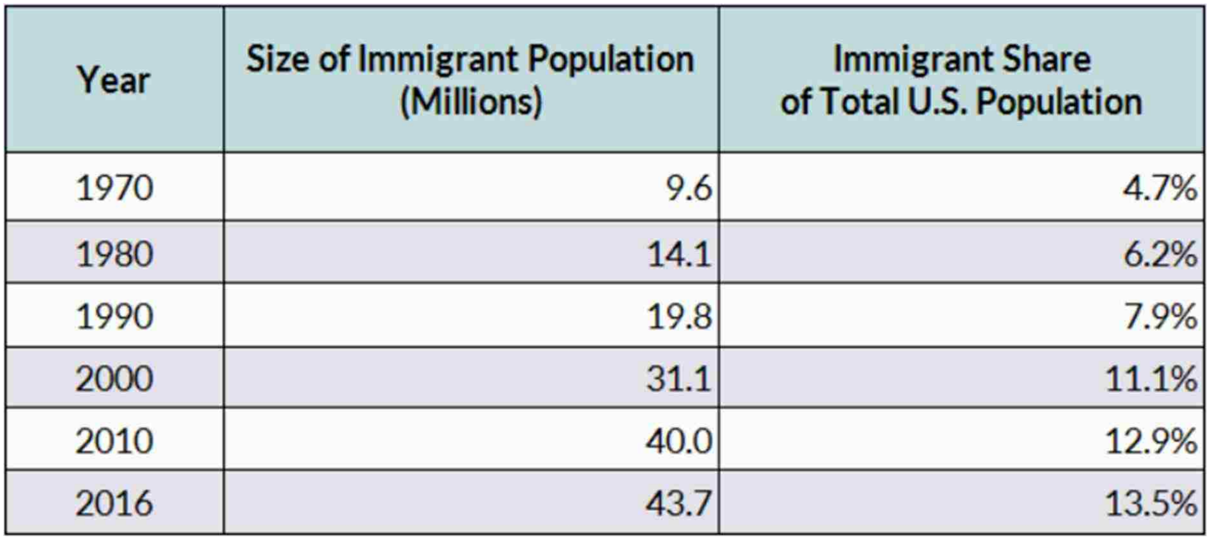
With the capture of more accurate data by the Census Bureau concerning English language proficiency, researchers are now better positioned to conduct studies concerning English proficiency that are more patient-centric using real-world data. Analysis of data that contain the perspective of patients may enable greater insight and understanding of the LEP population’s needs. Recently, there has been a global trend of an increased use of real-world data to inform decision making in healthcare and health policy (de Groot et al., 2016). The term real-world data is fairly recent and is not well defined as a concept in the health research literature; however, in the current non-peer-reviewed knowledge base such as books, posters, and white papers, the term often refers to data collected using means such as a patient registry (e.g., an organized system that uses observational study methods to collect clinical and other data in order to evaluate specified population outcomes) or a structured survey (de Groot et al., 2016).

There is currently a gap in knowledge concerning LEP and SRHS. As previously discussed in the introduction section of this dissertation, if this gap continues to remain inadequately addressed, it logically follows that its scope and the magnitude of its implications will continue to increase in view of current and projected demographic changes in the U.S. Since many previous studies concerning LEP have focused on small population segments by race or ethnicity, studies with more comprehensive population groups who speak various non-English languages could yield results that are more representative of the general population of LEPs in the U.S. because of vast differences in cultural norms among ethnic groups.

As immigration rates continue to increase, it is becoming increasingly more important to further our understanding of barriers and facilitators of health among both native- and foreign-born with LEP so that quality health care can be provided to that population. Since 1970, the size of the immigrant population has nearly tripled (see Table 4). An understanding of the relationships between access, utilization, and SRHS among LEPs may further our understanding of health-related disparities among LEPs and reveal unmet health services needs in that population.

Table 4

Immigrant Population in the U.S.: 1970-2016



Year	Size of Immigrant Population (Millions)	Immigrant Share of Total U.S. Population
1970	9.6	4.7%
1980	14.1	6.2%
1990	19.8	7.9%
2000	31.1	11.1%
2010	40.0	12.9%
2016	43.7	13.5%

Note. From Migration Policy Institute. Tabulation of data from the U.S. Census Bureau 2010 and 2016 American Community Survey and 1970-2000 decennial census data. Reprint permission obtained from Migration Policy Institute. Retrieved from https://www.migrationpolicy.org/article/frequently-requested-statistics-immigrants-and-immigration-united-states

California is a state with substantial ethnic and linguistic diversity. As illustrated in Figure 5, between 2009 and 2013, the city of Los Angeles was estimated to have the second highest prevalence in the number of languages spoken in the U.S. Also, in 2015, it was estimated that California had in excess of 10 million immigrants (see Figure 5). Health data collected at the state level in California, therefore, are fit for studying access, utilization, and SRHS among LEPs (American FactFinder, 2014).

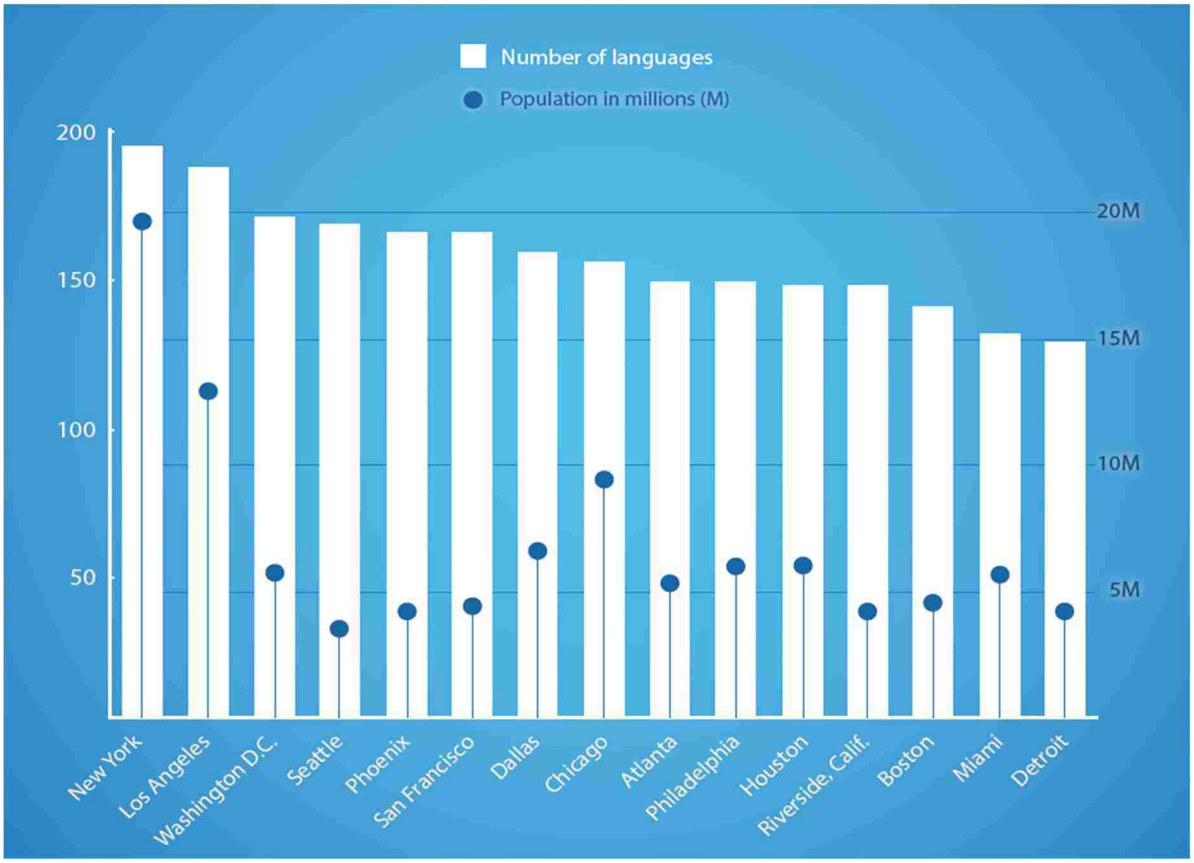


Figure 5. From American Community Survey - 2009-2013. U.S. Department of Commerce, Economics and Statistics Administration, U.S. Census Bureau. Number of Languages Spoken in the 15 Largest Metropolitan Areas. Retrieved from https://www.census.gov/newsroom/press-releases/2015/cb15-185.html

Research on LEP and health status, and more specifically research using real-world evidence collected from a patient's perspective, is significant in contributing to the existing body of knowledge-based literature. Findings from analysis of real-world data may give valuable insights into interventions that can be tailored to effectively address the language needs of LEPs and minimize safety related risks. In addition, the findings may contribute to mitigating negative financial impacts on health systems and reducing overall cost of health care. Further, the findings may contribute to further awareness of the importance of patient-provider language concordance. Finally, findings may contribute to the development of new theories in the health research field.

Operational Definitions of Key Terms

Access: A construct measured by indicators that allow a broad range of individuals to reach and use health care and services.

English Proficiency: The ability to read, write, speak, or understand English on a scale.

Health: "[A] state of complete physical, mental and social well-being and not merely the absence of disease or infirmity" (World Health Organization, 1948).

Health literacy: The "degree to which individuals have the capacity to obtain, process, and understand basic health information and services for appropriate health decisions" (U.S. Department of Health and Human Services, 2000).

Limited English Proficient (LEP): According to the U.S. Department of Health and Human Services (HHS), "*individual with limited English proficiency"* means an individual ***whose primary language for communication is not English*** [emphasis added] and who has a limited ability to read, write, speak, or understand English" (42 CFR Part 92.4; Fed. Reg., 2016).

Literacy: A continuous developmental process that includes listening, speaking, reading, and writing (Willis, Kabler-Babbitt, & Zuckerman, 2007a).

Self-rated Health status (SRHS): Refers to a rating on a scale of the degree to which one perceives that he/she is in "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity." (Definition adapted from the World Health Organization's definition of health).

Utilization: A construct measured by quantitative and qualitative indicators of health care and services provided to individuals.

Research Questions

The following research questions relate to both the problem statement and the purpose of the study previously described and are necessary to sufficiently investigate the research problem and meet the objectives of the study. More importantly, these questions are based on gaps found in the literature reviewed and are researchable.

RQ1 explored the demographic characteristics of the sample. RQ2-4 respectively examined a difference in access, utilization, and SRHS among adult Californians by English proficiency. Additionally, RQ5-7 assessed correlations between access, Utilization, and SRHS. Finally, RQ8 tested the fit of a hypothesized model to the data.

RQ1: What are the demographics of Californian adults based on the 2013-2014 California Health Interview Survey (e.g., Age, sex, race and ethnicity, education, and income)?

RQ2: Is there a difference in access to health services among Californian adults with LEP as compared to adults who speak English only (EO) and adults who speak English and another language at home (E+OL)?

H_0: There is no difference in access to health services among Californian adults with limited English proficiency (LEP) as compared to adults who speak English only (EO) and adults who speak English and another language at home (E+OL).

RQ3: Is there a difference in utilization of health services among Californian adults with limited English proficiency (LEP) as compared to adults who speak English only (EO) and adults who speak English and another language at home (E+OL)?

H_o: There is no difference in utilization to health services among Californian adults with limited English proficiency (LEP) as compared to adults who speak English only (EO) and adults who speak English and another language at home (E+OL).

RQ4: Is there a difference in self-rated health status among Californian adults with limited English proficiency (LEP) as compared to adults who speak English only (EO) and adults who speak English and another language at home (E+OL)?

H_o: There is no difference in self-rated health status among Californian adults with limited English proficiency (LEP) as compared to adults who speak English only (EO) and adults who speak English and another language at home (E+OL).

RQ5: Is there an association between access and utilization among Californian adults with LEP?

H_o: There is no association between access and utilization among Californian adults with limited English proficiency (LEP).

RQ6: Is there an association between access and self-rated health status among Californian adults with LEP?

H_o: There is no association between access and self-rated health among Californian adults with limited English proficiency (LEP).

RQ7: Is there an association between utilization and self-rated health among Californian adults with LEP?

H_o: There is no association between utilization and self-rated health status among Californian adults with LEP.

RQ8. Are there recursive direct and indirect effects of LEP on access, utilization, and *SRHS* among Californian adults with LEP?

H_o: There are no recursive direct and indirect effects of LEP on access, utilization, and SRHS among Californian adults with LEP.

Theoretical Discussion

A theoretical or conceptual foundation that enables an explanation of the relationships among the variables in the stated hypotheses and that also allows a more comprehensive view of concepts, processes, and factors that are associated with SRHS among LEPs served to anchor this study. Upon that foundation a framework was built, which enabled the researcher to explore the research questions, test the hypotheses, and tie the findings from this study to its purpose.

The researcher took various steps to achieve an evidence-based foundation upon which such a framework was built to guide this study, which included the following: (1) review of relevant previous research concerning the topic, (2) examination of existing legal authorities and regulatory frameworks concerning the topic, (3) examination of relevant conceptual models and theories that help conceptualize and explain the constructs analyzed, (4) selection of two conceptual tools that helped define and measure latent constructs in the study, and (5) selection of a theoretical framework that enabled a comprehensive view of a systematic pathway to use of health services and perceived health status.

This body of supporting theoretical and empirical evidence informed the researcher’s understanding in conceptualizing a framework that provided a lens for examining the problem as stated in the problem statement and a framework for interpretation of outcomes. As conceptualized, the researcher’s hypothetical framework supported the explanation of findings by other researchers in previous studies in the literature reviewed. This supported generalization to the theoretical population from which the sample in this study was drawn. Additionally, new knowledge that is summarized to give meaning to isolated empirical evidence emerged from the findings of this study, which will be explored in Chapter IV.

First, since the topic of LEP has had a long history of legislative and regulatory interventions, to set the study within a proper historical context, a legal and regulatory framework is provided that also guided the researcher’s understanding. That framework consists of laws that have been enacted over time, regulations to implement the laws, government guidance to assist with legal and regulatory compliance, and standards from nationally-recognized accrediting institutions that provide a process of review where healthcare organizations can demonstrate their ability to meet predetermined criteria and standards established by the accrediting institution with respect to the practice of health care. This body of evidence, which was previously discussed in this dissertation, provides a historical view concerning how the topic of LEP has been treated at the policymaking level. Considering existing standards concerning providing healthcare to LEPs, in theory, health care institutions should be in a position to meet the health care needs of LEPs. The literature documents however that current practices at health care institutions do not optimally implement set policies. LEPs' needs, therefore, remain inadequately addressed.

Second, previous studies in the health research literature where LEP was studied in a health care delivery context informed the researcher's understanding about how this topic has evolved in the literature, the population groups that have been studied, and settings in which studies were conducted. For example, studies related to adverse health outcomes with regard to LEP and studies that explored access, utilization with regards to LEPs were reviewed. Additionally, studies that support the research purpose of this study were reviewed.

Finally, the literature reviewed documents communication barriers, lack of availability of interpreter services, and lack of availability of translated materials as examples of cognitive barriers to access to health services (Carrillo et al., 2011). Based on the Carrillo, et al. (2011) framework, it can therefore be presumed that reducing these barriers could improve access and consequently facilitate utilization and ultimately improve SRHS. This presumption is more fully delineated in the hypotheses as this dissertation progresses.

A theory was therefore needed in which to ground the study and test the hypotheses. More specifically, a theory that takes into account all the variables in the study and facilitates the researcher's conceptualization of each variable and enables the fitting of all the variables into a framework that explains their relationship and how they work to affect SRHS. A framework considered suitable for this study had to explain relationships among LEP, access, utilization, and SRHS. Many of the studies retrieved in the literature concerning access, utilization, and SRHS with regard to LEP, however, lack a theoretical or conceptual perspective that could explain the understanding of behaviors or observations in LEPs with respect to access, utilization, and SRHS. Additionally, certain models that were retrieved in the literature do not have English language proficiency as a variable for assessing SRHS.

As is documented in the literature reviewed, as a practical matter, certain well-known determinants influence access and utilization (e.g., health insurance coverage, high-quality education, nutritious food, decent and safe housing, and reliable public transportation) (Office of Disease Prevention and Health, 2016). At the same time, other intangible determinants such as attribute values (e.g., demographics, social structure, and health beliefs) might be, in part, explanatory of the behavior of seeking use of health services (Andersen, 2008). As discussed below, the Andersen (2008) Phase 5 Behavioral Model of Health Service Use (“BMHS”) provided an adequate framework for conceptualizing the variables in this study, testing the hypotheses, and linking the findings back to the purpose of the study.

The Behavioral Model of Health Services. The BMHS was first developed in the 1960s. When it was originally developed, one of the purposes of the model was to assist the understanding of why families use health services and define and measure equitable access to health care (Andersen, 1995). While the BMHS model has been widely used, it has also been considerably “criticized and revised” (p. 1) by researchers and has also evolved over the years. To date, the model has gone through five phases and has been extended to revise and/or include other concepts and factors. Figure 6 illustrates the initial BMHS model.

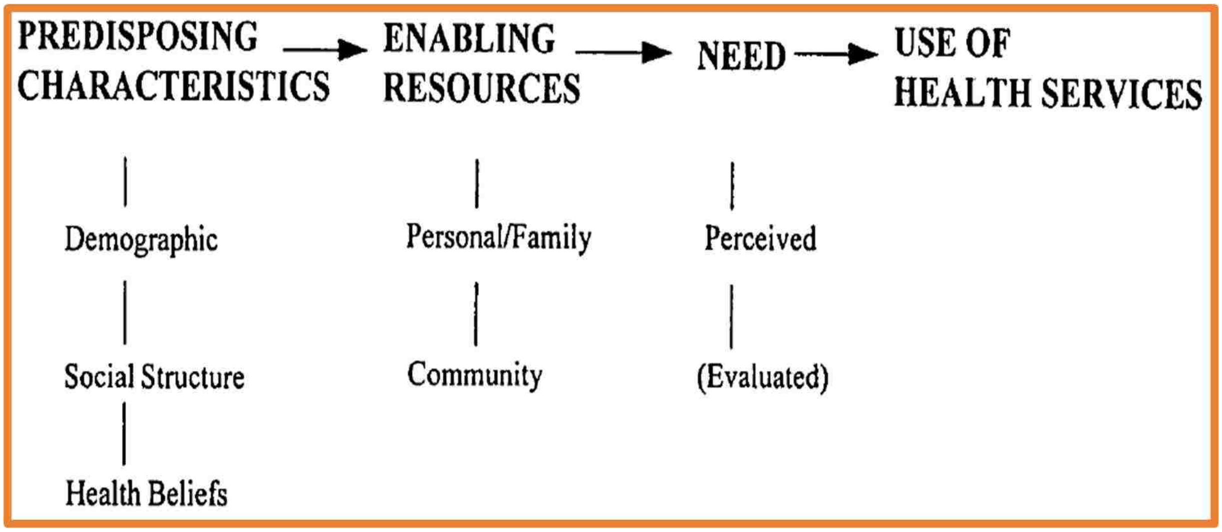


Figure 6. The Initial Behavioral Model (1968). From "National Health Surveys and the Behavioral Model of Health Services Use," by Andersen, R. M., 2008, *Medical Care*, 46:7, pp 647-653. The author has subsequently modified this model; however, in newer models, the concept of "predisposing characteristics" remain as a determinant in the path to "use of health services." Copyright 2008 by Wolters Kluwer Health. Published by Lippincott Williams & Wilkins. Reprinted with permission (see APPENDIX A).

Although the BMHS has gone through several revisions, the proposition put forth in the initial model continues to serve as a foundational starting point for the evaluation of access and utilization. The initial BMHS model provides an explanatory process for utilization of health services to take place. It posits that there is a *causal ordering* among concepts and their associated factors that explains a systematic pathway to *use of health services*. More specifically, the model posits that *use of health services* is a function of an individual's *predisposing characteristics* that might be exogenous, which are followed by *enabling resources* that are necessary but not sufficient conditions for utilization, and which are then followed by a defined *need* (Andersen, 1995).

It can be reasonably presumed from interpreting the BMHS model that if the *causal ordering* is broken at the point of *enabling resources* because of *predisposing characteristics* pertaining to an individual, having a *need*, therefore, does not necessarily translate to *use of health services*. The model helped support a broader understanding of the notion that *use of* *health services* can be a function of many characteristics attributable at the individual level (Andersen, 1995). Importantly, the BMHS model gives insight into attribute variables that may play a role in the pathway to access and utilization but that are hard to modify (e.g., age, health beliefs, English language proficiency, etc.).

In keeping with developments in research and policy in health services, considerable revisions and additions were made to the initial BMHS model in five phases. Figure 7 illustrates the extended model in the aggregate. It includes concepts that have been revised or added throughout the five phases of the model.

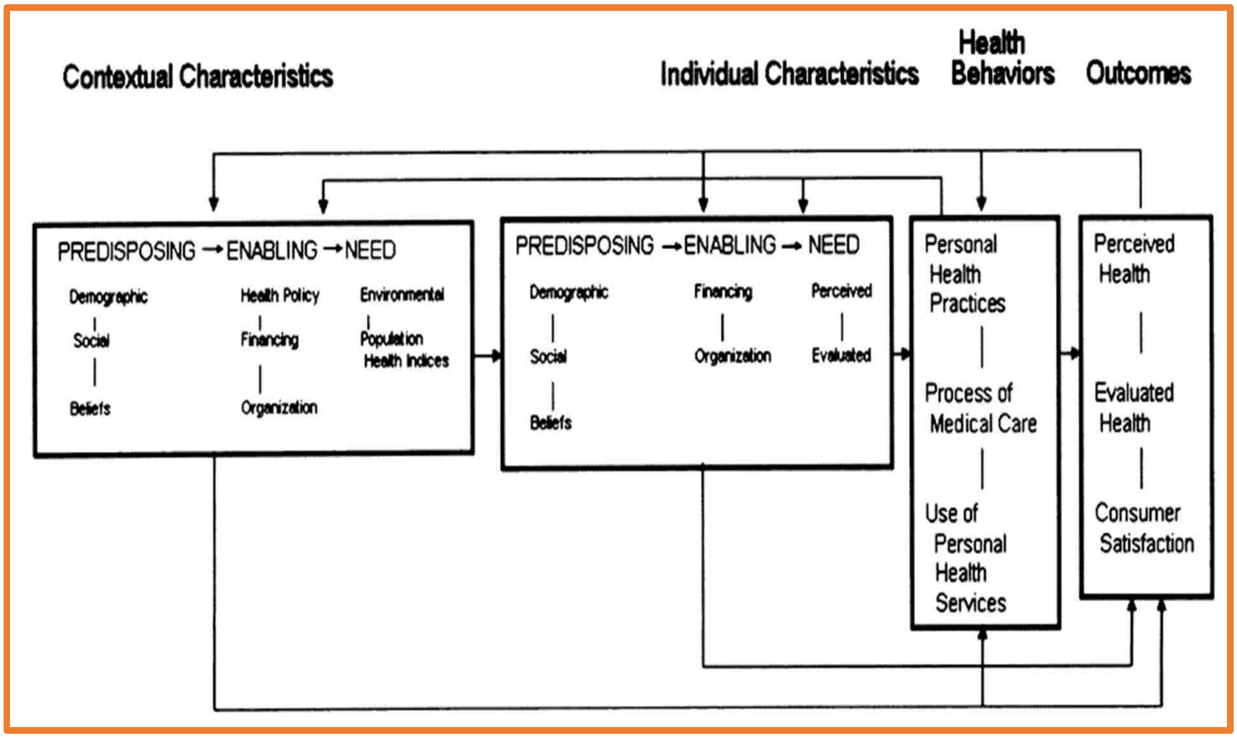


Figure 7. From "National Health Surveys and the Behavioral Model of Health Services Use," by Andersen, R. M., 2008, *Medical Care*, 46:7, pp 647-653. Copyright 2008 by Wolters Kluwer Health. Published by Lippincott Williams & Wilkins. Phase 5 of the Behavioral Model of Health Services is used as a theoretical framework for conceptualizing relationships among variables in this study. Phase 5 is an extended model, which incorporates phases 1-5. Reprinted with permission (see APPENDIX A).

Phase 5 of the extended BMHS model provided a framework to test associations among all the variables of interest in this study (i.e., LEP, access, utilization, SRHS). This extended BMHS model allowed conceptualization of *health behaviors*. Under that concept, in addition to *personal health practices* and *use of personal health services,*" the notion of *process of medical care* is introduced in the model as a *health behavior*, which Andersen (2008) describes as the interaction of providers with patients in the delivery of medical care. One of the measures Andersen (2008) provides for *process of medical care* is *quality of provider-patient communication*. This is in congruence with previous studies found in the literature concerning access and utilization where quality in provider-patient communication was analyzed as one of the variables (Cohen, Rivara, Marcuse, McPhillips, & Davis, 2005; Gardam, Verma, Campbell, Wang, & Khan, 2009; John-Baptiste et al., 2004). Applying this aspect of the model to this study allowed the researcher to test null hypotheses 1, 2, and 3 concerning an association of LEP to access, utilization, and SRHS.

Additionally, the initial BMHS proposition, informed the researcher's understanding in conceptualizing *predisposing characteristics* that may come into play for an LEP in decision-making concerning access and utilization of health services. In the initial BMHS model, the underpinnings for the concept of *predisposing characteristics* are: *demographic* (which contains attributes such as age and gender), *social structure* (which contains factors that determine the status of a person in a community (e.g., education, occupation, ethnicity, and culture), and *health beliefs* (which are "attitudes, values, and knowledge that people have about health and health services that might influence their subsequent perceptions of need and use of health services"). As defined in the initial model, the concept of health beliefs provides "a means for explaining how social structure might influence enabling resources, perceived, and subsequent use" (Andersen, 2008).

In the literature reviewed, it is well established that culture - a factor of social structure in the Andersen (2008) model - influences health care access and utilization (Ponce, Ku, Cunningham, & Brown, 2006; Shi, Lebrun, & Tsai, 2009). The BMHS model thus helped in conceptualizing normative health beliefs as they apply to individuals from diverse cultures who are LEP. For example, there might be subjective factors in the form of *predisposing characteristics* such as attitudes and cultural beliefs that might influence decision making and behaviors related to access and utilization and SRHS. These are in addition to objective intermediary factors such as health literacy, communication, lack of patient-provider language concordance, and unavailability of interpreter services that might also impact access and utilization. As previously discussed, the literature reviewed shows that there is supportive evidence that subjective measures of health status relate to objective measures (Wu et al., 2013).

The concept of *predisposing characteristics* in the BMHS model is, therefore, useful as a frame to help guide the researcher in conceptualizing potential factors that are hard to modify in LEPs and that might serve as links to both access and utilization, which are in the pathway to *use of health services*. Considering the concepts and factors in phase 1 of the extended model, an adequate framework was provided for testing hypotheses related to access and utilization.

It is posited in the model that utilization should be examined in the context of health outcomes; therefore, in Phase 3 of the extended model, the concept of *health outcomes* was added. Andersen (2008) argued that health status is both "as perceived by the population and as evaluated by professionals;" accordingly, one of the factors of *health outcomes* that was added to the model is *perceived health status*. This factor was used to guide the study in testing hypothesis 3 concerning SRHS.

Null hypothesis 4 tested a correlation between access and utilization accordingly, the concept in Phase 1 of the extended model was used to guide testing of that hypothesis. Null hypothesis 5 tested a relationship between access and SRHS; accordingly, the concept in Phase 3 of the extended model was used to test that hypothesis. Null hypothesis 6 tested a relationship between utilization and SRHS; therefore, Phase 3 of the extended model was used. Null hypothesis 7 tested direct and indirect effects of LEP on access, utilization, and SRHS; accordingly, the concepts in the full extended model was used to test if the researcher's postulation of theoretical relationships among all the variables in the study are supported by the data.

While the BMHS provides a theoretical lens to study the problem, the researcher needed a tool to serve as a framework to inform an understanding of how to measure access and utilization since they are latent constructs that are indirectly measured by observed variables. Although access and utilization have been studied in the health research field, it is however clear from the literature reviewed, that both concepts are highly complex and have not been well understood. This is demonstrated, in part, by the fact that there is an almost interchangeable use of the terms "access," "accessibility" and "utilization" in the literature in studies that evaluated access to care (Haggerty et al., 2011).

In this study, survey items that measure access and utilization, respectively, were selected from the CHIS 2013-2014 data. The choice of such items was first guided by the operational definitions previously provided in this dissertation for access and utilization, respectively. Then to measure each concept, the researcher used two respective conceptual models that guided selection of observed variables from the data. The Carrillo et al. (2011) Health Care Access Barriers ("HCAB") model was used to select variables to measure access and the Model for Evaluating Health Services utilization ("Utilization model") (Da Silva, Contandriopoulos, Pineault, & Tousignant, 2011) was used to select variables to measure utilization. The following is an explanation concerning these two conceptual frameworks.

Health Care Access Barriers Model. The HCAB model provides a framework for conceptualizing three categories of health care access barriers described in the form of constructs and multiple practical examples of items to measure each construct are given as well: (1) financial (e.g., cost of care and health insurance status barriers), (2) structural (e.g., institutional and organizational barriers), and (3) cognitive (e.g., knowledge and communication barriers). Fundamentally, HCAB is designed to (1) classify health care access barriers, (2) identify barriers that are measurable, modifiable, and identified using the best available evidence, and (3) recognize intermediary factors that link barriers with health outcomes. Figures 8 and 9 illustrate the HCAB model. One of the key concepts in HCAB is "*cognitive barriers"* to access (see Figure 8). As illustrated, language concordance is one example of cognitive barriers to access.

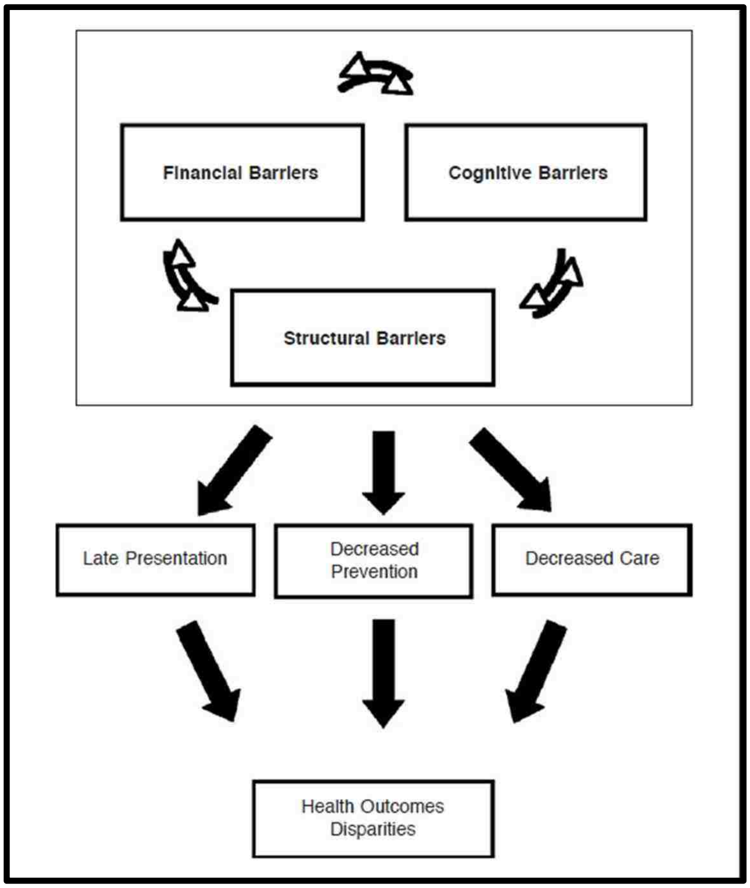
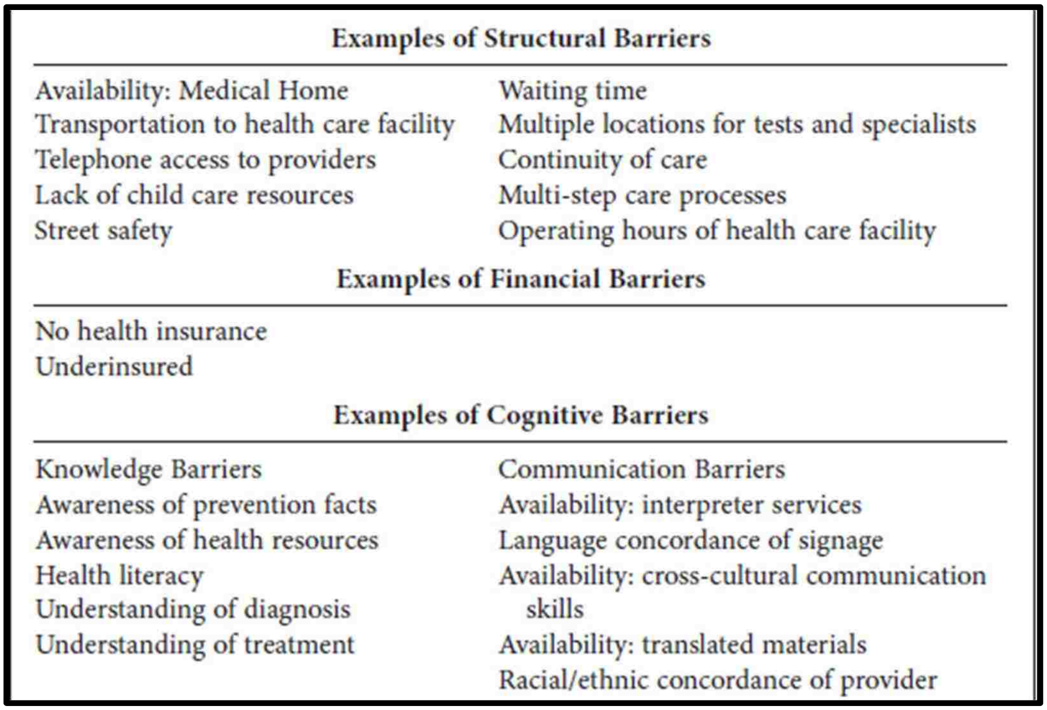


Figure 8. From “Defining and Targeting Health Care Access Barriers,“ by Carrillo, J. E., et al., 2011, *Journal of Health Care for the Poor and Underserved*, 22(2), 562-575. Copyright 2011 by John Hopkins University Press. Reprinted with permission (see APPENDIX B).



Examples of Structural Barriers

Availability: Medical Home	Waiting time
Transportation to health care facility	Multiple locations for tests and specialists
Telephone access to providers	Continuity of care
Lack of child care resources	Multi-step care processes
Street safety	Operating hours of health care facility

Examples of Financial Barriers

No health insurance
Underinsured

Examples of Cognitive Barriers

Knowledge Barriers	Communication Barriers
Awareness of prevention facts	Availability: interpreter services
Awareness of health resources	Language concordance of signage
Health literacy	Availability: cross-cultural communication skills
Understanding of diagnosis	
Understanding of treatment	Availability: translated materials
	Racial/ethnic concordance of provider

Figure 9. From "Defining and Targeting Health Care Access Barriers," by Carrillo, J. E., et al., 2011, *Journal of Health Care for the Poor and Underserved*, 22(2), 562-575. Examples of Constructs of Structural, Financial, and Cognitive Barriers. Copyright 2011 by John Hopkins University Press. Reprinted with permission (see APPENDIX B).

In the literature concerning English proficiency and access to care, previous researchers have taken the approach of measuring access with indicators that either facilitate or obstruct access for patients. For example, DuBard and Gizlice (2008) assessed access to care with four indicators: (1) "health insurance status (dichotomized as insured or uninsured), (2) lack of a personal physician (yes or no), (2) inability to see a doctor because of cost in the past year (yes or no), and (4) no routine medical checkup in the past (yes or no)." Also, Ye, Mack, Fry-Johnson, and Parker (2012) measured access by three indicators: (1) "health insurance status (measured by whether a participant had any kind of health insurance coverage and both (2) routine care access and (3) sick care access were determined on whether a participant identified a physician's office or clinic or health center for routine/preventive care and for sick care, respectively."

Operationalizations in the current study are similar to previous studies. For example, this study used the HCAB model as a tool in guiding the review of studies concerning access and to provide a framework for organizing ideas about the operationalization of the broader concept. The HCAB model allows for classification of barriers to access and, as previously indicated, in studies similar to this study access was evaluated by how it was facilitated or obstructed. Relying on the HCAB model, it can therefore be subsumed that removal of barriers could facilitate access to health care and related services. By dichotomizing responses on the observed variables as "Yes" = 1 and "No" = 0, access can be studied using the HCAB model as a guide for selecting observed indicators.

Other conceptual models for evaluating access were also considered; however, the concept of access is more clearly delineated and distinguished from that of utilization in the HCAB model.[7] More importantly, unlike HCAB, other models reviewed did not include a construct to analyze English language proficiency as a cognitive barrier to access to health services.

Health Services Utilization: Concepts and Measures. Utilization is a multidimensional process; however, it has been defined as the outcome of the interaction between health professionals and patients in previous studies (Donabedian, 1973). This thus explains the traditional approach of using medical databanks to evaluate utilization in many of the studies reviewed. More recently, however, in contrast to the approach of linking utilization to only the

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[7] It should be pointed out however that, the two concepts are interrelated and have been used interchangeably at times in certain previous studies.

volume of interaction between patient and provider, Da Silva et al. (2011) proposed a conceptual model to asses utilization that posits four elements to quality of care that allows for quantitative measurements while also providing information about the qualitative aspects of utilization: (1) first contact, (2) longitudinality, (3) comprehensiveness, and (4) coordination).

The researcher's understanding for operationalizing and measuring the term utilization is based on Da Silva's (2011) model. In contrast to other models reviewed, in that model, the concept of utilization is clearly delineated from that of access in that it is seen from the viewpoint of actual provision of services by physicians and does not include access indicators such as the *predisposing characteristics* and *enabling resources* as set forth in Andersen's (2008) model previously discussed.

The Da Silva et al. (2011) model supports analysis of utilization in terms of indicators that indirectly provide an estimate of volume, while also documenting the qualitative aspects of utilization. Thus, although Da Silva, et al. (2011) explored utilization from an objective perspective – volume of medical services offered by physicians to patients – two constructs in her framework may be applied to subjective measures of utilization: (1) comprehensiveness and (2) continuity and thus making the model suitable for assessing patient-reported outcomes concerning utilization from a patient's perspective (e.g. SRHS) (see Figure 10).

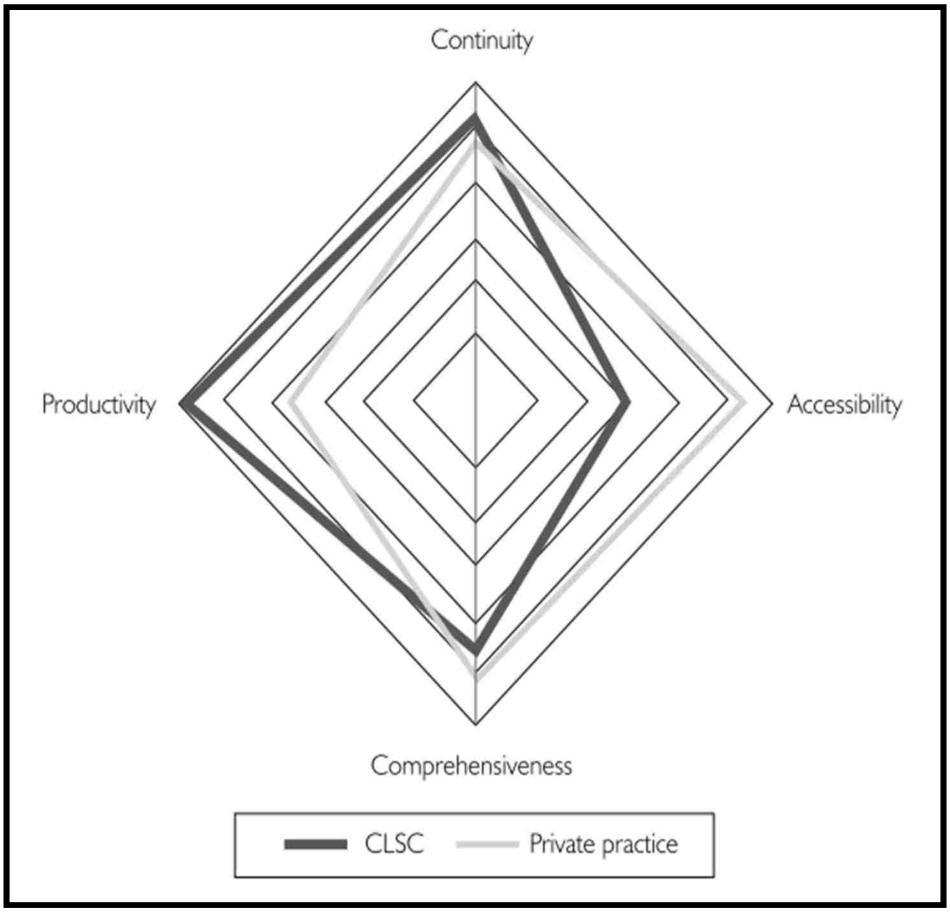

Figure 10. From “A Global Approach to Evaluation of Health Services Utilization: Concepts and measures,” *by* Da Silva, R. B., et al., 2011, *Healthcare Policy*, 6(4), p e114. Copyright 2011 by The Canadian Copyright Agency. Reprinted with permission (see APPENDIX C).

Researcher’s Conceptualized Framework. In summary, taken as a whole, the theoretical framework discussed in this section provided an adequate framework for conceptualizing the research problem, how it had been studied previously, and the various factors that might enable or minimize the problem. This theoretical framework includes the BMHS model and the HCAB and utilization models. In addition, the researcher’s understanding of the problem from the literature reviewed was informative.

From the researcher’s understanding of the evidence reviewed, emerged a conceptual framework that provided a lens for a more comprehensive and systematic view of certain processes and behaviors regarding LEPs accessing and using health services and their perception of their health status. Figure 11 illustrates a graphical representation of the researcher's understanding of relationships among variables in the study. This conceptualization guided the study.

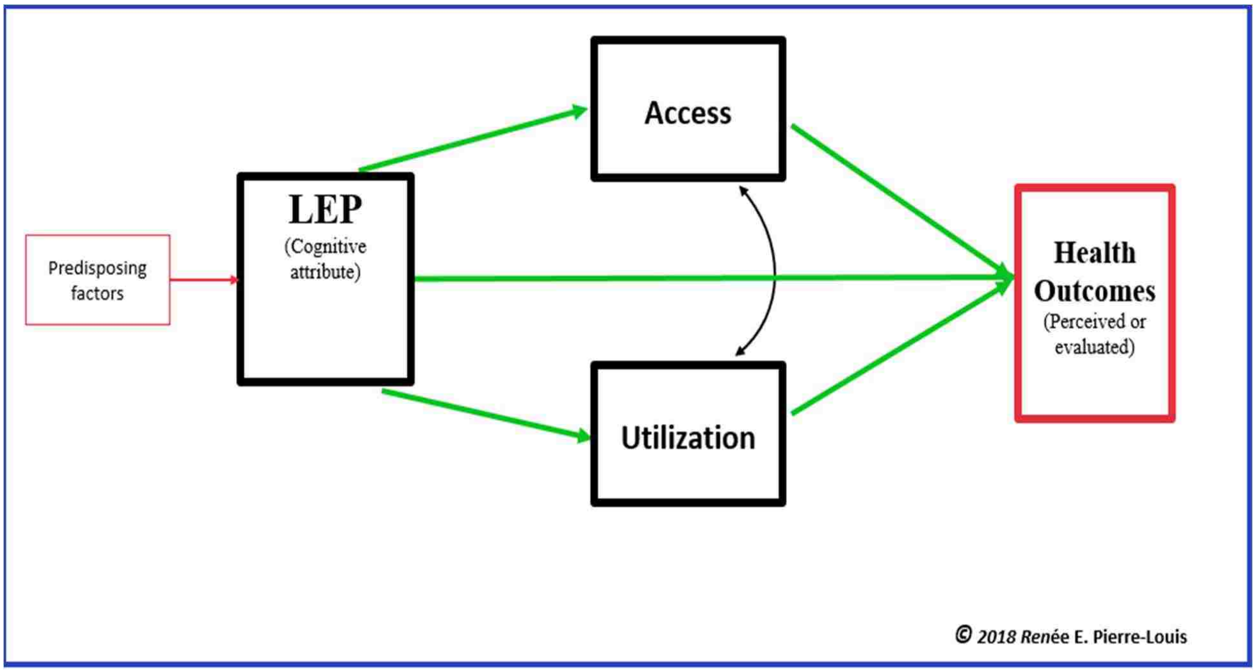

Figure 11. Researcher self-developed conceptual framework informed by the literature reviewed. This framework guided the researcher's understanding of relationships among variables in the study.

In addition to the conceptualization in Figure 11, inclusive to the researcher's overall conceptual framework is a graphical representation of the researcher's conceptualization of current theoretical requirements vis-à-vis their implementation in actual practice at the point of health care delivery as represented in the literature reviewed (see Figure 12). This graphical representation illustrates a top-bottom approach that puts standards at the top and the LEP patient at the bottom. In contrast to the top-bottom approach, a more integrative approach in which the LEP patient is the objective target and policies and practices work together for a common goal – meeting patients' needs - is conceptualized (see Figure 13). This representation allows for integration of LEP patients' needs with theoretical requirements and actual practices at the point of health care delivery in order to achieve care that is more patient-centered. In this representation, the patient's perspective plays a significant role in informing both government policy and structural process in health care institutions.

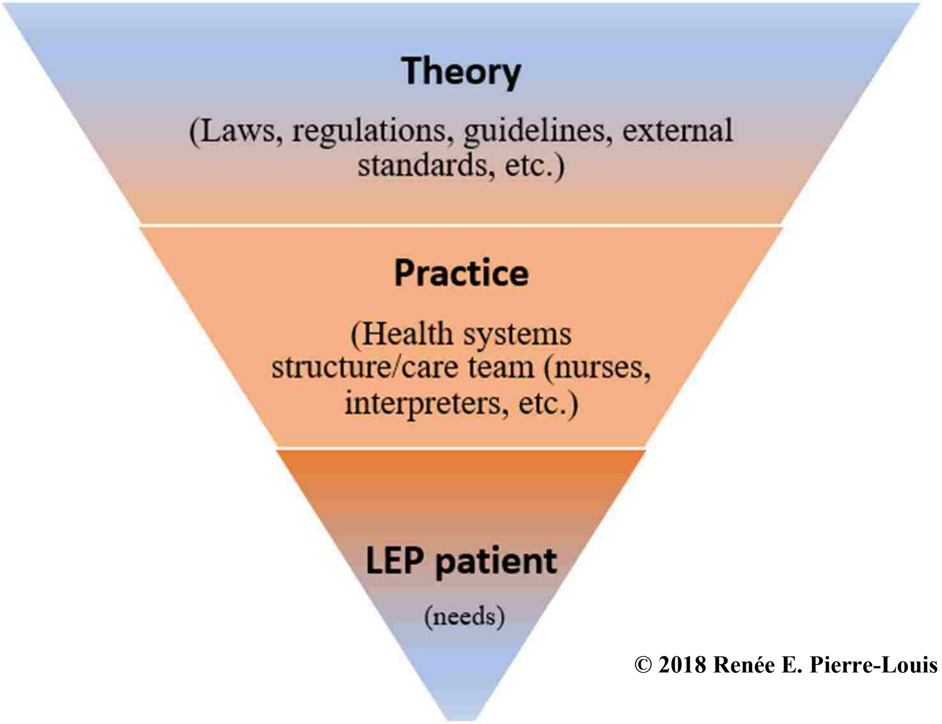

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Figure 12. Researcher self-developed conceptualization of current theory in relation to actual practices.

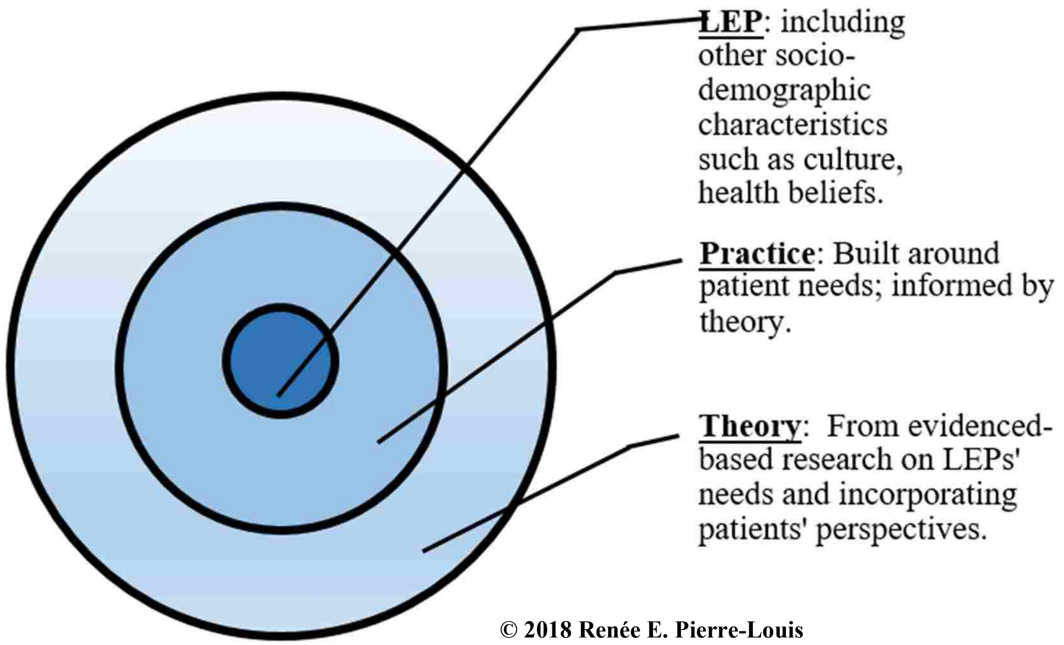

Figure 13. Researcher self-developed representation of a patient-centered care system model for providing health care and services to LEP patients. The patient is positioned at the center as the unit of focus. Practices such as institutional policies, structures, and immediate and extended care team activities are closer to the patient and built around the needs of the patient while they are informed by theories. In this model the foundation for healthcare theories is evidence-based findings from research related to LEP patients' needs that also incorporate the patient's perspective.

In conclusion, taken together, the explanation provided in this section that is supported by graphical representations in Figures 11, 12, and 13 forms the researcher's overall supporting theoretical framework that guided the study. The underpinnings of this framework are patient safety and quality at the point of care through improved patient-provider communication in LEP populations.

Alternative Hypotheses

According to Creswell (2007), scholars use research questions and hypotheses to shape the purpose of the research. The research questions were previously stated. There is no alternative hypothesis for RQ1 because it is descriptive and seeks to provide an understanding of the characteristics of the sample. The seven remaining research questions (RQ2-8) are difference or correlational questions; thus, associated alternative hypotheses are provided for each respective question.

H_1: There is a difference in access to health services among Californian adults with limited English proficiency (LEP) as compared to adults who speak English only (EO) and adults who speak English and another language at home (E+OL).

H_2: There is a difference in utilization of health services among Californian adults with limited English proficiency (LEP) as compared to adults who speak English only (EO) and adults who speak English and another language at home (E+OL).

H_3: There is a difference in self-rated health status among Californian adults with limited English proficiency (LEP) as compared to adults who speak English only (EO) and adults who speak English and another language at home (E+OL).

H_4: There is an association between access and utilization among Californian adults with LEP.

H_5: There is an association between access and self-rated health status among Californian adults with LEP.

H_6: There is an association between utilization and self-rated health status among Californian adults with LEP.

H_7: There are recursive direct and indirect effects of LEP on access, utilization, and SRHS among Californian adults with LEP.

Organization of the Chapters

The researcher's conceptual framework for this study was built on the foundation of the scientific literature reviewed, which includes several concepts that are introduced and operationally defined, a body of legal authorities pertaining to the topic of LEP (e.g., laws, regulations, federal agency guidelines), standards published by an internationally recognized accrediting organization, and a theoretical model found in the literature that helped the conceptualization of a systematic pathway to perceived health status. As such, there were complexities inherent to building the researcher's conceptual framework to guide the study because it relies on various sources for supporting evidence, which include not only the current knowledge-based evidence described in this section but also the understanding the researcher developed from reviewing the literature. As the dissertation progresses, therefore, this description of the organization of the study will assist in keeping in mind the logical flow and systematic approach undertaken in carrying out each step in the study.

In order to explore associations among LEP, access, utilization, and SHRS, statistical analysis of secondary data was performed to do the following: (1) examine a difference in access, utilization, and SRHS among Californian adults based on the English language proficiency, (2) examine correlations between access and utilization, access and SRHS, and utilization and SRHS, and (3) fit a statistical model to the data to test if the BMHS theory holds true based on the CHIS data.

Immediately preceding Chapter I, operational definitions of terms used are provided to explain the specific way in which concepts are to be understood in this study. Then, a summary of the major aspects of the study is provided in the abstract.

In chapter I, a brief introduction is given concerning the circumstances that gave rise to the continuous increase of LEP in the U.S. Then future projections of growth concerning foreign-born and LEP are briefly discussed to establish the prevalence of the problem and the imperative for studying the LEP population in health research. Then operational definitions of terms are presented. Following that research questions are formulated. Then, through a theoretical discussion, the researcher's conceptual framework for guiding the study is presented, together with frameworks that constitute its underpinnings. Then alternative hypotheses are stated. The chapter concludes with this section on organization of the chapters of the dissertation.

In chapter II, a brief overview of the continued upward trends of immigration to the U.S. is first stated with the impact of lack of English proficiency on health services and LEPs in order to tie the literature reviewed to the research topic and problem presented in chapter I and set the literature reviewed in a proper context. An integrated and synthesized review of the literature is presented concerning major concepts such as access, utilization, LEP and SRHS. Other determinants that might affect access and utilization are also discussed. The literature reviewed consisted of related previous studies and contributed to the researcher's conceptual framework that allowed for a systematic view of the phenomenon of being LEP with regard to access, utilization, and SRHS. The researcher also presents a synthesis of how the constructs to be explored have been studied in the literature. At the end of the chapter, an evaluation and summary of what is known from the literature reviewed is presented and findings in terms of gaps in the literature are also presented.

In Chapter III, the research methodology is explained. More specifically, the stepwise process followed for conducting the study is described. First the research design is presented. Then, since secondary data were used, the data analyzed are described through an explanation of the following: data source, previous uses, population, sampling method, variables, procedure and data collection methods. Following that, the variables used in this study and how the data were analyzed are described. Then the method used to conduct the study is explained and the statistical analysis used for null hypothesis testing are also described. The chapter ends with a brief summary concerning how conclusions about the data are supported by the results obtained from the statistical analyses.

In Chapter IV, prior to presenting the results from the quantitative statistical analyses conducted, techniques used for data cleaning and handling of missing data are presented, which is followed by a discussion concerning sampling procedure, instruments, and measurement scales. Then the demographic characteristics of the sample are presented, followed by presentation of the results from inferential and correlational statistical analyses conducted to test the hypotheses and answer the research questions. Following that, results of the fit of the measurement models developed to measure access and utilization as constructs and path analysis techniques used to test the fit of the BMHS model to the data are presented. The chapter concludes with a summary of the findings.

In Chapter V, first the problem investigated with the significance and purpose of the study are briefly revisited through a general discussion in order to link the findings to the overall context of the study and provide a framework for discussing the findings. Then the chapter progresses with an in-depth discussion about the results and findings in the study. Following that, the findings are discussed in relation to the literature and the theoretical framework that was used to guide the study. Then, based on the findings in the study, a new conceptual framework is proposed as an innovative tool that allows a wider lens for conceptualizing LEP in relation to health status while simultaneously facilitating assessment, measurement and analysis of both the measurement and structural components of a statistical model with latent constructs in order to crate knowledge upon which decisions can be made. The usefulness of the proposed new conceptual framework is discussed, together with the rationale for its underpinnings. After that, the rationale for the findings in this study with their practical applications and implications are discussed. Then the study limitations are discussed. The chapter concludes with relevant insights from the researcher and recommendations based on the findings in this study. This includes a brief discussion about the contribution and significance of this study to the field of health research.

Chapter II

REVIEW OF RELEVANT LITERATURE

The context of the literature review is amply discussed in the background section of this dissertation. It rests in the continued rise in immigration together with the concurrent increase in the number of LEPs and the broad implications of these two phenomena on the U.S. healthcare system in terms of providing culturally- and linguistically-competent care to LEPs. Data sources for the literature reviewed include relevant scientific literature on scholarly databases, official Internet sites for federal government agencies, the United States Code, the Code of Federal Regulations, the Federal Register, guidelines from recognized major health care institution accrediting organizations, and scholarly books.

What is currently known about LEP in a health care setting is provided through a synthesis of evidence reviewed and evaluated. The evidence includes a legal framework for studying LEP. Also, studies that are either supportive, non-supportive, or neutral concerning the influence of LEP on patient outcomes are discussed. In addition, the synthesis provides a description of settings in which LEP has been studied and trends that have been observed concerning factors reported in the literature reviewed as indicators related to lack of access and utilization among LEPs. These factors are in addition to factors that impact the U.S. population in general (such as financial and structural barriers to healthcare).

Legal and Regulatory Framework

Historically, the U.S. government has attempted to address the needs of LEPs in health care through legislations, regulations, and establishment of national standards for health care providers to provide services that accommodate such needs. These attempts date as far back as the enactment of Title VI of the Civil Rights Act of 1964 ("Civil Rights Act of 1964"), codified at 42 U.S.C. § 2000d et seq., which, in relevant parts, prohibits discrimination based on national origin. It is worth pointing out that federal regulatory agencies, have traditionally construed *national origin* to include *national language*. For example, that is the position of the U.S. Department of Health & Human Services' ("HHS") Office for Civil Rights ("OCR") in its Final Rule published on May 18, 2016 to implement section 1557 of the Patient Protection and Affordable Care Act of 2010 ("PPACA"), which prohibits "discrimination on the basis of race, color, national origin, sex, age, or disability in certain health programs and activities" (Fed. Reg., 2016).

Other legislative measures related to LEP have been taken subsequent to the enactment of the Civil Rights Act of 1964. For example, in 2000, President William Clinton signed Executive Order 13166 ("Improving Access to Services for Persons with Limited English Proficiency"), which requires federal agencies to identify LEPs' needs for services and develop and implement a system to facilitate access to services by LEPS (Executive Order 13166, 2000). Also, in 2001, the U.S. Office of Minority Health ("OMH") published 14 national standards concerning the provision of healthcare in a cultural and linguistic context. Commonly known as CLAS 2001, the National Standards for Culturally and Linguistically Appropriate Services in Health Care contains 14 standards, and provide a framework to health care professionals for providing culturally and linguistically appropriate health care to LEPs (Office of Minority Health, 2001).

In addition to the Executive Order and the OMH standards, in 2006, the OCR issued a guidance to federal financial assistance recipients regarding Title VI prohibition against national origin discrimination affecting LEPs (Office of Civil Rights, 2006). In the OCR's guidance, healthcare institutions are defined as federal financial assistance recipients (Office of Civil Rights, 2006).

As previously discussed, PPACA of 2010, in relevant parts, requires the provision of health care services that meet the needs of LEPs. Also, in 2012, the Agency for Healthcare Research and Quality (AHRQ) issued an extensive guide for hospitals for improving patient safety systems for patients with LEP (Betancourt, Renfrew, Green, Lopez, & Wasserman, 2012). Further, in 2013, the OMH issued enhanced CLAS standards (Office of Minority Health, 2013). The 2013 National Standards for Culturally and Linguistically Appropriate Services in Health and Health Care contains 15 standards -- four of which fall under the theme of communication and language assistance to LEPs.

While adherence to CLAS is voluntary, many health care institutions have committed to some or all of the standards (Koh et al., 2014). In addition, HHS's publication in 2016 of its Final Rule to implement the nationality-based anti-discrimination provision of PPACA was previously discussed in this document. The Rule, which became effective on July 18, 2016 and is codified at Title 42 of the Code of Federal Regulations (CFR), clarifies existing non-discrimination requirements and sets forth new standards to implement PPACA § 1557. In 42 CFR 92.4, HHS defined "*national origin*" to include ". . . an individual's, or his or her ancestor's, place of origin (such as country or world region) or an individual's manifestation of the physical, cultural, or *linguistic* [emphasis added] characteristics of a national origin group."

In addition to legal and regulatory measures, the Joint Commission, which is a widely-recognized independent organization that accredits and certifies health care organizations and programs in the U.S. for performance standards, has provided guidance to hospitals concerning the provision of health care to LEPs. The Joint Commission recognizes that language barriers significantly impact safe and effective health care and that lack of patient–provider communication concordance is a common root cause of adverse events among LEPs (Joint Commission, 2015).

In information disseminated to its members, the Joint Commission has stated that “[i]t is critical to patient safety that organizations maintain collective mindfulness, particularly when there are high-risk and complex situations involving LEP patients. Some of these situations are medication reconciliation, transitions of care, informed consent, urgent and emergency care, and surgical care. The Joint Commission has further stated that communication needs of LEP patients “must be addressed across the care continuum” (Joint Commission, 2015).

Figure 14 provides a chronology of some key laws, regulations, and standards concerning providing health services to LEPs. Despite this body of requirements, however, findings from recent studies show that health outcomes for LEPs continue to be influenced by lack of access and utilization (DuBard & Gizlice, 2008; Kim et al., 2011). It can therefore be properly inferred that there is room for improvement in current practices to optimize services to LEPs.

Date	Key Standards	Provisions
1964	-U.S. Congress: Civil Rights Act of 1964.	-Prohibits discrimination based on national origin.
2000	-President William Clinton: Executive Order 13166.	-Requires services for LEPs.
2010	-President Barack Obama: Patient Protection and Affordable Care Act.	-Requires culturally- and linguistically-appropriate services for LEPs.
2013	-U.S. Office of Minority Health: National Standards for Culturally and Linguistically Appropriate Services Health and Health Care.	-Enhanced CLAS Standards.
2016	-U.S. Department of Health & Human Services, Office for Civil Rights: Final Rule published on May 18, 2016 to implement section 1557 of the Patient Protection and Affordable Care Act of 2010.	-Prohibition of "discrimination on the basis of race, color, national origin, sex, age, or disability in certain health programs and activities."

Figure 14. Researcher's self-developed chronological chart of certain key laws, regulations, and standards concerning LEP as it relates to the health care. Several federal agencies have traditionally construed "national origin" to include "national language." HHS has defined "national origin" to include an individual's linguistic characteristics.

Current Practices

Although a patient's right to effective patient-provider communication is legally required and supported by nationally established accreditation standards for health care institutions, communication needs often remain either unmet or inappropriately addressed (Regenstein, Mead, Muessig, & Huang, 2009). Accordingly, the provision of quality care to LEPs might be impeded by communication discordance (Regenstein et al., 2009).

It has been documented that many health care institutions use ad hoc interpreters such as family, friends, or administrative and custodial staff to communicate and facilitate patient-provider communication -- even though findings from research show that such practice can lead to miscommunication and medical errors (Wilson-Stronks & Galvez, 2007). This might be because although ad hoc interpreters can communicate to patients in their native language, they may or may not have the technical training or skill to communicate medical or health information. Patient communication using these ad hoc means might be inadequate and therefore ineffective in some cases - which leaves LEP patients at risk. According to Wilson-Stronks, Lee, Cordero, Kopp, and Galvez (2008), in order for communication to be effective, the information provided must be "complete, accurate, timely, unambiguous, and understood by the patient." Keeping in mind Regenstein et al.'s, (2009) and Wilson-Stronks et al.'s (2008) findings and the existing body of legal and regulatory requirements governing the provision of care to LEPs, there is therefore, an apparent discrepancy between theory and practice. It is not well understood, therefore, how effectively current policies accomplish key goals for addressing the health care needs of LEPs.

A comparison of the current evidence found in the literature reviewed supports that despite the abundance of legal, regulatory, and accreditation measures, there appears to be disparities in access and utilization among LEPs and a lack of compliance with standards (Diamond et al., 2010). Closing health disparities by adhering to established standards remains a daunting challenge to health care institutions in terms of providing quality care that is culturally- and linguistically-appropriate and that are accessible to LEPs while managing cost (Gadon et al., 2007). While improving health equity is a national mandate, it may also (1) increase patient satisfaction, (2) improve quality and safety, and (3) meet legislative, regulatory, and accreditation standards. In addition, in view of the Census Bureau's current and projected demographic changes in the U.S., if the issue continues to remain inadequately addressed, the problem could become larger as the LEP population increases.

The gap in the quality of services due to lack of an interpreter that Wilson-Stronks et al. (2008) identified has been recognized as a major barrier to access and utilization among LEPs and a root cause of health disparity among minority groups in the U.S. (Agency for Healthcare Research and Quality, 2014; Lees, Wortley, & Coughlin, 2005; Meltzer, Bonito, Eicheldinger, & Lenfestey, 2005; Pollack, Blackman, Wilson, Seeff, & Nadel, 2006). According to the Office of Disease Prevention and Health Promotion, "there is disparity if a health outcome is seen to a greater or lesser extent between populations" (Office of Disease Prevention and Health, 2016). Also, according to Meltzer et al. (2005), "a disparity in health service use is said to exist in a situation when, by reason of greater minority group risk factors, disease prevalence, mortality, disability, or other unacceptable health outcome, there is no way to justify a difference in the health service use of the minority group and the rest of the population" (p. 120).

Findings from previous studies and estimates from the Census Bureau show various factors that influence access and utilization and that result in disparity in health services across population groups (Agency for Healthcare Research and Quality, 2014; Graham, Jacobs, Kwan-Gett, & Cover, 2008; Njeru et al., 2015). Generally, certain factors are well-known influences on health care access and utilization for the U.S. population (e.g., health insurance coverage, high-quality education, nutritious food, decent and safe housing, and reliable public transportation) (Office of Disease Prevention and Health, 2016). For example, prior to the Affordable Care Act (ACA), 47 million Americans were estimated to either lack or have inadequate health insurance coverage due to financial constraints or coverage limits related to health insurance (Garfield, Licata, & Young, 2014). Access and utilization for these individuals were, therefore, limited. More particularly, among racial and ethnic minority groups, compared to the dominant population group, there are generally well documented disparities in access and utilization that are impacted by factors other than the ones that affect the U.S. population in general.

There is a trend in the literature reviewed that shows that the following groups of four factors exert influences on access and utilization and are contributors to health disparities in minority groups: (1) Race and ethnicity (Meltzer et al., 2005; O'Hara & Caswell, 2012). The literature reviewed documents disparities among minority groups. (2) Illiteracy, low literacy proficiency, and low health literacy. The literature reviewed documents that illiteracy and low literacy proficiency among adults in the U.S. affect health status (Mohadjer et al., 2009; Willis et al., 2007a). According to Guy (2006), low literacy proficiency is relatively common in the U.S. "with somewhere between one in five and one in three adult Americans with sufficient difficulty in reading or computation to be challenged by the ordinary tasks of everyday life and work." The literature reviewed also shows that low or lack of health literacy contributes to health disparities (Kimbrough, 2012; Rudd, Kirsch, & Yamamoto, 2004). (3) Lack of cultural competence which is a concept that was first propounded by Leininger (1991) (Anderson et al., 2003; Betancourt, Green, & Carrillo, 2002; Betancourt et al., 2005; Hoffman, 2011; Leininger, 1991; Purnell, 2000; Purnell & Paulanka, 2002), and (4) English language proficiency (Bernstein et al., 2002; Carter-Pokras et al., 2004; Cohen et al., 2005; Da Silva et al., 2011; Dewalt, Berkman, Sheridan, Lohr, & Pignone, 2004; Graham et al., 2008; Masland et al., 2011; Nielsen et al., 2010; Office of Minority Health, 2001, 2013; Prentice & Pizer, 2007; Rudd et al., 2004; Shi et al., 2009; Starfield, 1998; Szalados, 2004; Torres & Kovacich, 2014; Zanchetta & Poureslami, 2006; Zhang et al., 2012).

As previously discussed, the notion of English language competency in health care and services delivery has traditionally been studied by many researchers in the health research field as part of cultural competence. For example, many earlier models of conceptual tools for assessing cultural competence have included English language competency as one of the factors to measure cultural competence. To illustrate, each of the following three tools for assessing cultural competence that are widely used in health care includes language as a factor: (1) The Leininger Sunrise Model: This model provides a visual guide to assist nurses in assessing and planning care for patient of different cultures (Leininger, 1991). (2) The Purnell Model for Cultural Competence: This model provides the health care provider's a foundation for understanding the many attributes of a different culture (Purnell & Paulanka, 2003). (3) The Campinha-Bacote Model of Cultural Competence in Healthcare Delivery: In this model, cultural competence is viewed as a process in which a health care provider seeks to achieve greater efficiency through building an ability for working in a culturally-diverse environment (Campinha-Bacote, 2002).

It is also noteworthy to point out that cultural competence itself as a concept first emerged in social work literature as well as in counseling psychology literature in the early 1980s (Gallegos, Tindall, & Gallegos, 2008b). It is not until a decade later that several articles on cultural competence were published in the nursing and education literature. Accordingly, in addition to the newness of the concept of limited English proficiency in the literature, the interest in cultural competence itself is recent in the health research literature (Gallegos et al., 2008b).

In more recent studies, English language competency appears to have emerged as an isolated factor of access and utilization that deserves more attention from health care providers because of the detrimental effects on health outcomes associated with a patient's inability or lack of ability to speak English. More health care institutions are using trained interpreters or interpreter services to facilitate communication between providers and LEPs and the findings from recent studies show the beneficial effect of the use of such resources in facilitating health care delivery to LEPs (Torres & Kovacich, 2014; Zhang et al., 2012).

There is a growing awareness of the notion of English language competency as it concerns the health status of the foreign-born. Judging, however, by the lack of preponderance of published scholarly articles that have studied English language competency independent of other factors and the newness of the literature, this heightened level of appreciation for the problems posed by lack of patient-provider communication concordance in health care delivery appears to be recent. One of the earliest articles written about spoken language in the context of health care was authored in 1998 in the context of examining genetic services in primary care for Asian Americans and Pacific Islanders (George, 1998).

In general, the literature reviewed shows that the foreign-born face many societal challenges in terms of acculturation. Navigating through the multiple layers of complexity within the health care system with a lack of cultural perspective and inadequate or no English language competency might, however, present an additional significant hardship. For the millions of foreign-born who are LEP, it is a daunting challenge as lack of access and utilization affects their health (Toppelberg & Collins, 2010). Likewise, providing health services and care to individuals who are LEP presents a unique challenge to the health care system in terms of continuing to provide adequate services in view of the continued upward trends in immigration (Hall, Singer, De Jong, & Graefe, 2011). In addition, logistical uncertainties for physicians in treating patients who may not understand instructions, coupled with the risk of litigations and the fiscal impact on small group practitioners should not be underestimated (Gadon et al., 2007; Robert Wood Johnson Foundation, 2004).

Notwithstanding the challenges health care providers face, it is however of significant importance to also keep in mind that an association between various serious adverse events and harmful health impacts related to LEP has been documented. These events include: (a) mortality (Prentice & Pizer, 2007), (b) patient medication errors (Regenstein et al., 2012), (c) misunderstanding of prescription labels resulting in adverse drug events and non-adherence (Masland et al., 2011), (d) increased hospital costs through higher resource utilization when medical care is delayed (Zhang et al., 2012), (e) negative effect on mental health of immigrants and ethnic minorities (Zhang et al., 2012), (f) lower quality of care (Nielsen et al., 2010), and (g) increased likelihood of exclusion in clinical trial research (Giuliano et al., 2000).

Further, in a guide to hospitals for improving patient safety systems for LEP patients prepared for the Agency for Healthcare Research and Quality (AHRQ) of the U.S. Department of Health and Human Services, LEPs are identified as a large and growing *vulnerable* [emphasis added] population (Betancourt et al., 2012). At the time the guide was written in 2012, it was estimated that at least 8.6 percent of the U.S. population was at risk for adverse events because of barriers associated with their English language ability.

According to statistical predictions by the Census Bureau, prevalence in LEP is projected to increase. In the AHRQ guide, Betancourt et al. (2012) identified several areas in terms of risk management that remain a critical concern and are directly linked to patient safety and expose hospitals to multiple liabilities when providing care to LEP populations. According to Betancourt et al. (2012), those areas may include: (1) patient comprehension of medical condition, treatment plan, discharge instructions, complications, and follow-up; (2) inaccurate and incomplete medical history;(3) ineffective or improper use of medications or serious medication errors; (4) improper preparation for tests and procedures; and (5) poor or inadequate informed consent. A risk mitigation process is proposed in the report; however, it appears to come with added cost to health care institutions.

What is Limited-English Proficiency in the Literature?

As discussed, studies with respect to spoken language as being associated with health care are relatively new in the health research literature. Traditionally, language was mostly studied in the field of education. Spoken language has emerged as another determinant associated with access and utilization and health outcomes (Zanchetta & Poureslami, 2006). One's inability or lack of ability to speak English affects utilization and, by extension, health outcomes (Graham et al., 2008).

Findings from previous studies support the notion that individuals with LEP are less likely to receive basic preventive medical care (Ponce et al., 2006; Shi et al., 2009). Some immigrants choose to return to their country of origin to seek healthcare. Lack of English proficiency is one of the documented reasons for such decision (De Jesus & Xiao, 2013). Immigrants might delay, underutilize, or forego health care because of barriers such as lack of English proficiency (De Jesus & Xiao, 2013). When healthcare is delayed, outcomes are worsened. This might lead to an increase in healthcare spending. The concept of healthcare access, however, is paramount in American idealism. Many in the U.S. view healthcare access as a public right and not an opportunity (Szalados, 2004).

Campinha-Bacote and Campinha-Bacote (2009) and Hoffman (2011) assessed the legal and regulatory aspects of providing health care to LEPs. On examination of case law, Campinha-Bacote and Campinha-Bacote (2009) found that numerous lawsuits can be directly attributed to culturally incompetent health care professionals. Hoffman (2011) also found that health care providers are now faced with the challenge of not only dealing with patients who have LEP but also complying with legal and regulatory requirements. Both Hoffman (2011) and Campinha-Bacote and Campinha-Bacote (2009) make recommendations to legal counsel on how to advise health care providers in establishing processes that are culturally- and linguistically-adequate. They both argue for the importance of health care providers to be aware of their obligations under legal mandates and propose that if healthcare providers comply with these mandates, safer health care services could be provided.

In studies concerning the impact of English proficiency in health care, both Cohen et al. (2005) and Shi et al. (2009) found that there are statistically significant differences regarding access to health care between English proficient individuals and LEPs. While Shi et al. (2009), did not find a significant relationship between language proficiency and delayed medical care, Cohen et al. (2005) found that such a relationship was statistically significant (see Figure 15).

Study	Findings	LEP Influence
Cohen et al. (2005)	Significantly increased risk of serious medical events during hospitalization of pediatric patients whose families have a language barrier compared to patients whose families do not have a language barrier.	Supportive
Shi et al. (2009)	LEPs are more likely than English-proficient individuals to report having trouble accessing medical care even after controlling for socioeconomic and health status.	Supportive

Figure 15. Studies related to the impact of LEP in a health care setting.

Findings from several studies reviewed support that although informed consent in research involving human subjects is mandated by law, the process for obtaining such consent from LEPs for health procedures or participation in clinical trials is often compromised and leaves LEPs at particularly high risk for receiving inadequate informed consent information. Torres and Kovacich (2014), Hunt and de Voogd (2007), and Schenker, Wang, Selig, Ng, and Fernandez (2007) studied LEP subjects and the informed consent process in research and found differences in health care providers being compliant with requirements based on English proficiency (see Figure 16).

A retrospective study comparing the charts of 74 Spanish and Chinese-speaking LEP patients to the charts of 74 English-speaking patients, all of whom underwent thoracentesis, paracentesis, or lumbar puncture at a hospital where trained interpreters in Spanish and Chinese were available, found that 28% of LEP patients had informed consent documented compared to 53% of English speakers (Schenker et al., 2007). Further, in a study concerning Latina women who were offered amniocentesis at eight prenatal clinics where there were no trained interpreters it was found that the informed consent process contained all, or nearly all, of the essential informed consent elements for only 9% of LEPs compared with 68% of the English-speaking women (Hunt & de Voogd, 2007). Also, Torres and Kovacich (2014) found that communication methods and the understanding of LEP guardians of pediatric patients during participation in the informed consent process during clinical trials was inadequate. LEP study participants had signed informed consent forms and participated in clinical trials without knowing or understanding the scope of the clinical trials.

Study	Findings	LEP Influence
Hunt & de Voogd (2007)	The informed consent process when interpreters are not available for LEP patients show that the essential informed consent elements for only 9% of LEPs were documented compared with 68% of the English-speaking patients.	Supportive
Schenker et al. (2007)	Hospitalized LEP patients are less likely to have documentation of informed consent for common invasive procedures compared to English speaking patients.	Supportive
Torres & Kovacich, 2014	LEP study participants signed informed consent forms and participated in clinical trials without knowing or understanding the scope of the clinical trials.	Supportive

Figure 16. Studies related to informed consent and LEP.

Taken aggregately, the findings from the studies reviewed support the notion that there are differences in both access to care and the quality of care provided to LEPs. For most of the literature from studies conducted in the health research field, the researchers have conducted studies in an emergency room setting using for the most part data collection methods such as retrospective chart review, interventional means such as observing cases where an interpreter was used versus when one was not used during the provider-patient interaction, follow up surveys: (e.g., phone interviews) and analysis of large registries containing patient datasets. Participants in the studies were for the most part from countries in North and South America, the Caribbean, and countries in Europe that do not have English as their primary language. Most of the studies were qualitative, non-interventional, and assessed the impact of culture and language on health care delivery. In most of the studies reviewed, however, the sample consisted of groups that were linguistically homogenous.

LEP and Access

As previously indicated in chapter I, the notion of access has been studied in the health research literature. Interchangeability in the use of the terms access, accessibility and utilization of healthcare services in the health services literature has also been discussed (Haggerty et al., 2011). In previous studies, access has been shown to be a determinant of health status and health disparity among minority groups (Graham et al., 2008). The three categories of health care access barriers described in the HCAB conceptual model (financial, cognitive, and structural barriers) and the BMHS theoretical model guided the review of the literature on access.

Findings from previous studies substantiate that LEPs might be less likely to receive basic preventive medical care because of cultural beliefs (Ponce et al., 2006; Shi et al., 2009). In addition to not receiving preventive care, lack of English proficiency might be a contributing factor that explains why some immigrants return to their country to seek health care (Bergmark, Barr, & Garcia, 2010; De Jesus & Xiao, 2013). In a study on quality of cancer care, Nielsen et al. (2010) found disparities in treatment of foreign-born as compared to people of similar race and ethnicity who were born in the U.S. In that study, the researchers point out that such disparities may be related to access to screening services or care, which may be mediated in part by language differences.

In their study, Avila and Bramlett (2013) sought to estimate health disparities between Hispanic and non-Hispanic White and assess the degree to which disparities could be explained by immigrant status and household primary language. Findings from that study underlined that even controlling for language and immigrant status did not eliminate all disparities and showed poorer outcomes for Hispanic children.

Cordasco, Ponce, Gatchell, Traudt, and Escarce (2011) assessed the relationship between distance to the nearest safety net clinic and access in non-rural uninsured adults in California and examined whether this relationship differs by language proficiency. Findings from that study suggest that having LEP is a barrier to health care access, which is even worse when combined with increased distance to the nearest safety net clinic.

Flores and Tomany-Korman (2008) examined whether disparities in terms of access to care and use of services exist for children in non-English primary language households. It was found that children in non-English primary language households had no usual source of medical care and made no medical or preventive dental visits during the previous year in addition to having problems obtaining specialty care.

To identify language-associated disparities among the U.S. Hispanic adult population, DuBard and Gizlice (2008) examined self-reported health status and access to care using data from the 2003 Behavioral Risk Factor Surveillance System (BRFSS). The findings indicated that access to health care was worse for Spanish-speaking than for English-speaking Hispanic for all four measurements of access.

Ye et al. (2012) investigated access to care and the use of health care services of US-born Asian Americans as compared to foreign-born Asians. Findings from the study confirmed the conclusion of various previously conducted studies in terms of the existence of disparities in access to health care between US-born and foreign-born Asians.

Heterogeneity in sub-categories among population groups might have an impact on access as well. Vargas, Fang, Rizzo, and Ortega (2009) explored the heterogeneity among Latinos as opposed to defining them as a single group to have a detailed understanding of the differences in health care access and utilization within Latinos and found that significant differences exist in terms of health care access and utilization across different categories of Latinos. Moreover, Latinos of Mexican ancestry experienced the worst patterns of access and utilization.

In summary, not all the studies reviewed were conclusive about a relationship between LEP and access. Some studies found that other factors such as culture might also play a role in influencing health outcomes for LEPs. For example, Vargas et al. (2009) found that ethnic heterogeneity in sub-categories among population groups might have an impact on access. Additionally, Callahan, Hickson, and Cooper (2006) found that access might be influenced by U.S. citizenship influences access (see Figure 17).

Study	Findings	LEP Influence
Callahan, Hickson, & Cooper (2006)	U.S. citizenship influenced access.	Non-supportive
Cordasco et al. (2011)	Having LEP is a barrier to health care access, which is even worse when combined with increased distance to the nearest safety net clinic.	Supportive
DuBard & Gizlice (2008)	Self-reported health status and access were examined. Access to care was worse for Spanish-speaking than for English-speaking Hispanic for all access measurements.	Supportive
Flores & Tomany-Korman (2008)	Children in non-English primary language households had no usual source of medical care and made no medical or preventive dental visits during the previous year and had problems obtaining specialty care.	Supportive
Vargas et al. (2009)	Ethnic heterogeneity in sub-categories among population groups might have an impact on access.	Non-supportive

Figure 17. Studies related to access.

LEP and Utilization

Traditionally, utilization has been studied in terms of the outcome of the interaction between health professionals and patients (Donabedian, 1973). According to Andersen (1995), however, utilization presupposes access. The author posited that for utilization to be enabled, both community and personal enabling resources, which are elements of access, must be present. In contrast to the traditional approach to studying utilization, Da Silva et al. (2011), in their conceptual framework for evaluating utilization, posited four elements to quality of care (continuity, comprehensiveness, accessibility, and productivity) and analyzed utilization in terms of indicators that indirectly provide an estimate of volume, while also documenting the qualitative aspects of utilization.

The studies described in this section show that previous studies document a broad range of barriers to utilization that are associated with LEP. These barriers include the following: (1) A physician visit in the previous year was less likely among undocumented immigrants. (2) Even if documents are not required to access the services, undocumented immigrants might still not use healthcare services. (3) Discontinuation of public mental health services may be significantly less likely among non-English speaking Asian children compared to their English-speaking White counterparts. (4) LEP patients might show ambulatory health care utilization associated with lower cost and more access to preventive care through establishing a primary care home when language barriers are reduced and health insurance coverage is the same. (5) Higher rates of inpatient health care utilization were observed among LEP patients compared to English-Proficient patients. Findings from some studies, however, were not supportive of the finding that LEP is associated with utilization (Aratani & Liu, 2015).

Findings from previous studies also show that immigrants might be reluctant to use the health care system based on their documentation status. For example, Bustamante, Fang, Rizzo, and Ortega (2009) studied the differences in health care access and utilization among Mexican immigrants based on their documentation status and found that undocumented immigrants from Mexico were much less likely to have a physician visit in the previous year and a usual source of care as compared to their documented countrymen. Also, Allen et al. (2013) explored the factors related to cancer screening and utilization of health services among Haitians in Boston, Massachusetts. The findings were organized into three major categories, one of which was barriers to access and utilization of health services. Within that category, the researchers noted that many participants reported that the high cost of health services, coupled with poverty, constituted a significant barrier to accessing healthcare services. In addition to the high cost, there also exists a mistrust of the health care system and a fear of being detained or deported. Findings from the study also show that undocumented Haitians might still not use healthcare services even if documents are not required to access the services. Avoidance of health services was often attributed to the participant's preference for traditional, cultural remedies and mysticism over traditional Western medicine (Allen et al., 2013).

A difference in utilization rate has also been found among LEPs in several other settings. Aratani and Liu (2015) investigated the role of English proficiency, ethnicity, and California's threshold language policy in the rates of discontinuing mental health services among Asian-American children and found that non-English speaking Asian children were significantly less likely to discontinue public mental health services than their English-speaking White counterparts. Also, Graham et al. (2008) evaluated the health care utilization of LEPs compared to English proficient (EP) adults with the same health insurance (Medicaid managed care) and full access to professional medical interpreters. The findings support that, compared to English proficient subjects, LEP were enrolled longer and more continuously in Medicaid, were 94% more likely to use primary care and 78% less likely to use the emergency department. There was no difference in specialty visits and hospitalization. These findings support the conclusions that when language barriers are reduced and health insurance coverage is the same, LEP patients show ambulatory health care utilization associated with lower cost and more access to preventive care through establishing a primary care home.

Similar to Graham et al. (2008), Njeru et al. (2015) found an association between patients with LEP and emergency department visits and hospital admissions. The findings show that patients who required interpreter services had significantly more emergency department visits and hospitalizations than patients who did not require interpreter services. The findings lend support to the researchers' conclusion that LEP patients had higher rates of inpatient health care utilization compared to English-Proficient patients (see Figure 18).

Callahan et al. (2006) assessed health insurance coverage and health care access and utilization for different Hispanic subgroups, young adults in the U.S. and found that a majority of noncitizens had no contact with a health care professional the previous year and lacked a usual source of care. Callahan et al. (2006) also found that while US citizenship and socio-demographic factors may help explain much of the differences, they could not account for all the differences due to substantial variability in rates of uninsurance and health care access and utilization measures that existed among some Hispanic young adults who participated in the study.

Study	Findings	LEP Influence
Aratani & Liu (2015)	Non-English speaking Asian children were found to be significantly less likely to discontinue public mental health services than their English-speaking White counterparts.	Non-supportive
Graham et al. (2008)	No difference in specialty visits and hospitalization found in utilization by adult LEPs compared to English proficient with same health insurance when LEPs had full access to interpreters.	Supportive
Njeru et al. (2015)	Patients who required interpreter services had higher rates of inpatient health care use.	Supportive

Figure 18. Studies related to utilization.

LEP and Self-Rated Health Status

Sharma and Petosa (2014) have defined beliefs as convictions that a phenomenon is true or real. Also, the word belief is defined in Merriam-Webster's dictionary as a "conviction of the truth of some statement or the reality of some being or phenomenon especially when based on examination of evidence" (Merriam-Webster's dictionary). These definitions suggest that beliefs are ideas from one's perspective - although they might also be supported by some underlying objective evidence.

Health, as defined by the World Health Organization is "a state of *complete* [emphasis added] physical, mental and social well-being and not merely the absence of disease or infirmity" (World Health Organization, 1948). In this study, self-rated health status is viewed from the perspective of respondents vis-à-vis their own beliefs concerning their general health status. Borrowing from the WHO's definition, SRHS was accordingly operationally defined in this study as the rating on a scale of the degree to which a respondent perceived that he/she was in "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity."

In general, SRHS is an assessment of one's own health and accordingly a subjective measure; however, it is a measure that is extensively used in the public health field. Questions have been previously raised as to the objective health status of patients in relationship to a self-evaluation. Wu et al. (2013) studied the relationship between SRHS and objective health status in the general population by examining the prevalence of diseases, laboratory parameters, and some health-related factors in different groups that self-rated their health status. It was found that SRHS was consistent with objective health status. The authors argued that therefore these subjective measures can serve as a global measure of health status in general population. Wu et al.'s (2013) findings about SRHS is also supported by findings from a study by Lima-Costa, Cesar, Chor, and Proietti (2012) where SRHS was found to be a reliable predictor of mortality.

Findings from previous studies using large samples from health surveys to assess SRHS in LEPs suggest that LEP has negative impacts on health status (see Figure 19). Kim et al. (2011) explored the implications of LEP on disparities in health status and healthcare services use of older Latino and Asian immigrants. Findings show that older Latino and Asian immigrants with LEP tended to have poorer self-rated health and higher psychological distress than groups who were proficient in English. They were also less likely than the English proficient groups to use health services and more likely to experience barriers to service use such as difficulty understanding written information at the doctor's office.

Gee and Ponce (2010) examined the association of racial discrimination and limited English proficiency with health-related quality of life among Asian Americans. Health-related quality of life was assessed with the Centers for Disease Control and Prevention's measures of self-rated health, activity limitation days, and unhealthy days. The findings show that overall, Asians who reported racial discrimination or had LEP were more likely to have poor quality of life, after adjustment for demographic characteristics.

Gee, Walsemann, and Takeuchi (2010) examined the association of language proficiency versus language preference with self-rated health among Asian American immigrants. The authors also examined whether modeling preference or proficiency as continuous or categorical variables changed their inferences. The findings show that all English proficiency measures were associated with self-rated health across all models; however, associations between language preference and self-rated health varied by the model considered. In an examination of health status comparing Asians versus non-Hispanic White children less favorable and heterogeneous care access and utilization patterns were found among Asians children (Yu, Huang, & Singh, 2010).

Study	Findings	LEP Influence
Gee & Ponce (2010)	Examination of association of racial discrimination and LEP with health-related quality of life among Asian Americans show overall racial discrimination, and to a lesser extent LEP, are key correlates of quality of life among Asian ethnic groups.	Neutral
Kim et al. (2011)	Poorer self-rated health and higher psychological distress than the English Proficient (EP) and English Only (EO) groups were shown in an exploration of the implications of LEP on disparities in health status and healthcare services use of older Latino and Asian immigrants.	Supportive
Yu et al. (2010)	Less favorable and heterogeneous care access and utilization patterns were found among Asian children in an examination of health status and health services access in Asians versus non-Hispanic White children.	Supportive

Figure 19. Studies related to health status.

Low Literacy and Health Literacy

From the literature reviewed, most studies that explored an association between low literacy and health literacy in the U.S. were commissioned by the U.S. government. For example, in 2009, the National Center for Educational Statistics of the U.S. Department of Education published survey data from its 2003 National Assessment of Adult Literacy (NAAL) (N = 18,500). Findings from that survey provided indirect estimates among states of the percentage of adults at the lowest literacy level and showed that a range from 6% to 23% of the U.S. population had a lack of basic prose literacy skills (Mohadjer et al., 2009).

Prior to the results of NAAL, various broad definitions of the concept of literacy had been offered (Gee, 1998; Willis, Kabler-Babbitt, & Zuckerman, 2007b). For example, according to Gee (1998), literacy is “control in secondary uses of language” (p.56). On the other hand, Willis et al. (2007b) defined literacy as a continuous developmental process that includes listening, speaking, reading, and writing. Both Gee and Willis, however focused on literacy in the formative years of children. In contrast with these authors, the results from NAAL suggest that for many adults a complex mix of variables influence literacy proficiency (Guy, 2006).

There is a long history of studies concerning literacy; however, there is no consensus in the literature on the definition of the term. According to the UNESCO Institute for Statistics (UIS),[8] however, a person who is functionally literate is one “who can engage in all those activities in which literacy is required for effective functioning of his (her) group and community and also for enabling him (her) to continue to use reading, writing and calculation or his (her) own and the community's development" (UNESCO Institute for Statistics, 2008).

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[8] The UNESCO Institute for Statistics (UIS) is the statistical branch of the United Nations Educational, Scientific and Cultural Organization (UNESCO) that produces the data and methodologies to monitor trends at national and international levels.

The relationship between poor health status and literacy in the U.S., similar to that in non-industrialized nations, has been studied by Weiss, Hart, McGee, and D'Estelle (1992) who investigated whether, like in non-industrialized nations, illiteracy in the U.S. is independently associated with poor health status. Weiss et al. (1992) found that in the U.S., poor literacy and poor health status are related - even after controlling for confounding co-variables. Also, Dewalt et al. (2004) conducted a systematic review of the literature on the topic of literacy and health outcomes. The findings lend support to the notion that patients with low literacy have poorer health outcomes in terms of knowledge, intermediate disease markers, measures of morbidity, general health status, and use of health resources. Patients with low literacy were generally 1.5 to 3 times more likely to experience a given poor outcome.

Low literacy proficiency is relatively common in the U.S. (Guy, 2006). It has been shown to contribute to health disparities among immigrants (Guy, 2006; Hall et al., 2011; Kimbrough, 2012; Weiss et al., 1992). Illiteracy and low literacy in the context of healthcare are often studied in the context of health literacy abilities. For example, Scudder (2006) found that literacy affects the quality of health care; however, the author looks at literacy in terms of a person's ability to perform basic health-related tasks such as reading a prescription, filling out a consent form, or following a hospital map. Weiss and Palmer (2004) found very limited reading skills to be associated with higher health care charges among medically-needy and medically-indigent Medicaid patients.

Health literacy is well studied in the literature and has been defined in various ways. In Healthy People 2010[9], health literacy is defined as "the degree to which individuals have the capacity to obtain, process, and understand basic health information and services for appropriate

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[9] Healthy People 2010 is a comprehensive, nationwide health promotion and disease prevention program, which was commissioned by the U.S. government.

health decisions" (U.S. Department of Health and Human Services, 2000). More recently, however, health literacy has also been defined as the ability to obtain, understand and use the information needed to make wise health choices (Kimbrough, 2012). Health literacy has also been defined as "the degree to which an individual has the capacity to obtain, communicate, process, and understand basic health information and services to make appropriate health decisions" (Patient Protection and Affordable Care Act (PPACA) of 2010, 2010).

According to the Agency for Health Care Policy and Research, low health literacy among members of populations with poor reading skills, limited mastery of the English language, members of ethnic or cultural minorities, and immigrants is likely a major contributor to health disparities in the U.S. People with low health literacy often lack, not only the ability to read well, but also knowledge about the body, its functioning, and the nature and causes of different types of disease (Agency for Health Care Policy and Research, 1997). Health literacy has been reported to be associated with poor general health status and use of health resources (Agency for Health Care Policy and Research, 1997). It was not until recently, however, that the first analysis of population-based health literacy skills among adults in the U.S. (age 16 and older) was conducted by Rudd et al. (2004). From that survey, the authors developed the Health and Adult Literacy Survey (HALS) tool. Improving health literacy could reduce health care cost. It has been reported that the savings that could be achieved by improving health literacy are between a lower bound of $106 billion and an upper bound of $238 billion (Vernon, Trujillo, Rosenbaum, & De Buono, 2016).

In a qualitative study, Kimbrough (2012) investigated health literacy as a contributor to health disparities among immigrants. The major themes that emerged from analysis of the responses from interviews with focus groups were summarized in terms of four categories of issues that the population surveyed faced: cultural competence, medication compliance, patient education, and communication and translation.

Prins and Monnat (2015) analyzed the relationship between self-reported health and literacy and numeracy proficiency for immigrants compared to U.S.-born respondents and for Hispanics versus Asians. The findings show that immigrants had significantly lower literacy and numeracy scores; yet, they reported better health than U.S.-born respondents. Second, U.S.-born and immigrant adults accrued similarly positive health benefits from stronger literacy and numeracy skills. Third, although Hispanic immigrants were more disadvantaged than Asian immigrants on almost all socioeconomic characteristics and had significantly lower literacy and numeracy scores and worse self-rated health than Asian immigrants, both Hispanic and Asian immigrants experienced similar positive health returns from literacy and numeracy proficiency.

Although findings from previous studies support that low literacy proficiency contributes to health disparities in immigrants, interpretations from findings in most of the studies reviewed linked literacy and health literacy to health status. Findings from two studies that linked LEP to literacy or health literacy (Agency for Health Care Policy and Research, 1997; Kimbrough, 2012) and findings from three studies that are neutral are highlighted in Figure 20.

In summary, the literature reviewed shows that previous studies document the following: (1) Patients with low literacy are generally more likely to experience a given poor outcome. (2) Health literacy is a major contributor to health disparities in the U.S. and is prevalent among immigrants. (3) Low health literacy contributes to an increase in cost to the U.S. health system and is associated with poor general health status and use of health resources. (4) A range from 6% to 23% of the U.S. population lacks basic prose literacy skills.

Study	Findings	LEP Influence
Agency for Health Care Policy and Research (1997)	Low health literacy among members of populations with limited mastery of the English language is likely a major contributor to health disparities in the U.S.	Supportive
Kimbrough (2012)	Communication and translation shown to be related to health literacy as a contributor to health disparities among immigrants.	Supportive
Dewalt et al. (2004)	Patients with low literacy have poorer health outcomes in terms of knowledge, intermediate disease markers, measures of morbidity, general health status, and use of health resources.	Neutral with respect to immigrants and LEPs
Guy (2006)	Low literacy proficiency found to be relatively common in the U.S. and to contribute to health disparities among immigrants.	Supportive
Abdus, Mistry, & Selden (2015); Scudder (2006)	Low literacy singled out as likely contributor of health disparities	Neutral with respect to immigrants and LEPs

Figure 20. Studies related to low literacy and low health literacy.

Race/Ethnicity and Access and Use

The literature documents persistent inequalities in access, utilization, and self-rated health status among minority groups based on race and ethnicity (Agency for Healthcare Research and Quality, 2014; Lees et al., 2005; Meltzer et al., 2005; O’Hara & Caswell, 2012; Pollack et al., 2006; Ross et al., 2008). One of the major determinants of access and utilization is insurance coverage; however, findings from a survey conducted by the Census Bureau show that minority groups are more likely to be uninsured than White groups. In 2010, 16% of the U.S. population was uninsured. While Whites represented 72.4% of the U.S. population, the uninsured population was divided as follows: White: 15.1%, White, not Hispanic: 11.4%, Black: 20.2%, American Indian and Alaska Native: 27.9%, Asian: 17.4%, Native Hawaiian and other Pacific Islander: 20.5%, and Hispanic (any race): 30.7% (Meltzer et al., 2005; O'Hara & Caswell, 2012).

With the passage of the PPACA and the subsequent implementation of its provisions at different points in time, it was expected that health status, in general, would be improved through promotion of preventive programs (Koh & Sebelius, 2010). Racial and ethnic disparities have been studied after the implementation of the PPACA. Abdus et al. (2015) examined pre-reform patterns in insurance coverage, access to care, and preventive services use by race and ethnicity in adults targeted by the coverage expansions of the PPACA using pre-PPACA. The findings show that minorities were disproportionately represented among those targeted by the coverage provisions of the PPACA. They concluded that PPACA both improved coverage, access, and use for all racial/ethnic groups and narrowed disparities in these outcomes.

Previous studies have shown that differences in utilization may be attributable to race. A study of utilization among Medicare beneficiaries as measured by race and ethnicity was commissioned by the U.S. Department of Health and Human Services (HHS), Centers for Medicare & Medicaid Services (CMS). Findings generally show a difference across race and ethnicity (Meltzer et al., 2005). For example, there was a general trend that White Medicare beneficiaries consistently received higher percentages of services. Also, findings from a study by Pollack et al. (2006) show that a disparity exists between Hispanic and non-Hispanic U.S. adults in colorectal cancer test use. From 1992 to 2000, colorectal cancer mortality rates in the general U.S. population declined; however, the rates for Hispanic men and women did not. Also, Lees et al. (2005) explored race/ethnicity as a predictor of utilization and found that Blacks and Hispanics were significantly less likely to report receiving all preventive health care services compared to Whites.

In contrast to the studies discussed above in this section, findings from some studies suggest that the presence of race may not always be a variable to which a difference in health care is attributable. Findings from a study by Ross et al. (2008) to explore racial and ethnic differences in adherence to cervical cancer screening recommendations among female post-graduate physicians show that women who self-identified as Asian were significantly less adherent when compared with women who self-identified as White. The Asian women were insured and highly-educated physicians with access to health care. These findings suggest that, as opposed to race, culture may play a role in cervical cancer screening. In addition, findings from the study by Sentell and Braun (2012) suggest that although important racial/ethnic variations exist in healthcare among minorities, other covariates such as low health literacy may affect health status. Individuals with both limited English proficiency and low health literacy were found to be at high risk for poor health (see Figure 21).

The following themes emerged from the studies described in this section: (1) There are differences in utilization based on race and ethnicity. (2) Culture, as opposed to race, may influence health behaviors with regard to utilization. (3) In addition to belonging to a minority group, LEP affects poor health.

Study	Findings	LEP Influence
Meltzer et al. (2005)	A difference across race and ethnicity was shown in utilization among Medicare beneficiaries. White beneficiaries consistently received higher percentages of services.	Neutral
Pollack et al. (2006)	Rates of colorectal tests used was shown to be less frequent for Hispanics compared to non-Hispanic U.S. adults.	Neutral
Ross et al. (2008)	Culture, as opposed to race, may play a role in non-adherence to recommended guidelines for cervical cancer screening among female post-graduate physicians.	Neutral
Sentell & Braun (2012)	Important variations exist in health care among minorities; however, LEP and low health literacy affects poor health.	Supportive

Figure 21. Studies related to race and ethnicity.

Cultural Competence in Health Care

The term cultural competence has become ubiquitous in human services settings. The concept first appeared in social work literature (Gallegos, Tindall, & Gallegos, 2008a) as well as in counseling psychology literature (Pedersen & Marsell, 1982; Sue, Bernier, Durran, Feinberg, Pedersen, Smith, & Vasquez-Nuttall, 1982). It did not however take too long for multiple research articles to appear in the medical education literature (Suh, 2004; Bigby, 2003). Also, as previously discussed in this dissertation, there are existing legal standards requiring the provision of culturally-competent care to patients.

Although studies about cultural competence are fairly recent in the literature, the concept itself is well studied and several assessment tools have been developed to measure it. Cross (1989) has defined cultural competence as a developmental process that evolves over an extended period where both individuals and organizations are at various levels of awareness, knowledge, and skills along the cultural competence continuum. Campinha-Bacote and Campinha-Bacote (2009) and Purnell and Paulanka (2002) also studied cultural competence and agree with the view of Cross (1989) about cultural competence as a process. Campinha-Bacote and Campinha-Bacote (2009) defined cultural competence in the health care setting as the adaptation of care in a manner that is consistent with the culture of the client. In that way, Campinha-Bacote views cultural competence as a conscious and nonlinear process. According to Banks (2014), most ethnic groups in the U.S. have distinctive cultures and values that are complex and dynamic. This complexity and the dynamics of it create many challenges for health care providers in caring for a diverse population. Healthcare workers are challenged with lack of cultural and linguistic competence as immigration trends have rendered communities in the U.S. to become more and more diverse in terms of ethnicity, culture, and spoken languages (Anderson et al., 2003).

In addition to the respective conceptual model of cultural competence of Campinha-Bacote and Campinha-Bacote (2009) and Purnell and Paulanka (2002), several instruments were found in the literature that measure cultural competence. Some specifically measure cultural competence in a health care delivery setting. The Inventory for Assessing the Process of Cultural Competence among Health Professionals (IAPCC) is a valid and reliable instrument that is widely used and is designed specifically for health-related fields. It was first developed for use in nursing, medicine, and pharmacy and is based on Campinha-Bacote and Campinha-Bacote's (2009) model of cultural competence. The IAPCC assesses five subscales on a four-point Likert scale (very aware to not aware, strongly agree to strongly disagree, very knowledgeable to not knowledgeable, very comfortable to not comfortable, very involved to not involved): (1) cultural awareness, (2) cultural knowledge, (3) cultural skills, (4) cultural encounter, and (5) cultural desire (Fitzgerald, Cronin, & Campinha-Bacote, 2009).

Betancourt et al. (2005) studied cultural competence and its relation to health care disparities. According to Betancourt et al. (2005), cultural competence is an important issue for three practical reasons. First, as the U.S. becomes more diverse, clinicians will increasingly see patients with a broad range of perspectives regarding health, which are often influenced by their social or cultural backgrounds. Second, previous research supports that provider-patient communication is linked to patient satisfaction, adherence to medical instructions, and health outcomes. Third, the landmark Institute of Medicine (IOM) reports highlight the importance of patient-centered care and cultural competence in improving quality and eliminating racial/ethnic health care disparities (National Academy of Engineering (US) and Institute of Medicine (US) Committee on Engineering and the Health Care System, 2005). These barriers might not apply only to minority groups but may simply be more pronounced in these cases.

To Betancourt et al. (2005), cultural competence in the literature includes race and ethnicity and learned beliefs and behaviors shared among groups. Accordingly, programs that aim at addressing cultural competence must consider these assumptions. Hoffman (2011) compels healthcare providers to be aware of their obligations to comply with legal mandates that require healthcare institutions to be culturally and linguistically competent. These previous studies support the view that to adequately service immigrant populations, a culturally-competent healthcare system is needed.

Related to cultural competence in health care is the concept of transcultural nursing that was first propounded by Leininger (1991) before the emergence of the notion of cultural competence in the health-related literature. Leininger (1991), a seminal theorist, defined transcultural nursing as "the humanistic and scientific area of formal study and practice in nursing, which is focused on differences and similarities among cultures with respect to human care, health, and illness based on people's cultural values, beliefs, and practices, and to use this knowledge to give culturally specific or culturally congruent nursing care to people" (p.60). Leininger (1991) developed the Sunrise Model in 1955, which is reported as the earliest tool developed as a visual guide to assist nurses in assessing and planning care for patient of different cultures.

Purnell and Paulanka (2002) developed the Purnell Model for Cultural Competence. The Purnell model provides a framework to guide cultural competence among multidisciplinary healthcare team members. The model includes knowledge and skills as well as the following: (1) Developing an awareness of one's own culture, existence, sensations, thoughts, and environment without letting them have an undue influence on those from other backgrounds; (2) demonstrating knowledge and understanding of the client's culture, health-related needs, and meanings of health and illness;(3) accepting and respecting cultural differences; (4) not assuming that the healthcare provider's beliefs and values are the same as the client's; (5) resisting judgmental attitudes such as "different is not as good," and being open to cultural encounters; and (6) being comfortable with cultural encounters and adapting care to be congruent with the patient. Also, according to Campinha-Bacote and Campinha-Bacote (2009), culturally competent organizations should have the capacity to (1) value diversity, (2) conduct self-assessment, (3) manage the dynamics of difference, (4) acquire and institutionalize cultural knowledge, and (5) adapt to diversity and the cultural contexts of the communities they serve.

The need for healthcare professionals to become culturally competent has been recognized in health care. The National Center for Cultural Competence,[10] a not-for-profit association whose mission focuses on designing, implementing, and evaluating culturally and

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[10] The NCCC is a component of the Georgetown University Center for Child and Human Development (GUCCHD) housed within the Department of Pediatrics of the university’s medical center.

linguistically competent service delivery systems to address growing diversity in the U.S. population, has offered the following six reasons why health care institutions should be culturally competent: (1) To respond to current and projected demographic changes in the U.S.; (2) to eliminate long-standing disparities in the health status of people of diverse racial, ethnic and cultural backgrounds; (3) to improve the quality of services and outcomes; (4) to meet legislative, regulatory, and accreditation mandates; (5) to gain competitive edge in the market place; and (6) to decrease the likelihood of liability - malpractice claims (National Center for Cultural Competence, 2016). Additionally, the findings from a qualitative study about cultural competence where participants were experts from managed care, government, and academe show that one of the themes that emerged is a need for more outcomes research on cultural competence interventions because that type of studies is sparse in the literature (Betancourt et al., 2005).

Cultural competence has been studied in academic settings among populations of future health care providers. Mareno and Hart (2014) compared the level of cultural awareness, knowledge, skills, and comfort of nurses with undergraduate and graduate degrees when encountering patients from diverse populations and found that undergraduate-degree nurses scored lower than graduate-degree nurses on cultural knowledge. Vu et al. (2015) conducted a study to identify the cultural climate at southwestern dental colleges from the perspective of dental hygiene and dental students and found a generally positive cultural climate among students. One significant finding was that students who reported diversity training were more likely to engage in three of the six awareness practices.

In a qualitative study, Lu, Tsai, and Tseng (2014) explored clinical teachers' attitudes towards cultural competence training in terms of curriculum design, educational effectiveness and barriers to implementation and found that clinical teachers acknowledge the need for explicit and implicit training in cultural competence, but the overall goals of such training needs to be clarified, the time allotted to it and how it should be assessed, as well as a faculty-wide development program addressing pedagogical needs. Kratzke and Bertolo (2013) explored undergraduate community health students' perceptions of their cultural competence. The findings underscore the need for academic preparation of students using cross-cultural educational approaches to enhance cultural competence.

More recently, Okoro, Odedina, and Smith (2015) assessed the change in the level of cultural competency and knowledge of health disparities among students in the third year of the doctor of pharmacy program at the University of Florida and explored the demographic correlates by conducting a cross-sectional survey in three consecutive academic years. The findings show some increase in knowledge of health disparities and self-awareness following the inclusion of relevant instruction; however, there was no significant increase in cultural competency skills. More students reported receiving relevant instruction within the pharmacy school curriculum than outside the curriculum.

In contrast to assessing cultural competence in future health care practitioners, Starr and Wallace (2011), postulated that cultural competence is best understood by assessing provider and client perspectives. Starr and Wallace (2011) conducted a descriptive quantitative study where clients assessed dimensions of nurses' cultural competence including communication, decision-making, and interpersonal style. Nurses in seven county health departments in North Carolina assessed their own cultural competence. Clients perceived their nursing care to contain key components of cultural competence. Nurses rated themselves as moderate to high cultural competence. Consistencies were noted between the clients' and nurse perceptions of cultural competence.

Most of the literature reviewed on cultural competence did not specifically target LEP as a factor that impacts health care. Rather, the studies focused on ethnicity and culture. Two studies that were supportive of the notion that English language proficiency affects health care and three studies that were neutral are highlighted in Figure 22.

Study	Findings	LEP Influence
Anderson, et al., (2003)	Healthcare workers are challenged with cultural and linguistic competence as immigration trends have rendered communities more linguistically diverse.	Supportive
Betancourt, et al. (2005)	Provider-patient communication is linked to patient satisfaction, adherence to medical instructions, and health outcomes.	Supportive
Lu, Tsai, & Tseng (2014)	Main obstacles to teaching and assessing cultural competence was perceived to be a lack of commonly-agreed goals, low priority accorded to culture, and inadequacy of teachers' cultural competence.	Neutral
Mareno & Hart (2014)	A need for education in the level of cultural awareness, knowledge, skills, and comfort of nurses when encountering patients from diverse populations was shown.	Neutral
Okoro, Odedina, & Smith (2015)	Some increase in knowledge of health disparities and self-awareness following the inclusion of relevant instruction in a program for third-year doctor of pharmacy students was shown; however, there was no significant increase in cultural competency skill.	Neutral

Figure 22. Studies related to cultural competence.

Themes from Literature Reviewed

Several main themes emerged from the literature reviewed pertaining to LEPs, access, utilization, and SRHS. In addition, the literature reviewed documents that LEP has been studied in various settings.

Figure 23 lists the settings in which LEP has been studied and Figure 24 lists the main themes found in the literature. Although recent, the literature reviewed show that there is a growing awareness of the influence of LEP on access to and utilization and SRHS.

Settings
Observational: Chart review, health survey, claims data (Cohen et al., 2005; Nielsen et al., 2010; Rudd et al., 2004; Schenker et al., 2007)
Hospitals: Informed consent process (Hunt & de Voogd, 2007; Schenker et al., 2007; Torres & Kovacich, 2014)
Schools: Using academic training as an intervention (Kratzke & Bertolo, 2013; Lu et al., 2014; Mareno & Hart, 2014; Okoro et al., 2015; Starr & Wallace, 2011; Vu et al., 2015)
Qualitative: Face-to-face interview, focus group (Kimbrough, 2012; Torres & Kovacich, 2014)

Figure 23. Main settings reported in the literature reviewed where LEP was studied.

Themes
• Predisposing characteristics related to culturally-based beliefs and attitudes may play a role in influencing health-related behaviors.
• Various legal precedents requiring health care institutions to provide linguistically-competent care to LEPs.
• Although recent, there is a growing awareness of the influence of LEP on access to and utilization of health services.
• LEP has been studied in groups that are linguistically homogenous or lack cultural diversity.
• The importance of studying English language proficiency in health care settings is driven by current and projected needs concerning linguistically diverse populations in the U.S.

Figure 24. Main themes from the literature reviewed.

Associations Among LEP, Access, Utilization and SHRS

In summary, not all the studies reviewed were conclusive about a relationship between LEP and access, utilization, and SHRS. Some studies found that other factors such as culture might also play a role in influencing health outcomes for LEPs. For example, Vargas et al. (2009) found that ethnic heterogeneity in sub-categories among population groups might have an impact on access. Additionally, Callahan et al. (2006) found that access might be influenced by U.S. citizenship.

It is noteworthy to point out that Graham et al. (2008) found that when language barriers were reduced (e.g., availability of interpreters) health care cost was also reduced. Also, Kim et al. (2011) found that LEP patients show ambulatory health care utilization associated with lower cost and more access to preventive care through establishing a primary care home when language barriers are reduced and health insurance coverage is the same. Aratani and Liu (2015), however, found that non-English speaking Asian children were significantly less likely to discontinue use of public mental health services than their English-speaking White counterparts. This finding was not supportive of the findings of Graham et al. (2008) and Kim et al. (2011).

The researcher's hypotheses are founded on trends that emerged in the literature reviewed concerning relationships among the variables that were examined in this study. Figure 25 and Figure 26 below illustrate examples of previous studies that suggest a relationship among the variables to be studied. As discussed, however, there are also previous studies with findings that were non-supportive of the notion of LEP being a factor associated with access and utilization and SRHS. An association among the variables in the study is therefore not conclusively established in the literature reviewed; therefore, there is equipoise concerning whether LEP is independently associated with access, utilization, and SRHS.

LEP Associated with Access

- LEP found to be a barrier to access, which is compounded when combined with increased distance to the nearest safety net clinic (Cordasco et al., 2011).
- LEP patients found to have longer hospital stays for some medical and surgical conditions. LEP does not affect in-hospital mortality (John-Baptiste et al., 2004).
- LEPs were more likely to forgo needed medical care and less likely to have a health care visit, compared to individuals who were proficient in English. No significant association between language proficiency and reports of delayed care (Shi et al., 2009).
- Among Medicare seniors in California, LEPs had less access to a usual source of care and were less likely to receive preventive cancer screening tests (Ponce et al., 2006).

LEP Associated with Utilization

- Children in non-English-primary-language households compared to children in English-primary-language households were found to be significantly more likely to experience poor health outcomes (Flores & Tomany-Korman, 2008).
- Enrollment rates in a statewide initiative in California using a model of care for depression were found to be lower for LEPs versus other patients (Njeru et al., 2016).
- Patients who required interpreter services had significantly more emergency department visits and hospitalizations than patients who did not require interpreter services (Njeru et al., 2015).

LEP Associated with Self-Rated Health Status

- LEP pose a risk to physical and mental health. In a sample of older Korean Americans show LEPs had higher risk of activity limitations, fair or poor rating of health, and probable depression (Jang, Yoon, Park, & Chiriboga, 2016).
- LEP was associated with good/fair/poor current self-rated health (Okafor, Carter-Pokras, Picot, & Zhan, 2013).
- LEP may carry greater health risk than low health literacy (Sentell & Braun, 2012).

Figure 25. Association of LEP with access, utilization, and SRHS.

Access Associated with SHRS

- Physical activity and rates of chronic disease, obesity, and smoking were significantly lower among Spanish-speaking Hispanics than among English-speaking Hispanics. Spanish-speaking Hispanics reported far worse health status and access to care than did English-speaking Hispanics and received less preventive care. Adjustment for demographic and socioeconomic factors did not mitigate the influence of language on these health indicators (DuBard & Gizlice, 2008).

- Access has been shown to be a determinant of health status and health disparity among minority groups (Graham et al., 2008)

Utilization Associated with SRHS

- LEPs tend to have poorer self-rated health and higher psychological distress than the English proficient and English only groups. LEPs were also less likely to use health services and more likely to experience barriers to service use (Kim et al., 2011)

Figure 26. Access and utilization associated with SRHS

What is Known

Clearly, there is a body of evidence showing a long history of legal and regulatory mandates and recommendations that culturally- and linguistically-appropriate health care services be provided to LEP patients. There are also frameworks for health care institutions to implement such mandates and recommendations. Based on the literature reviewed, however, findings from previous studies show instances where LEPs have suffered adverse health events that are associated with lack of quality in health services based on inadequate patient-provider language concordance (Cohen et al., 2005; John-Baptiste et al., 2004). There might therefore be a lack of congruence between theory and practice regarding the provision of culturally- and linguistically-appropriate health care and services to LEPs.

The literature reviewed also supports that there are both subjective and objective factors that might be influencing access and utilization which in turn affect SRHS. In the BMHS model, Andersen (1995) suggests that use of health services is a function of many characteristics - one of which is predisposition to use services. As illustrated in the model, health beliefs may be one of the determinants of predisposing characteristics of use of health services.

With regard to LEPs, predisposing factors such as attitudes and cultural beliefs might influence behaviors related to access and utilization in addition to objective intermediary factors such as illiteracy, lack of health literacy, and race and ethnicity. Since this study looked at a sample that contains multi-cultural and multi-linguistic individuals, it was expected that there might be a range of health beliefs based on diversity in languages and cultures in the population of LEPs. Additionally, there is supportive evidence that subjective measures of health status are in congruence with objective measures. Further, judging by the Census Bureau's future predictions of population growth estimates, the problem of finding a more adequate way to mitigate the risk of adverse events in health care for LEPs might continue to increase in magnitude if not addressed more adequately. Finally, there is a growing awareness of the importance of providing health care that is linguistically appropriate; however, this awareness is recent.

Conceptually, the notion of language is intrinsically related to culture. In studies in groups that are linguistically homogenous, it has been shown that language is one of the factors associated with access and utilization. In view of the magnitude and spectrum of adverse health events that have been shown to be associated with lack of English proficiency, its placement in the paradigm of barriers to access and utilization makes it unequally weighted vis-à-vis other barriers.

Research Gaps

What is not known is whether LEP is independently associated with access, utilization, and SRHS in groups that are multi-linguistic and multi-cultural. Also, from the literature surveyed concerning LEP, there is a paucity of research concerning LEPs and health where real-world data collected from multi-ethnic and multi-lingual groups were used to examine subjective health data to isolate language as a predictor of SRHS.

In this study, data collected from multiple ethnic groups in the state of California, which has a population that is ethnically- and linguistically-diverse were analyzed. It was expected, therefore, that one aspect in which findings from this study would add to the body of knowledge would be by considerably strengthening the findings from previous studies where a single and culturally homogenous ethnic group or a relatively small number of ethnic groups was studied.

The data analyzed included ethnic samples such as Latino or Hispanic, Black or African American, White, Asians, and American Indians. Those ethnic groups however contain sub-ethnic groups with vastly heterogenous cultures and norms. For example, Latinos or Hispanics include Mexican, Salvadoran, Puerto Rican, Honduran, Panamanian, Cuban, Nicaraguan, Peruvian. Also, Asians include Bangladeshi, Burmese, Chinese, Filipino, India (from India), Japanese, Vietnamese, and many other groups. The data also include representative data for many under-surveyed groups, such as Pacific Islanders (California Health Interview Survey, 2016a).

On one hand, as discussed in the theoretical framework, the literature reviewed documents that in addition to objective barriers that serve as intermediary links to access and utilization, subjective attributes that are hard to modify, such as cognitive processes that are influenced by cultural and religious norms might impact an LEP's decision making to seek access to and use of health services (Carrillo et al., 2011). On the other hand, however, there are studies that are non-supportive of the notion that language independently affects access and utilization.

Several other gaps were noted in the literature reviewed as follows: (1) It is not well established whether health outcomes for LEPs may be differentiated by language use and proficiency compared to individuals who speak English and another language at home and individuals who speak English only. (2) It is not well established whether access, utilization, and SRHS are correlated independent of language use and proficiency. (3) There is also a lack of studies on illiteracy and low literacy in the context of healthcare. (4) While LEP has been documented to be a significant determinant to access, there is a lack of research where language has been studied independent of other components of the concept of cultural competence.

Although an attempt was made to review the most current and seminal studies, the body of literature reviewed only gives a limited understanding of the critical issues individuals face in accessing and using the health care delivery system when they lack English language proficiency. Long-held inattention to this problem as it was developing has led to the situation where there are significant gaps in our understanding of the needs of LEPs for culturally- and linguistically-competent health services from a patient's perspective.

Chapter III

METHODOLOGY

Introduction

This chapter describes the methodology used in this study. First, the research design and its rationale are presented. Since data collected by a third-party were used to conduct secondary analysis, an explanation concerning the source of the dataset is given with a description of the methods the third-party used for data collection. This includes a discussion about the integrity of the data and previous uses in the literature. Then the following are described: population and sampling methods, and measurement scales of variables (including a discussion concerning selection of observed variables to measure latent constructs). Following that, constructs validity of measurements of latent variables is discussed. Then testing of assumptions and statistical analyses are discussed. Finally, ethical considerations are discussed. The chapter ends with a summary of how results from statistical tests are reported in Chapter IV.

Research Design

The research design was retrospective, observational, and pooled cross-sectional using secondary data from a population-based health survey experiment to examine differences and associations among variables. Recursive direct and indirect effects of exogenous on endogenous variables were also statistically assessed by fitting a hypothetical model to the data. This was a quantitative research because quantitative statistical techniques were the appropriate techniques required to analyze the data in a rigorous fashion. Creswell (2007) refers to research design as the entire process of research from conceptualizing a problem to writing research questions and on to data collection, analysis, interpretation, and report writing.

According to Gliner, Morgan, and Leech (2009), the descriptive approach refers to research questions that use only descriptive statistics. Research Question #1 asked about the demographic characteristics of the sample. The researcher performed descriptive analysis of the sample by examining five characteristics: age, sex, ethnicity, income, and education.

In addition, the design is pooled cross-sectional because, although the data analyzed were collected at one point in time, they were continuously collected over a two-year period -- which constitutes one full cycle of data collection for CHIS. The data are released per year of collection so that they may be used (e.g., for yearly fiscal planning by some municipalities in California); therefore, the full dataset is delivered in two files. To analyze the complete data that cover the entire state of California for a full collection cycle and obtain valid statistical results, the data must be pooled by following a procedure that CHIS provides. Further, the purpose of exploratory research is to explore data in order to determine relationships among variables (Portney & Watkins, 2009). This study focused on exploring a relationship between LEP, access, utilization, and SRHS in a multiethnic, multi-lingual population.

As discussed in Chapter I, for a systematic view of the concepts being explored, the researcher developed a preliminary conceptual framework, which rests on the body of current evidence in the literature reviewed concerning the topic of LEP. Finally, the type of research was also retrospective in nature because the researcher examined secondary data.

Data Source

It was briefly indicated previously that data from the 2013-2014 California Health Interview Survey (CHIS) that was conducted by the UCLA Center for Health Policy Research (UCLA), the California Department of Health Services, and the Public Health Institute were used[11] to conduct the study. According to Portney and Watkins (2009), prospective studies offer the potential for greater control of data collection methods and the ability to document a temporal sequence of events. In that respect, as compared to retrospective studies, prospective studies, offer a higher level of reliability; however, Portney and Watkins (2009) also agree that many research questions can only be answered by using retrospective data. Also, as a practical matter, the degree of insights that can be obtained from real-world evidence often may not be obtainable otherwise (Portney & Watkins, 2009).

Relying on Portney and Watkins (2009), an appropriate inference can be made that studying real-world health data may give invaluable insights to health care professionals and researchers that facilitate a greater understanding of patient characteristics and outcomes. Also, studying real-world data based on patient-reported outcomes may give insights into how to more effectively address health-related problems in pre-specified populations. Keeping these thoughts in mind, for this study, as will be explained more fully as the text of this dissertation progresses, the accuracy and trustworthiness of the data source and collection method were given important considerations in the choice of a dataset that was used to answer the research questions.

CHIS data are made publicly available and can be downloaded from the Internet without charge in the form of public use files "PUF." The dataset was identified and downloaded through an Internet search of the website of the University of California, Los Angeles, Center for Health Policy Research. The URL where the data can be found is: http://healthpolicy.ucla.edu/chis/data/Pages/GetCHISData.aspx. The PUF data do not contain confidential or personally-identifiable information of respondents.

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[11] CHIS is an ongoing state-wide health survey of a representative sample of the population in California that UCLA has been conducting since 2001. In the survey, a two-stage, geographically stratified dual-frame (cell phone and landline), random-digit-dial (RDD) sample is used.

CHIS data are reported to have been used previously in many settings and the data are considered to be consistent and trustworthy. The data are reported to have been used extensively to assess public health and health care needs, develop and advocate policies to meet those needs, and plan and budget health care coverage and services by federal and state agencies, local public health agencies and organizations, advocacy and community organizations, other local agencies, hospitals, community clinics, health plans, foundations, and researchers (California Health Interview Survey, 2016b). CHIS data have also been used previously in doctoral dissertation studies (Zane, 2013). Independent investigators have also used the data to conduct empirical research in the health and social sciences fields to obtain estimates of health statistics. (See for example, Cordasco et al., 2011; Kim et al., 2011; Sentell & Braun, 2012; Yu et al., 2010). For purposes of this study, only those previous studies reviewed that are relevant to the topic under exploration are synthesized in chapter II of this dissertation.

Further, CHIS data have previously been used with online tools by a wide range of organizations to support health policy and advocacy at the national level. For example, the Agency for Healthcare Research and Quality has used CHIS data in part to create its 2012 National Healthcare Quality and Disparities report. Also, the data have been used to analyze longitudinal trends in the health of young children in California (Holtby, Zahnd, & Grant, 2015). The National Cancer Institute (NCI) has indicated that population-based health data such as CHIS can be used with the Health Disparities Calculator (HD*Calc)[12] (National Cancer Institute, 2013).

CHIS data were suitable for this study that focused on LEP because California is a state with a vastly ethnically- and linguistically-diverse population. Also, data from surveys conducted

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[12] The Health Disparities Calculator (HD*Calc) is a statistical software developed by NCI, which is designed to generate multiple summary measures to evaluate and monitor health disparities.

decennially by the Pew Research Center show that since 1990 California has continuously remained the state with the highest percentage of foreign-born compared to other states: 21.7% in 1990, 26.2% in 2000, and 27.0% in 2012 (Krogstad & Keegan, 2014). In addition, population estimates for 2014 show that California's population numbered 38,066,920 with 27,776,284 native and 10,290,636 foreign-born. Language spoken and ability to speak English in 2014 were classified as follows: (1) English only: 56.3%, (2) language other than English: 43.7%, and (3) speak English less than "very well": 19.4% (American FactFinder 2014). There is, therefore, a substantial proportion of LEPs residing in California.

With respect to the validity of the CHIS data, it is worth noting that the data are self-reported by respondents to the survey and, therefore, subjective. As previously discussed, however, in previous studies, consistency of subjective data concerning health status was shown in the reliable prediction of health outcomes when compared to objective measures of health status (Lima-Costa et al., 2012; Wu et al., 2013). In addition, the data are population-based data weighted to fixed population estimate, which are population estimates published by a recognized and reliable authority such as a government agency. For CHIS 2013-2014, the data were weighted to the adult population of California as estimated by the U.S. Census Bureau in the American Community Survey 5-year estimates (U. S. Census Bureau, 2013). Since the data are weighted to fixed population estimates, adjustments for CHIS sample design were made when the data were analyzed in this study by applying the weights in the statistical analyses.

CHIS 2013-2014 Sampling and Data Collection Methods

CHIS concepts. CHIS's survey questionnaire is divided into a nomenclature of 13 broad concepts, each containing constructs with items that allow for measurement of each construct[13] The variables were measured either dichotomously (yes/no) with a numerical value of 1 assigned to "yes" answers and 2 assigned to "no" answers or at an ordinal level on a Likert scale with an assigned point value for each item on the scale. As reported in the CHIS data dictionary, the 13 broad concepts are divided by sections as follows: (a) A. Demographic information, Part I, (b) B. General health conditions, (c) C. Health behaviors, (d) D. General health, disability, and sexual health, (e) F. Mental health (f) G. Demographic information, Part II & Child Care (g) H. Health insurance, (h) J. Health care utilization and access and dental health, (i) K. Employment, income, poverty status, and food security, (j) L. Public program participation, (k) M. Housing and community involvement, (l) N. demographic information, Part III Geographic Info[] (sic) (California Health Interview Survey, 2015).

To answer the research questions in this study, variables were extracted from relevant sections of the CHIS questionnaire as described. The variables are as follows: (1) *Limited English proficiency* from Section G. Demographic information, Part II & Child Care (California Health Interview Survey, 2015) (p. 114). (2) *Self-rated health status* from Section B. General health conditions (California Health Interview Survey, 2015, p. 50). (3) *Access* in this study is measured both by observed variables and as a construct. When a research question is testing a difference between groups, access is indirectly measured by observed factor variables. In that case, the HCAB model served as a conceptual framework for selecting the variables to measure

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[13] The CHIS 2013-2014 survey questionnaire can be accessed on line at the website provided in this dissertation document. A full copy of the survey questionnaire is not provided with this dissertation document because it contains 196 pages.

access and a measurement model was developed to test the adequacy of the variables to measure access. As more fully explained in this chapter in the section describing the statistical analyses conducted, path analysis techniques were also used to test the fit of a theory. When therefore the research question was testing the fit of a theory, in the final path analysis model, access was a variable that was generated using results from the measurement models developed. (4) utilization was treated in the same manner as access; however, the Da Silva et al.'s (2011) utilization model served as a conceptual framework for selecting measurement variables for utilization. All variables were drawn from Section J health care utilization and access and dental health (California Health Interview Survey, 2015, pp. 156-170).

Participants and sampling. The sampling frame was at the household level and participants were as follows (N=48,005): adults (age 18 and older) n = 40,240, adolescents (ages 12-17) n =5,512, and children (ages less than 12) n =2,253. Interviews were conducted in six languages to cover the largest number of Californians that lack English communication skills according to the 2000 census conducted by the U.S. Census Bureau: English, Spanish, Chinese (Mandarin and Cantonese dialects), Vietnamese, Korean, and Tagalog.

As part of the sampling approach, a dual-frame, multi-stage, sampling design using random-digit-dial (RDD) technique that included telephone numbers assigned to both landline and cellular service was used to meet two objectives: (1) "provide health estimates for adults in most counties and groups of counties with small populations", and (2) "provide estimates for California's overall population, major racial and ethnic groups and for several smaller groups (such as several Asian and Latino ethnic subgroups)." The RDD sample was approximately 80% landline and 20% cellular numbers (California Health Interview Survey, 2016a).

The sample was purposefully designed as a complex sample. For a sample to be complex, both stratification and clustering must be used in sample selection (IBM Corporation, 1989, 2014). To accomplish CHIS's stated two objectives, CHIS used a complex design sampling by applying the following five properties to the sample; therefore, probabilities of selection for respondents vary on those characteristics: (1) *Stratification by race and ethnicity*: There were different probabilities of selection for different participants; there will be therefore an effect on point estimates because probabilities of selection differed across households and participants. Variances might also be affected by stratification. (2) *Clustering*: Groupings of respondents was done to provide data at county level. In contrast to traditional sample design that uses simple random sampling methods where respondents are independent and have equal probabilities of selection, in the CHIS sample, respondents are not independent because of clustering. For example, there may be many similar characteristics among people living in the same households and geographical areas. Estimates of variance might, therefore, be affected if the weights are not used when conducting statistical analysis. (3) *Non-random sampling*: The sampling was systematic, which affects probabilities of selection. (4) *Unrestricted sampling*: Areas with high concentration of Koreans and Vietnamese were sampled at higher rates to increase the precision of estimates for these groups. In addition to that geographical oversampling, to further increase the sample size for Korean and Vietnamese, a supplemental surname list frame from telephone numbers associated with group-specific surnames was used. In addition, to increase the statistical stability and precision estimates for American Indian/Alaska Native, there was oversampling of that population as well. (5) *Sample weighting*: CHIS applied survey weights and variance estimation formulas to correct for complexities in the survey design. In order to correct for the complexity of the CHIS survey design, for statistical analysis in this study, the researcher used the weights formula that CHIS provided with the data. By applying the weights in the statistical analyses, the researcher also ensured external validity for purposes of generalizing the findings in this study to the theoretical population (i.e., the non-institutionalized population of adults in California in 2013-2014).

Inclusion and exclusion criteria. California's non-institutionalized population living in households was included. California's population living in group quarters (e.g., nursing homes, prisons, etc.) and cellular numbers used exclusively by children under 18 were excluded.

Survey design and tools. A structured health survey questionnaire consisting of a standardized set of questions was used for data collection. This allowed all respondents to be exposed to the same questions in the same way. Westat, a third-party firm that specializes in statistical research and large-scale sample surveys, contributed to the design of the questionnaire and also collected the data.

Participants consent. To encourage cooperation, where addresses were available, a letter was sent in advance with a $2 bill to targeted households and Westat conducted screening first to introduce the survey to a sampled household and administered the extended questionnaire only after obtaining consent from respondents to participate in the survey.

Data collection. Westat's computer-assisted telephone interviewing (CATI) system was used for all interviews. For landline RDD, data were collected at the household level and included adults (age 18+), adolescents (ages 12-17), and children (ages 0-11). Residential telephone numbers were first selected within each geographic stratum then an adult was randomly selected to complete the survey. Where there were adolescents and/or children present, one of each was selected to complete the survey. The selected adolescent was interviewed directly about his/her health and behaviors and the parent or legal guardian completed the survey on behalf of the child.

For cellular RDD, Westat selected one household member for the adult interview where a sampled cell number was shared by two or more adults in a household; otherwise, the adult owner was selected. Similar to the landline RDD sample, strata were created for the cell sample respondents and they were included in the overall and county specific target sample sizes. Except for the child's data, the adult and adolescent data are thus based on self-report. Figure 27 illustrates the process Westat followed for data collection.

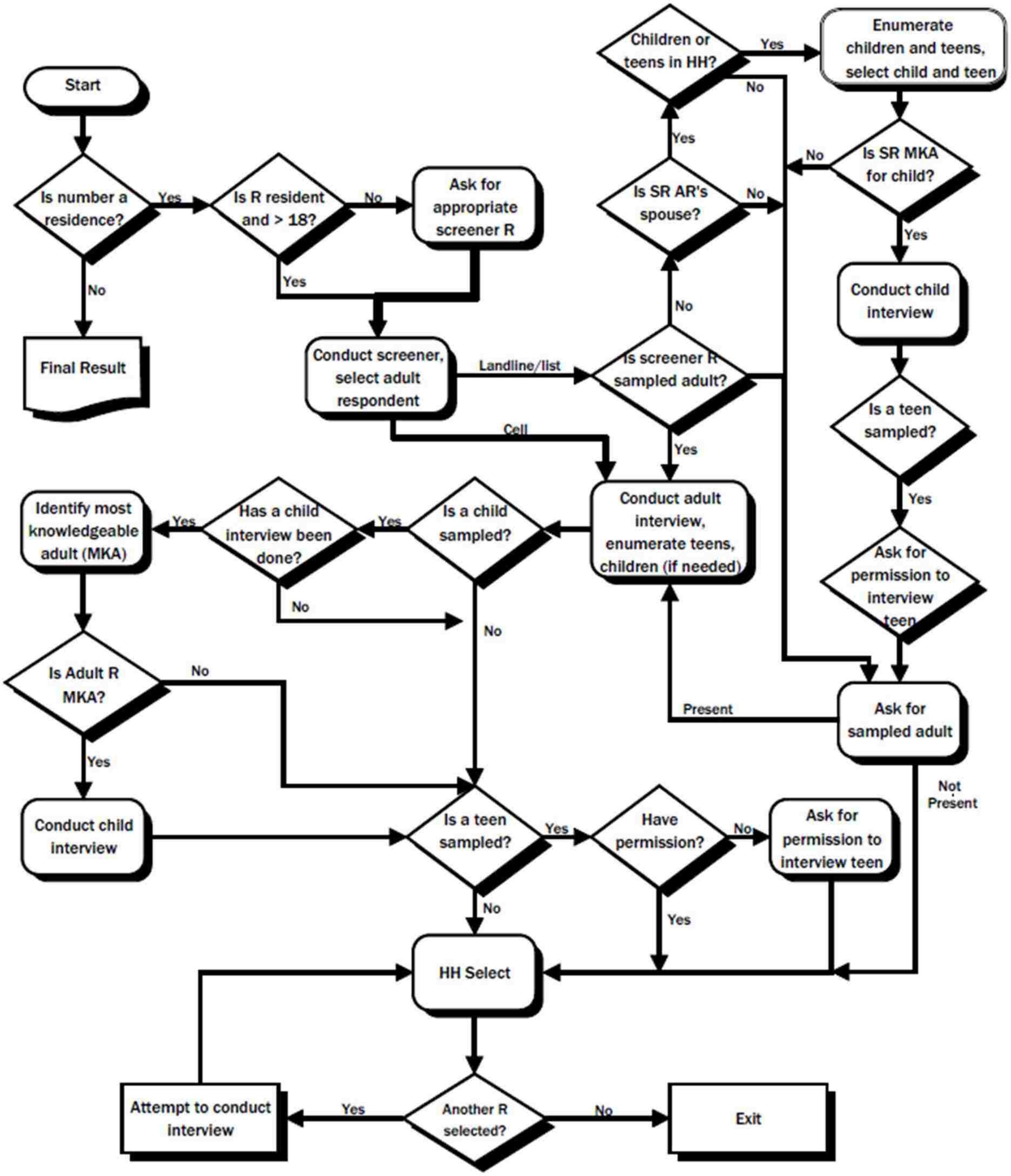

Figure 27. From 2013-2014 California Health Interview Survey by UCLA Center for Health Policy Research (2015). CHIS data collection process. Reprint from publicly available information retrieved from http://healthpolicy.ucla.edu/chis/design/Pages/questionnairesEnglish.aspx

Target Population and Sampling Procedure

In this study, convenience sampling was used and inclusion and exclusion criteria were applied to select a final sample. The sampling frame was N= 48,005. The target population was adults living in California, which was weighted to the non-institutionalized adult population in 2013-2014 as estimated by the Census Bureau (N = 28,350,722). Inclusion and exclusion criteria were established as follows: (1) Adult respondents were included. An adult was defined as "any person 18 years or older residing in [a] household." Adolescents (ages 12-17) and children were excluded. "Children" were defined as *younger children* (between 0 and 5 years old) and *older children* as (between 6 and 11 years old). After excluding children and adolescents, the sample studied comprised all adult-respondents to CHIS 2013-2014 (N = 40,240[14]) (see Figure 28).

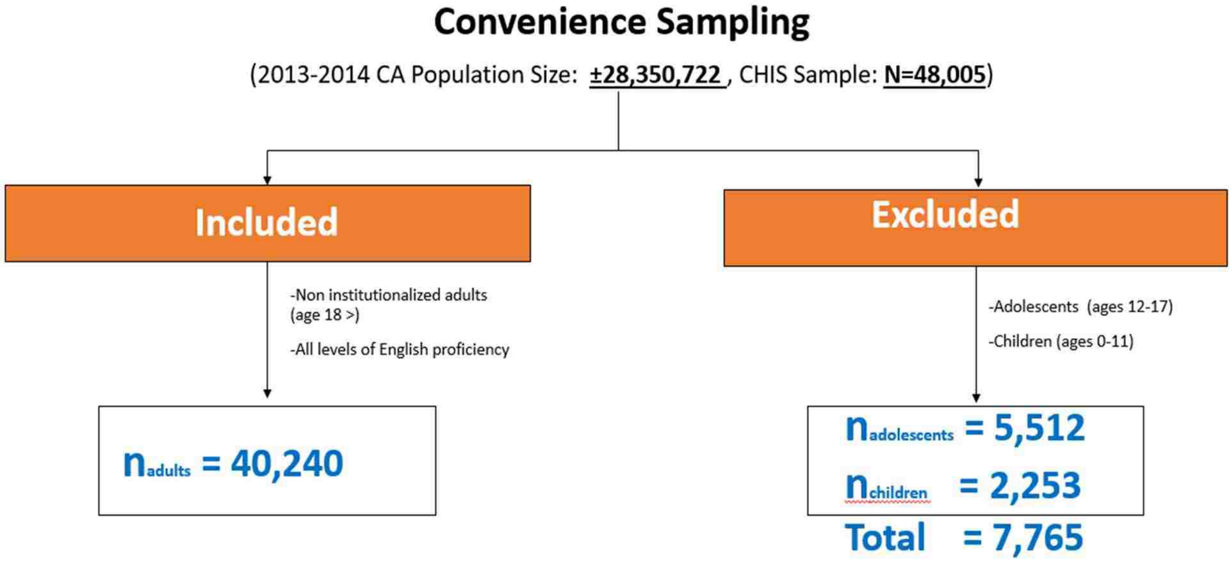

Figure 28. Chart depicting sampling process.

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[14] This includes interviews meeting the criteria of complete as well as partially complete.

Power Analysis

As depicted in Figures 29 and 30, the researcher conducted a priori power analysis for correlation and logistic regression using G*Power 3.1.9.2[15] to determine an approximate minimum sample size that would be needed for the study (Faul, Erdfelder, Buchner, & Lang, 2009). The approximate sample size determined was N = 342 for correlation and N = 568 for logistic regression. It is understood that sample size affects the statistical power of a study, which is the probability of detecting a true effect in terms of relationship or difference (Portney & Watkins, 2009). No post hoc sample size needed to be calculated in this study because the researcher decided to use the full dataset as the CHIS data are weighted to a fixed criterion – population estimates from the California Department of Finance. Results from this study therefore are valid and generalizable to the theoretical population because weights were used for the statistical analyses. Power in the study was set at 0.8 (or 80%), which is the generally-accepted standard in health research.

An effect size provided an objective standardized measure of the magnitude of the effect observed (Field, 2009, p. 57). It is also an invaluable way to express the importance of the findings. According to Field (2009, pp. 270-271), if a statistically significant association is found between the predictor variables and the outcome, an understanding of the measure of strength of the correlation between predictors and outcome variables is needed – this is expressed by an odds ratio in logistic regression. In this study, an odds ratio was calculated as a measure of an effect size.

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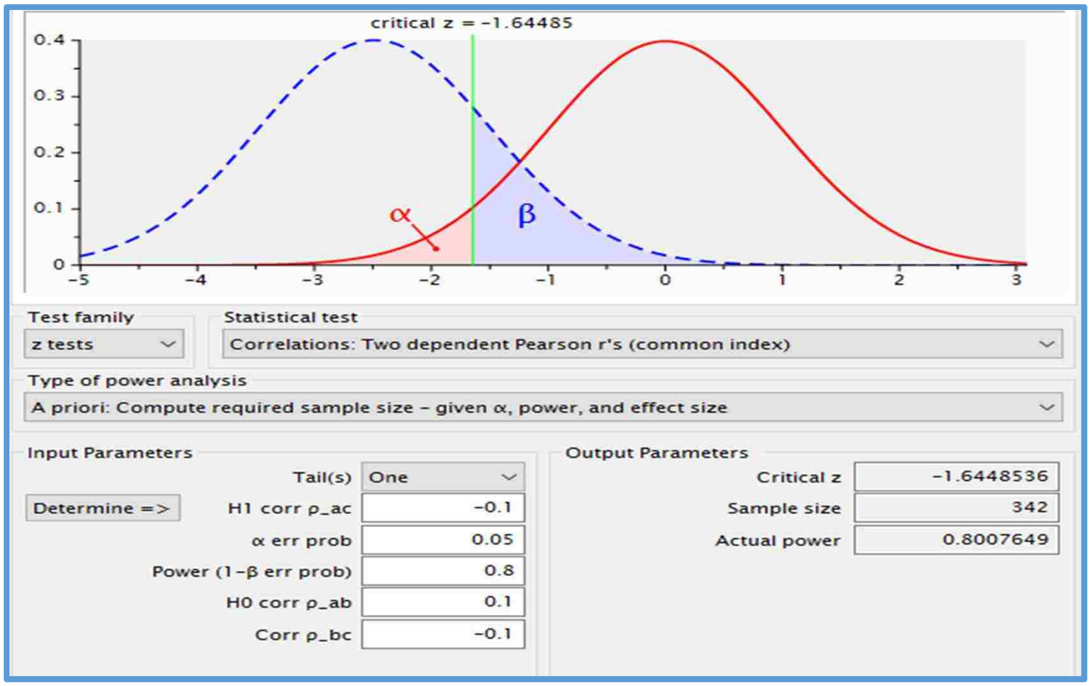
[15] G*Power 3.1.9.2 is a statistical power analysis software program.



Test family: z tests

Statistical test: Correlations: Two dependent Pearson r's (common index)

Type of power analysis: A priori: Compute required sample size – given α, power, and effect size

Input Parameters

Tail(s): One

H1 corr ρ_ac: −0.1

α err prob: 0.05

Power (1−β err prob): 0.8

H0 corr ρ_ab: 0.1

Corr ρ_bc: −0.1

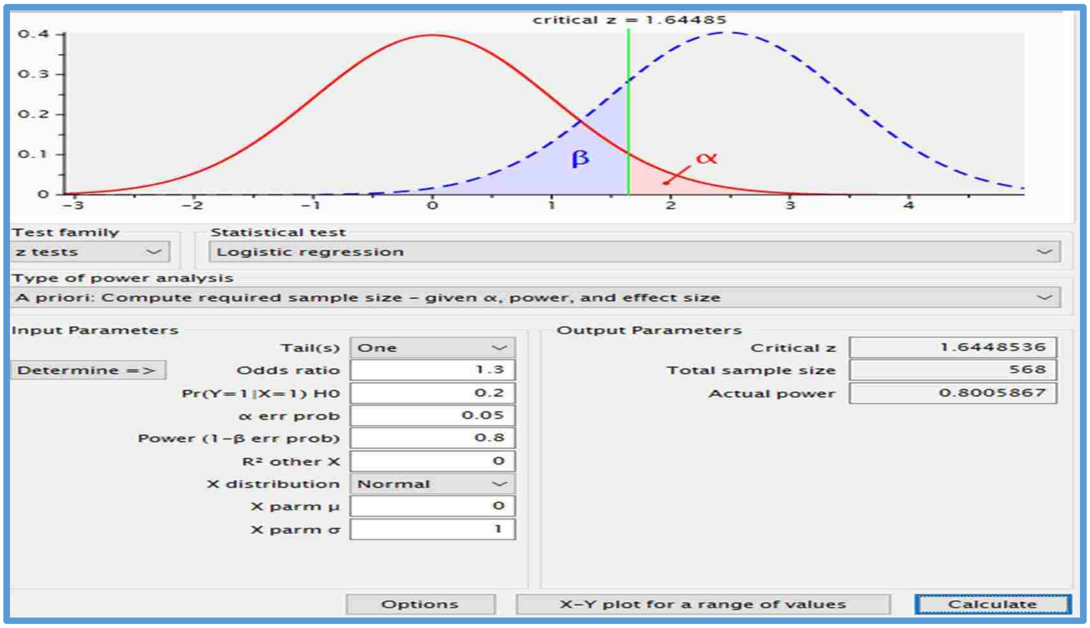
Output Parameters

Critical z: −1.6448536

Sample size: 342

Actual power: 0.8007649

Figure 29. Results from a priori G*Power Analysis Correlation - Central and Non-Central Distributions. OR>1 establishes a strong effect size for the test.



Test family: z tests

Statistical test: Logistic regression

Type of power analysis: A priori: Compute required sample size – given α, power, and effect size

Input Parameters

Tail(s): One

Odds ratio: 1.3

Pr(Y=1|X=1) H0: 0.2

α err prob: 0.05

Power (1−β err prob): 0.8

R² other X: 0

X distribution: Normal

X parm μ: 0

X parm σ: 1

Output Parameters

Critical z: 1.6448536

Total sample size: 568

Actual power: 0.8005867

Figure 30. Results from a priori G*Power Analysis Logistic Regression - Central and Non-Central Distributions. OR>1 establishes a strong effect size for the test.

Validity

According to Trochim and Donnelly (2008), construct validity refers to “the degree to which inferences can legitimately be made from the operationalizations [in a study] to the theoretical constructs on which those operationalizations were based” (p. 61). Further, in assessing construct validity, both convergent and discriminant validity must be confirmed. According to Trochim and Donnelly (2008), convergent validity is established by showing that measures that should be related are in reality related and discriminant validity is established by showing that measures that should not be related are in reality not related.

Access and utilization are latent variables that are indirectly measured by observed variables. Obtaining valid results from the evaluation of self-reported data that contain latent variables involved a complex process. The researcher therefore had to exercise a high degree of caution in developing a strategy for measuring the latent variables. Valid data had to be used to ensure that results obtained from analysis would be valid and, therefore, interpretations would also be valid. At the inception of the evaluation process, therefore, the constructs to be measured were clearly defined and the items that measure the constructs were checked to ensure that their operationalization would be effective. For example, the researcher verified, through a review of the questions selected that more than one item was not measuring the same constructs and the items were measuring the constructs that they should measure.

The researcher also checked the constructs for discriminant and convergent validity. To do so, operationalizations of constructs in this study were compared to previous research where the same constructs had been operationalized. Such examination revealed that previous studies have analyzed the same constructs using approaches similar to the ones used in this study. Also, the examination revealed that the operationalizations of the constructs in this study are not similar to other operationalizations to which they should not be similar. Also, to ensure content validity**,** only observed variables that represent an underlying dimension that fits the conceptual frameworks supporting this study were included in statistical models. Measurement models were developed using the selected observed variables and all indicators had positive paths loadings. Further, it was previously explained that the weights provided by CHIS were used in the statistical analyses in order to ensure external validity of the findings in this study.

A high degree of care was also exercised in order to sufficiently establish trustworthiness of the data using the CHIS survey questionnaire as a tool for data collection since the questionnaire was not validated for the purpose of this study. Due diligence undertaken included a qualitative review of the questionnaire and careful examination of extensive reports published by CHIS on sample design, data collection methods, data processing procedures, response rate, and weighting and variance estimation. The researcher also conducted pre-analysis data cleaning, which will be further discussed in Chapter IV.

As part of due diligence, the researcher investigated previous uses of the data. Recall that it was discussed in Chapter III of this dissertation that CHIS data have been extensively used previously in several fields to make decisions concerning population groups, which include health research, federal/state agencies, local public health agencies, advocacy and community organizations, hospitals, community clinics, and health plans. It was also discussed that the data have also been used previously in dissertation studies in peer-reviewed research. These facts lend support to the quality and trustworthiness of the CHIS data. Finally, after exercising due diligence, only data points that were collected using questionnaire items that fit the conceptual framework of this study were selected and analyzed.

It is important to keep in mind that the response variables used in CHIS are respectively binomial, multinomial, and ordinal. As explained previously, CHIS assigned values to represent the level of measurement of the variables. The variables selected for this study were recorded in the CHIS data as follows: (1) Binomials were measured as (1 = yes and 2 = no). (2) Multinomials were measured on a scale of 1, 2, and 3. (3) Ordinals were measured on a Likert scale with an assigned point value based on the degree to which the item represented a favorable or unfavorable characteristic. According to Portney and Watkins (2009), in a Likert scale, what is important is that the items are consistently scored -- not the actual values. It should be noted that in the CHIS survey questionnaire, agreement with favorable items is ranked with a lower value than agreement with unfavorable items. It is, however, important to also note that items in the questionnaire are consistently scored in this fashion -- thereby supporting the trustworthiness of the survey questionnaire as a tool with consistency. Consider as an example the following item that measures SRHS: For the construct "Excellent," which is the most favorable item, the value 1 was assigned to it; however, for the construct "poor," which is the least favorable item, the value 5 was assigned to it.

The validity of a Likert scale, however, is established through analysis that will indicate which items are truly discriminating between those with positive and those with negative values (Portney & Watkins, 2009). In terms of validity, CHIS reported having conducted multiple studies to assess methodological issues regarding the quality of the data. Results from such studies are consistent in supporting that CHIS data collected using the survey questionnaire are of high quality. One such studies was a benchmark of key estimates for CHIS compared to those from major federal health surveys. In collaboration with the National Center for Health Statistics (NCHS) and the Agency for Healthcare Research and Quality (AHRQ), CHIS compared results from its survey with those of NCHS and AHRQ as gold standards. Comparisons of numerous estimates from the three surveys did not reveal striking differences.

Variables Selected for the Study and Measurements

The extended BMHS conceptual model (Phase 5) discussed earlier in Chapter II of this dissertation was used to support examination of hypothesized relationships of the variables in the study (Levels of English proficiency, access, utilization, and SHRS). Levels of English proficiency in the data is a multinomial attribute variable measured as 1 = Speak only English, 2 = Very well/well, and 3 = Not well/not at all. Access and utilization are constructs indirectly measured by several observed variables. As previously discussed, the HCAB and utilization models were respectively used to inform the selection from the data of observed variables to measure access and utilization. The following observed variables were selected to measure access: (1) Usual source of care, (2) Internet use, (3) Not accepted as new patient, (4) Insurance, and (5) Trouble finding a doctor. Utilization was measured by: (1) Delay/not get health care, (2) Delay/not get prescription, (3) Last visit to a doctor, and (4) Last visit to a dentist. Those observed variables were recoded on a binomial scale as 0 = no and 1 = yes. To answer research question number 8 where the fit of a hypothesis was tested, since access and utilization were latent variables, the researcher used Stata/SE® 14.2 statistical software to generate the two variables and added them to the dataset. Respective scores were also created on each of the two variables for each case in the data. A more detailed discussion will be provided concerning the stability of the selected variables to measure access and utilization consistently as the dissertation progresses. SRHS was recoded and measured on a 5-point Likert scale from 1 to 5 (1 = poor, 2 = fair, 3 = good, 4 = very good, and 5 = excellent). A list of the survey questions selected to measure the variables is appended to this dissertation (see APPENDIX D).[16] In addition, permission from the UCLA Center for Health Policy Research to reprint the survey questions is appended as APPENDIX E.

Covariates which were controlled for in the statistical analysis were recoded as binomials: age, sex, race/ethnicity, income, and education. According to (Field, A. 2009), conducting logistic regression will allow for testing relationships while controlling covariates.

Human Subjects Protection

UCLA reported that protocols for conducting the CHIS survey were approved by the UCLA IRB and the California Committee for the Protection of Human Subjects and collection of the primary data paused minimum or no harms and threats to subjects. The UCLA-Center for Health Policy Research is responsible for maintaining consistent standards to protect the confidentiality of confidential information obtained during data collection (see APPENDIX F).

For this study, informed consent from respondents was not required because this study was retrospective and no confidential data were used. Only CHIS data that have been de-identified and made publicly available on the worldwide web as public use files (PUF data) were used in this study. Since the data are de-identified, no geographic identifier can be linked to individuals. The study was approved by the Seton Hall University Institutional Review Board and has been categorized as exempt (see APPENDIX G).

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[16] The full CHIS 2013-2014 questionnaire is not provided because it contains 196 pages.

Data Analysis

Data cleaning and management. As reported by CHIS, the PUF data contain missing data. Standard statistical methods allow analysis of rectangular data sets with complete data matrices (Little & Rubin, 1987, p. 3). Certain problems, therefore, might arise when data are missing. One method of handling missing data that some previous researchers have used is to ignore the missing data; however, ignoring cases with missing data can lead to problems such as introduction of potential bias in parameter estimation due to the loss of information (e.g., decreases in statistical power and increases in standard errors) (Peng, Harwell, Liou, & Ehman, 2006). This problem can in turn weaken the generalizability of results (Rubin, 1987; Schafer, 1997). According to Schafer and Graham (2002), before a data set with missing values is analyzed by using statistical procedures, it should be properly imputed to ensure that analysis is performed on a complete data as improper edits can “make the data unsuitable for a statistical procedure and the statistical analyses vulnerable to violations of assumptions” set (Dong & Peng, 2013, p. 2).

According to Rubin (1976), missing data can be missing under three scenarios: (1) missing at random (MAR), (2) missing completely at random (MCAR), and (3) missing not at random (MNAR). The missing data in the PUF data are of two types: (1) There are data that are missing because respondents refused to answer or did not know the answer. (Those data are thus MAR). (2) There are data that are missing from weighting the data and from other variables. (These data are thus MNAR).

Finally, in reports concerning the data, CHIS reported that excepting a few cases where item nonresponse rate was greater than 20%, overall item nonresponse rates in CHIS were low - with most variables missing valid responses for less than 2% of the sample. In order to enhance the analytical quality of the data set, CHIS used hot-deck imputation techniques to handle missing data.

Although the proportion of missing data is directly related to the quality of statistical inferences, the literature reviewed suggests that there is no established cutoff from regarding an acceptable percentage of missing data in a data set for valid statistical inferences (Dong & Peng, 2013, p. 2). For example, Schafer (1999) asserted that a missing rate of 5% or less is inconsequential. On the other hand, Bennett (2001) maintained that statistical analysis is likely to be biased when more than 10% of data are missing. Tabachnick, Fidell, and Osterlind (2001) posited that the missing data mechanisms and the missing data patterns have greater impact on research results than does the proportion of missing data. The amount of missing data, thus, is not the sole criterion by which a researcher assesses the missing data problem.

In this study, there were missing data that were MNAR for 248 cases (0.62%) on 2 variables where adults were answering by proxy for children. The researcher provides a detailed explanation of how missing data were handled in the results section of this dissertation.

Assumptions testing. According to Field (2009), accurate conclusions about reality cannot be drawn when assumptions are broken. Data collected can lead to the wrong conclusion if analysis is based on the wrong assumptions. Also, since different statistical models require different assumptions, in order to make accurate inferences from models, assumptions for each model must be true in order to ensure that results from the statistical tests reflect the reality of the population from which the sample was drawn (Field, 2009).

Prior to analyzing the data, assumptions were checked for logistic regression, correlational analysis and path analysis. A more detailed discussion is provided in the results section in Chapter IV of this dissertation under the section entitled quantitative analysis.

Statistical analysis. Stata/SE 14 (Stata) statistics software program was used to perform statistical analysis. Additionally, the statistical weights provided by CHIS were used in the analysis. The process followed to design the study and conduct statistical analysis is illustrated in Figure 31.

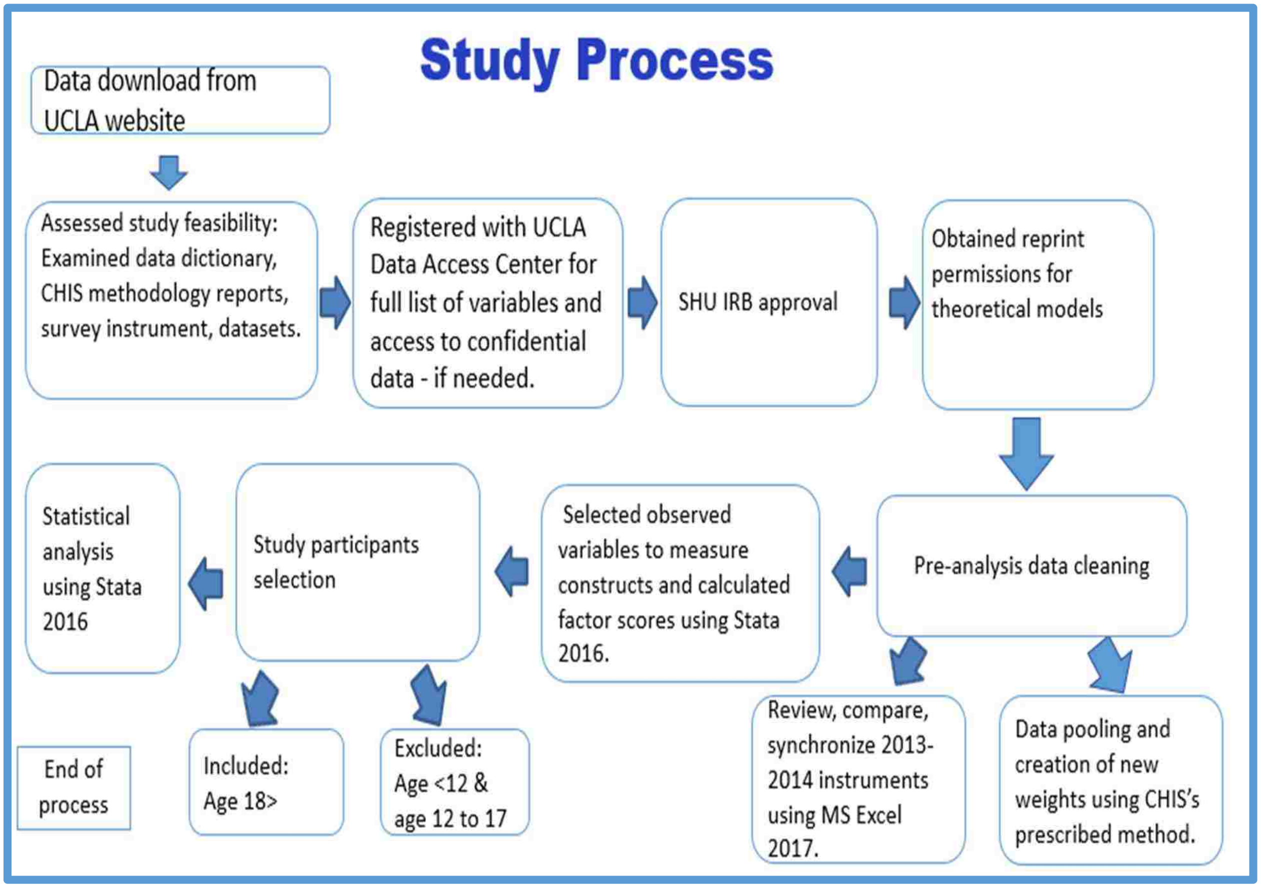

Figure 31. Process followed in conducting the study.

The research questions are descriptive, comparative, associational, and exploratory. According to Gliner et al. (2009), most survey-type research include comparative, associational, and descriptive research questions; therefore, it is common for one study to use all three of these approaches. All hypotheses were tested in the manner described in this section using the predictive models and reported parameters as guided by the research questions.

The objectives of this study were to: 1) examine a difference in access, utilization, and SRHS among Californian adults based on English language proficiency, (2) examine correlations between access, utilization, and SRHS, and (3) examine the fit of a theoretical model tested in the data. Weights provided by CHIS were used in the statistical analysis. The following quantitative statistical analyses were conducted in order to test the null hypotheses.

Descriptive statistics. As previously discussed, RQ 1 does not have a null hypothesis; therefore, descriptive statistics are provided for the following variables: sex, race and ethnicity, age, and income. Since the demographics were recoded as dummy variables, frequencies and percentages are provided in a tabular format and graphs are plotted to illustrate the categories and distributions of the variables. Also, for ease of readability the three groups analyzed by levels of English proficiency are referred to as follows: Only English (EO) = 1, Speak English and other language(s) (E + OL) = 2, and Only other language(s) (LEP) = 3.

RQ 1: What are the demographics of Californian adults in the 2013-2014 California Health Interview Survey (e.g., Age, sex, race and ethnicity, marital status, and income)?

Inferential statistics. Three outcomes were examined: Access, utilization, and SHRS. English proficiency was the predictor. A priori criteria for rejecting the null hypothesis were set as follows: critical value: $\alpha = 0.05$, Power: $\beta = .02$, 95% CI. After describing the characteristics of the sample in RQ #1, logistic regression was conducted for RQ#s 2 to 4 to determine the log odds of LEP as a predictor on each outcome variable. The results of the logistic regression test informed the researcher's determination of whether to reject the null hypotheses concerning a difference in access, utilization and SRHS in LEP compared to EO and E+OL.

The following parameters are reported in chapter IV of this dissertation: (1) Result of Pearson designed-base F test for logistic regression with degrees of freedom (df) to examine differences in outcomes for the between-groups design while accounting for the statistical weights. The design-based Pearson F test was used because it is specifically designed for statistical analysis of data collected from population-level surveys where the sampling design was complex and weights were used to adjust for bias in variances caused by stratification and clustering as a result of the sampling design. (2) The t test statistic. (3) Significance of the t statistic (p value), which is the probability of observing a value as extreme in the population, granted that the null hypothesis is true. Where there was statistical significance at $p < .05$, the researcher rejected the null hypothesis and concluded that the predictor significantly explained a percentage of variance in the outcome. (4) Odds ratios (OR) with their confidence intervals. The reported odds ratio was considered as the size effect that measures the magnitude of the effect of the predictor on an outcome (i.e., how much the log of the odds of the outcome changed for each one-unit increase in the predictor). (5) The confidence intervals, which provide an estimate interval of the parameter where the true value lies in the population. (6) Standard errors, which are the spreads of the average around the average of averages in the sampling distribution (Trochim & Donnelly, 2008, pp. Glossary G-9).

As previously discussed, when testing a hypothesis of a difference, access and utilization were measured by observed variables selected according to the HCAB and utilization respective conceptual model. For the logistic regressions, the null hypothesis inferred that all of the regression coefficients in the measurement model using the observed variables were equal to zero (meaning they did not make a difference in the outcome variables). The alternative hypothesis therefore was that, controlling for covariates, at least one of the predictors' regression coefficient was not equal to zero in the model (meaning English proficiency really had a genuine effect on an indicator of access and utilization). The a priori criteria for rejecting the null hypotheses previously discussed in this section were applied. In addition, statistical models were developed to conduct logistic regression analysis using each observed variable that were used to measure access and utilization, respectively.

In the analysis, EO was constrained at 1 and the confounders were controlled for. Using an example of an indicator variable that measured access, the following mathematical model specifications was applied: $\log\left(\frac{p(\text{us} \quad \text{care}_i=1)}{1-p(\text{usual care}= \ )}\right)= b_o + b_1$ EO $+b_2$ E+OL $+ b_3$ LEP $+ b_4$ age $+ b_5$ race $+b_6$ income b_7 education $+ b_8$ sex $+ e_i$. Likewise, for utilization the following is an example of the mathematical model specifications that was applied: $\log\left(\frac{p(delay\_care_i=1)}{1-p(\text{delay\_car} \quad)}\right)= b_o + b_1$ EO $+b_2$ E+OL $+ b_3$ LEP $+ b_4$ age $+ b_5$ race $+b_6$ income b_7 education $+ b_8$ sex $+ e_i$. For SRHS, the mathematical model specifications applied was: $\log\left(\frac{p(SRHS_i=1)}{1-p(SRHS= \ )}\right)= b_o + b_1$ EO $+b_2$ E+OL $+ b_3$ LEP $+ b_4$ age $+ b_5$ race $+b_6$ income b_7 education $+ b_8$ sex $+ e_i$

RQ 2: Is there a difference *in access* to health services among Californian adults with limited English proficiency (LEP) compared to adults who speak English only (EO) and adults who speak English and another language at home (E+OL)?

H_1: There is a difference in *access* to health services among Californian adults with limited English proficiency (LEP) compared to adults who speak English only (EO) and adults who speak English and another language at home (E+OL).

RQ 3: Is there a difference in *utilization* of health services among Californian adults with limited English proficiency (LEP) compared to adults who speak English only (EO) and adults who speak English and another language at home (E+OL)?

H_2: There is a difference in *utilization* of health services among Californian adults with limited English proficiency (LEP) compared to adults who speak English only (EO) and adults who speak English and another language at home (E+OL).

RQ 4: Is there a difference in *self-rated health status* among Californian adults with limited English proficiency (LEP) compared to adults who speak English only (EO) and adults who speak English and another language at home (E+OL)?

H_3: There is a difference in *self-rated health status* among Californian adults with limited English proficiency (LEP) compared to adults who speak English only (EO) and adults who speak English and another language at home (E+OL).

Associational statistics. Correlational analyses were conducted to determine associations of variables. The following statistics are reported in chapter IV of this dissertation in order to interpret results from correlational analysis: (1) Result of Pearson designed-based F test for survey data that examined bivariate correlations with degrees of freedom (df) (N – 1). (2) Significance p ($\alpha = .05$). (3) Cohen W statistic as an effect size for binomials. The results informed whether the variables are associated, the direction of the association, and also the magnitude of the relationship where statistical significance was found.

RQ 5: Is there an association between access and utilization among Californian adults with LEP?

H_4: There is an association between access and utilization among Californian adults with LEP as measured by English proficiency.

RQ 6: Is there an association between access and *self-rated health status* among Californian adults with LEP?

H_5: There is an association between *access* and *self-rated health status* among Californian adults with LEP as measured by English proficiency.

RQ 7: Is there an association between utilization and *self-rated health status* among Californian adults with LEP?

H_6: There is an association between utilization and *self-rated health status* among Californian adults with LEP as measured by English proficiency.

Path analysis. A path analysis model for testing the fit of the Behavioral Model of Healthcare Services Use (BMHS) to the data was used. Prior to conducting the path analysis, measurement models were developed to test the adequacy of the set of observed variables selected to measure access and utilization to consistently measure the constructs. Results from exploratory factor analysis showed that the observed variables measured the latent variables consistently.

The results of the path analysis informed the researcher's decision concerning the fit of the BMHS as a theoretical model applied to the dataset. The final path diagram obtained from the statistical analysis is provided in chapter IV. The diagram contains the following statistical parameters: (1) Path loading coefficients, which are standardized effect sizes. (2) Confidence interval, which allowed for statistical significance determination by examining the parameter boundaries. (3) Covariance of the access and utilization. The results of the path analysis informed whether the data fit the hypothesized connections and supported the theoretical framework of this study. The a priori criterion for rejecting the null hypotheses was applied. In the measurement model developed, the researcher ensured that all factor variables measured the latent variables either positively or negatively; accordingly, certain variables used in the logistic regression analyses in research questions 2-4 were not used in research question 8.

A statistical model was developed to test the fit of the BMHS theory. In the model, LEP is specified as an exogenous variable with a direct path to SHRS and indirect paths to both access and utilization which are constructs created from the measurement model and that serve as mediating factors. Paths were allowed from the confounders to the final outcome variable (SHRS) and not to the mediating variables (access and utilization). It should be noted that in this model, access and utilization are both exogenous and endogenous.

RQ 8. Are there recursive direct and indirect effects of *LEP* on access, utilization, and *SRHS* among Californian adults with LEP?

H_7: There are recursive direct and indirect effects of *LEP* on access, utilization, and *SRHS* among Californian adults with LEP.

Summary of Methodology Section

Conclusions about the data are supported by the results obtained from the statistical tests. Results from the logistic regression analysis and associated interpretation allowed the researcher to generalize the findings to the California population where statistical significance was found. Additionally, findings from the correlational analysis allowed the researcher to conclude about the degree of correlation of the variables where statistical significance was found. Further, results from the path analysis allowed the researcher to compare findings against the researcher's preliminary conceptual model to explore substantiation of the notion propounded in Andersen's (1995) model that perceived health status is a function of relations among variables and how they are actualized for a patient (e.g., access, utilization). Finally, findings from the path analysis informed the researcher's conceptualization and development of a proposed model for explaining relationships among variables in the path of health status for LEPs. In addition to conceptualization of relationships among variables, the proposed model simultaneously provides a means for assessing, measuring, and analyzing latent constructs in the model. It is postulated in the model that although LEP is an attribute, when analyzing health outcomes in LEPs, contemporary factors should be added to the framework as exogenous components that simultaneously exert a recursive influence on LEP -- in which case LEP becomes an endogenous component in the model.

Chapter IV

RESULTS

Introduction

This chapter presents the results of the dissertation study. In the first section, the description of the data analyzed is briefly revisited. Then techniques used for data cleaning and handling of missing data are presented. Then sampling procedure, instrumentation, and measurement scales are discussed. Following that, demographic characteristics of the sample are presented by using quantitative descriptive statistics. It is followed by the presentation of results from inferential quantitative statistical analyses conducted to test the hypotheses and answer the research questions. Then, results for the measurement models developed and path analysis techniques used to test the fit of the BMHS theoretical model to the data are presented. The last section presents a summary of the findings.

Data Analyzed

It was discussed in chapter III that the data analyzed come from the 2013-2014 California Health Interview Survey (CHIS) that was conducted by the UCLA Center for Health Policy Research (UCLA), the California Department of Health Services, and the Public Health Institute. A link containing the website address where the data can be retrieved on the Internet was also provided.

Pre-Analysis Data Cleaning

Prior to analysis, extensive data cleaning was conducted. First, the researcher conducted a review of the CHIS data dictionary and the survey instrument. The researcher also reviewed the following five reports from CHIS concerning its methods for conducting the health interview survey in order to assess feasibility of conducting scientific research using the dataset: (1) Sample design, (2) Data collection methods, (3) Data processing procedures, (4) Response rates, and (5) Weighting and variance estimation. Based on this review, it is the researcher's assessment that rigorous methods and processes for data collection were used by the CHIS data collectors in accordance with sound research methods principles.

It was previously discussed that the CHIS survey has been ongoing since 2001 and that data for one cycle are collected over two consecutive years. CHIS however makes one-year data available to the public because the data are often used in annual fiscal planning by governmental entities and for other research purposes (California Health Interview Survey, 2016b). Depending on CHIS's objectives during a survey cycle, however, it might add or drop certain questions from the survey questionnaire in the second year of data collection; therefore, two questionnaires might be used during one data collection cycle. Those two questionnaires might not contain the same number of variables. Also, certain variables might not be measured on the same scales in both years. The researcher, therefore, used the Vlookup, Match, and Sort functions in MS Excel 2017 to review and compare the 2013 and 2014 survey questionnaires to ensure the following: (1) The same questions were asked of respondents in both 2013 in 2014, (2) the number of variables in each year is equal, and (3) there is consistency in the measurement scales for both years.

The review revealed that certain variables in the 2013 were not in the 2014 questionnaire version and vice versa. For example, the 2013 data set had 421 variables with 20,724 observations while the 2014 had 439 variables with 19,516 observations. Also, four variables in the 2013 questionnaire were not found in the one for 2014. Those variables were dropped, resulting in a total of 417 retained variables for 2014. Likewise, 22 variables in 2014 were not found in the 2013 questionnaire. These variables were also dropped, resulting in a total of 417 retained variables for 2014. The 417 variables include 80 replicate weights for each year. The replicate weights supported statistical analysis because of CHIS's complex sampling design since CHIS did not provide the "*stratification*" and "*cluster*" variables[17] in the PUF file because they contain respondents' confidential data. The PUF file was amply discussed in the methodology section of this dissertation. Table 5 depicts the process the researcher followed to synchronize the 2013 and 2014 questionnaires to retain the same set of questions (n = 417).

Table 5

Process for Synchronizing 2013-2014 CHIS Survey Questionnaires

	No. of observations	Original # of variables in the CHIS questionnaire	No. of variables dropped	Retained variables
2013	20,724	421	4 (variables not contained in 2014)	417
2014	19,516	439	22 (variables not contained in 2013)	417

For the 2013-2014 cycle, CHIS provided the PUF data in two separate files. The survey however was cross-sectional; therefore, respondents in 2013 were different from those in 2014. It is therefore not appropriate to analyze the data longitudinally; therefore, in addition to synchronizing the survey instruments, the researcher followed a written process CHIS provided to pool the two-year data into one dataset and construct statistical weights for the pooled data file. The CHIS data pooling process is attached to this dissertation as APPENDIX H.

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[17] "Stratification and cluster variables" are variables CHIS used that contain information that might be identifiable of respondents.

CHIS reported that within each one-year dataset, the final weight, reflects the number of Californians each respondent represents in the data. Weights are techniques used in population-based surveys to adjust a study sample to represent the population from which the sample was drawn. It involves computing and assigning a weight (a value) to each respondent to the survey using a fixed criterion such as population estimates from an authoritative source to calculate the value to be assigned to a respondent. As previously explained, the CHIS data are weighted to the U.S. Census population estimates for 2013 as a criterion.

Weighting involves using techniques to adjust a study sample to represent the population from which the sample was drawn. As an example, suppose one wants to analyze a binary variable such as sex (coded male and female). Suppose also that in the theoretical population the proportion of male is 40% and female is 60%. Suppose further that the sample in the analysis is 80% female and 20% male. In that situation, the sample would not be representative of the theoretical population. If unweighted data are analyzed, the results would then not be generalizable to the theoretical population because the variances could be biased since the true population has 40% male and 60% female.

To correct for this issue, a weight can be calculated as a ratio of the theoretical population over the sample. In the supposed scenario discussed in this section, it would be .40/.80. The result in the example under discussion would be .5 - which is the design weight. This means that a weight of .5 has to be applied to each respondent so that results from statistical analysis are generalizable to the theoretical population. This .5 (or 50%) can be transformed into counts using the fixed estimates to which the data are weighted. To put this scenario in the context of the CHIS data, a case with a weight of 200 means that a respondent (and his/her answers) represent

200 Californians. It should be noted that a weight does not change a respondent's answer; rather, it gives relative importance to a respondent’s answer.

CHIS reported that the sum of the weights should be close to the estimated population from the California Department of Finance or U.S. Census Bureau estimates for the same time period that the health survey was conducted. In order to ensure that the population estimates and standard errors reflect the average California population over the pooled 2013 and 2014 period, per CHIS’s written procedure, the researcher obtained an average by dividing the final weight and each replicate weight by 2. Given the minimal change in California’s population between 2013 and 2014, it is not expected that this averaging will affect overall estimates.

In addition to the weights and data pooling procedures explained above, CHIS recommends that a variable labeled *year* be added to the dataset to identify the 2013 and 2014 files. The resulting pooled file therefore has a total of 579 variables as depicted in Table 6. The same number of variables from synchronizing the 2013 and 2014 questionnaires are maintained (n = 417) and the pooled data contain 40,240 cases (2013: n = 20,724 and 2014: n = 19,516). Table 7 depicts the variables that were used in the study. Also, the researcher generated a case ID for data sorting purposes in order to maintain the integrity of the original dataset after manipulation. It what assessed that a case ID would also ensure data integrity in replication of the study and would also ensure data integrity in case the researcher needed to do bootstrap resampling to compare results from study sample to another randomized sample in the same data set.

Table 6

Variables in Pooled Data File

Process	No. of variables
No. of variables retained from synchronizing the 2013 and 2014 questionnaires	417
Replicate weights created from pooling procedure	161
New variable created: *year*	1
Total # of variables	579

Table 7

Variables Selected for the Study

Variables Labels	No. of Variables
Demographics: Age, sex, ethnicity, income, education	5
Access: A latent variable measured by factors	5
Utilization: A latent variable measured by factors	4
Self-rated Health Status	1
English Proficiency	1
Weight variables due to CHIS complex sampling design	161
Total	177

Note. From the 579 variables, 177 were selected to conduct statistical analysis to answer the research questions. The weight variables (n = 161) were carried forward for all analyses in order to obtain accurate estimates.

Missing Data Handling

There is no consensus on an established cutoff in the literature regarding acceptable percentage of missing data for valid statistical inferences (Dong & Peng, 2013). It is however established that missing data are to be treated as missing. According to Little and Rubin (1987), results may be satisfactory with small amount of missing data (e.g., >2%). Contrary to Little and

Rubin (1987), Schafer (1999) asserts that 5% or less missing is inconsequential while Bennett (2001) points out with 10%$^+$ missing data, statistical analysis are likely to be biased.

CHIS reported that there are missing valid responses for 2% of the sample that resulted from "non-responses, weighting the sample, and from other variables" (California Health Interview Survey, 2016a). Random allocation and hot-deck imputation techniques were used to complete the data for analyzability (California Health Interview Survey, 2016a). The adult dataset contains cases that are coded as "*Inapplicables,*" which resulted from either when an adult was answering by proxy for a child or when a question was not asked of a respondent because it was not applicable to that respondent. Little and Rubin (1987) discusses such instances in the context of missing data. In which case, a researcher must determine why the data are missing in order to decide whether the missing data can be appropriately imputed and which imputation method is suitable or whether cases with missing data should not be analyzed. It is understood that in the latter instance, generalizability of findings might be affected if the sample was randomized or weighted to a fixed criterion – like it was in the case of the CHIS data - and there is high attrition. In the former instance, the data may be imputed following generally accepted standards for multiple imputation in the literature.

For two variables in this research, there was a minimal amount of missing data that resulted from questions not presented to adults who were answering by proxy for children. (N = 248 or 0.62% of the cases). These data are considered missing not at random (MNAR) based on accepted standards for handling missing data (Little & Rubin, 1987). Considering that the sample for this study is large and the missing data are minimal, generalizability of findings from this study are not affected according to current standards. The risk of losing power was also minimized due to the large sample size.

Stability Testing of Measurement Scales

The outcome variables served as measuring instrument. As indicated previously, self-rated health status is an ordinal variable that is measured on a Likert-type scale. Also, a theory-driven approach was used to select observed variables to measure access and utilization as latent variables to conduct logistic regression and correlational analyses. Selection of observed variables was guided by the HCAB and the Da Silva (2011) conceptual frameworks previously discussed. For the path analysis, measurement models were tested and results of model stability are reported as part of research questions 8.

The following questions were selected from the CHIS 2013-2014 Adult Questionnaire Version 5.4 January 8, 2015 to measure the predictor and outcome variables in this study. The questions are reprinted in this dissertation pursuant to prior written permission obtained from the principal investigator of CHIS at the UCLA Center for Health Policy Research for reprinting the survey items for purposes of this study (see APPENDIX F).

Access

1. During the past 12 months, did a doctor’s office tell you that they would not take you as a new patient?
2. Is there a place that you usually go to when you are sick or need advice about your health?
3. Have you ever used the Internet? (Interviewer’s note: This includes sending or receiving email, using Facebook, twitter, etc. include using a computer, phone, tablet, or any other electronic device for accessing the Internet).

4. Are you currently insured?

5. During the past 12 months, did you have any trouble finding a general doctor who would see you?

Utilization

1. About how long has it been since you last saw a doctor or medical provider for a routine checkup?

2. During the past 12 months, did you delay or not get a medicine that a doctor prescribed for you?

3. About how long has it been since you visited a dentist or dental clinic? Including hygienists and all types of dental specialists.

4. During the past 12 months, did you delay or not get any other medical care you felt you needed – such as seeing a doctor, a specialist, or other health professional?

Self-Rated Health Status

"Would you say that in general your health is excellent, very good, good, fair, or poor?"

English Proficiency

"Since you speak a language other than English at home, we are interested in your opinion of how well you speak English. Would you say you speak English: (1) Very well, (2) well, (3) not well, or (4) not at all?"

Covariates

Age, sex, race and ethnicity, education, and income

Statistical Results

For RQ#1, frequencies and percentages of demographics are provided in a tabular format with graphs plotted to illustrate the categories and distributions of the variables. For RQ#2 through RQ#4, logistic regression using Pearson designed-based F test for complex and weighted samples was used to test for a difference in the outcome variables; therefore, the results of the main test with its corresponding p value are reported. For RQ#5 through RQ#7, Pearson designed-based F test for examining bivariate correlations was used to test for relationships among the variables. A p value with associated Cohen W coefficient as an effect size is reported. For RQ#8, path analysis techniques were used to fit a statistical model to the data to test the hypothesis of recursive direct and indirect effects among variables. Path coefficients with associated standard error, z score, and probability values are reported for the relationships between endogenous and exogenous variables.

Prior to conducting analysis to answer RQ#s 2-4, assumptions for logistic regression were tested. The following assumptions were tested: (1) Independence of errors: This assumption requires that cases of data are not related. For example, the same question should not be asked twice to measure a construct. The items selected from the CHIS survey questionnaire have been examined and they are not similar (i.e., they measure a single construct only once). (2) Multicollinearity: This assumption requires that independent variables are not too highly correlated. A correlation matrix was obtained that showed that variables are not highly correlated and there is no collinearity. (3) The outcome variables must be measured either on a binomial or ordinal scale. Access and utilization are binomial and SRHS is ordinal. These assumptions for conducting logistic regression were met.

For RQ#s 5-7, a Pearson designed-based bivariate correlational analysis for survey data to accommodate the weights was performed. This test provides both a χ^2 statistics with a corresponding p value and an F statistic with corresponding p value. A Cohen W coefficient as an effect size was calculated because the variables are bivariate and violate the assumption for a Pearson r test.

For RQ# 8, prior to performing the path analysis, measurement models were developed to test the consistency of the indicator variables in measuring the latent variables in the study. In the path analysis, LEP is a multinomial and SRHS is ordinal. Access and utilization are Gaussian as measured by the linear coefficient of the underlying categorical observed variables that were coded as dummy variables: 0 = No and 1 = Yes.

Descriptive Characteristics of the Sample

Results for RQ#1: What are the demographics of Californian adults in the health survey (e.g., English proficiency, age, sex, race and ethnicity, education, and income)?

In CHIS, the adult population is defined with minimum age of 18 and maximum age of 85. The sample therefore consisted of all adult-respondents who participated in CHIS 2013-2014 (N = 40,240).

Frequencies of Respondents. The distribution of the groups by language is as follows: LEP: n = 4,016, E+OL: n = 7,387, and OE: n = 28,837. A minimum sample of N = 568 was required for logistic regression; however, analyses were conducted on the full CHIS adult sample because this study seeks to compare a theoretical group (the LEPs) to reference groups (E+OL and EO) as those groups are represented in the theoretical population (the state of California). For the variable English proficiency both the unweighted (Figure 32 and Table 8) and weighted

(Figure 33 and Table 9) results are reported. The unweighted frequencies represent the actual sample (N = 40,240) and the weighted parameters represent the total non-institutionalized California population (N = 28,350,722).

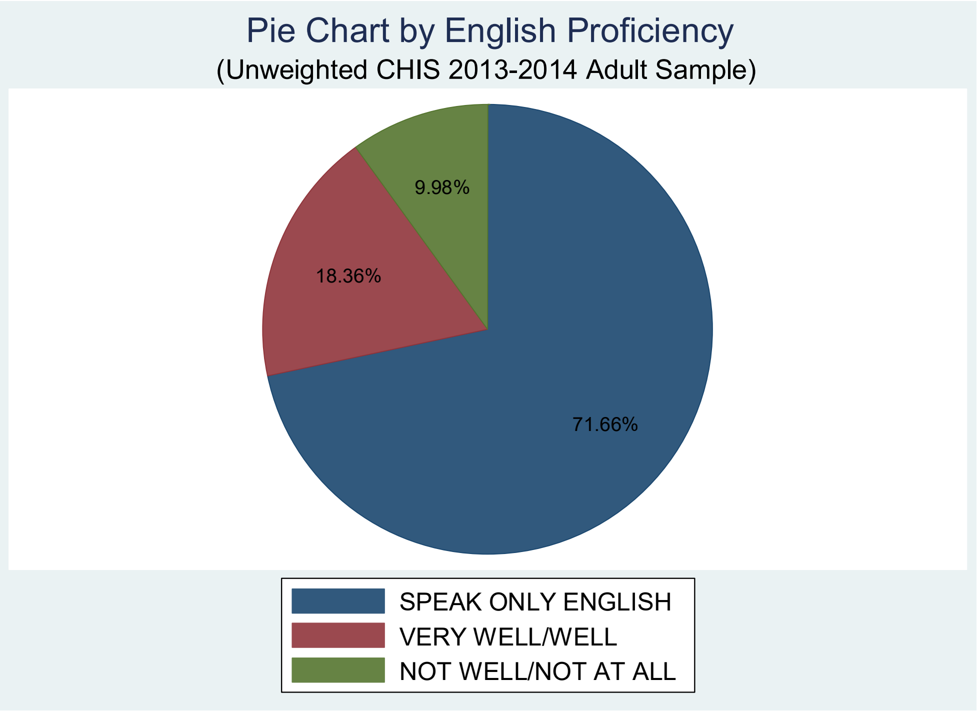


Figure 32. Unweighted Distribution of Respondents by English Proficiency

Table 8

Unweighted Frequencies and Percentage of Respondents by English Proficiency

English use and proficiency	**Frequency**	**Percentages**	**Cumulative**
Speak only English	28,837	71.66	71.66
Very well/Well	7,387	18.36	90.02
Not well/Not at all	4,016	9.98	100.00
Total	40,240	100.00	

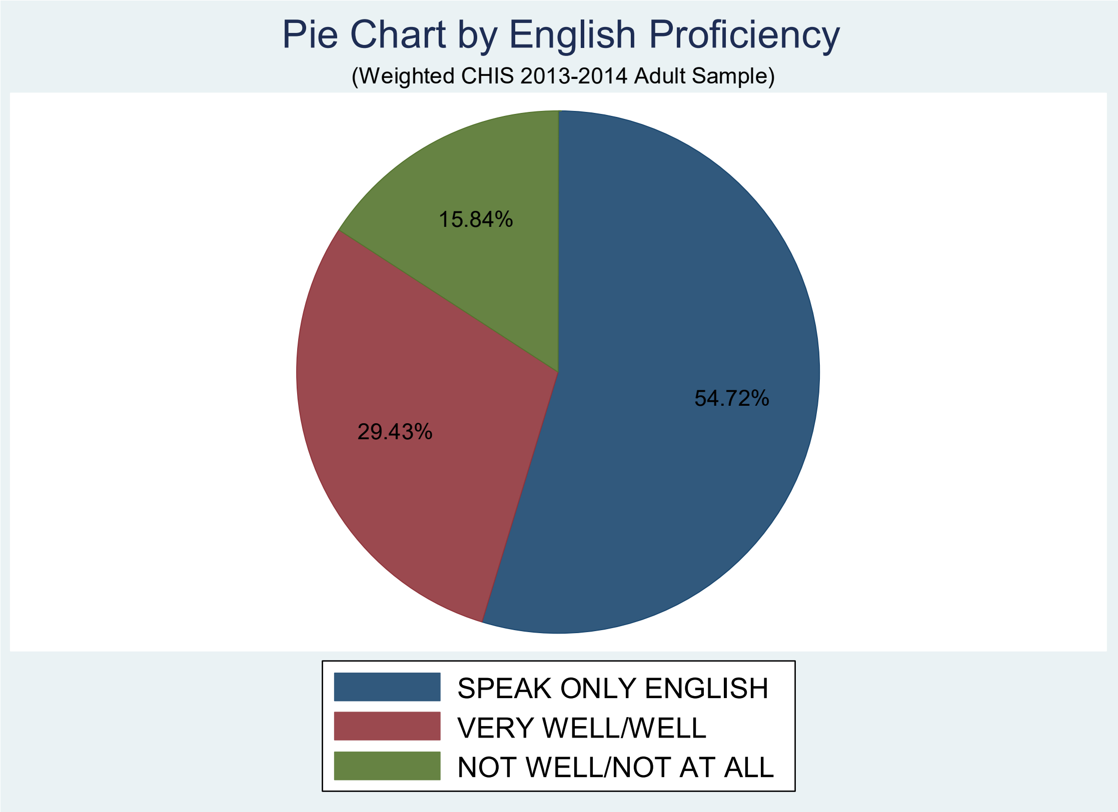


Figure 33. Weighted Distribution of Respondents by English Proficiency

Table 9

Weighted Frequencies and Percentage of Total Respondents by English Proficiency

English use and proficiency	Frequency	Percentages	Cumulative
Speak only English	22,020.825	54.72	54.72
Very well/Well	11,844.519	29.43	84.16
Not well/Not at all	6,374.65615	15.84	100.00
Total	40,240	100.00	

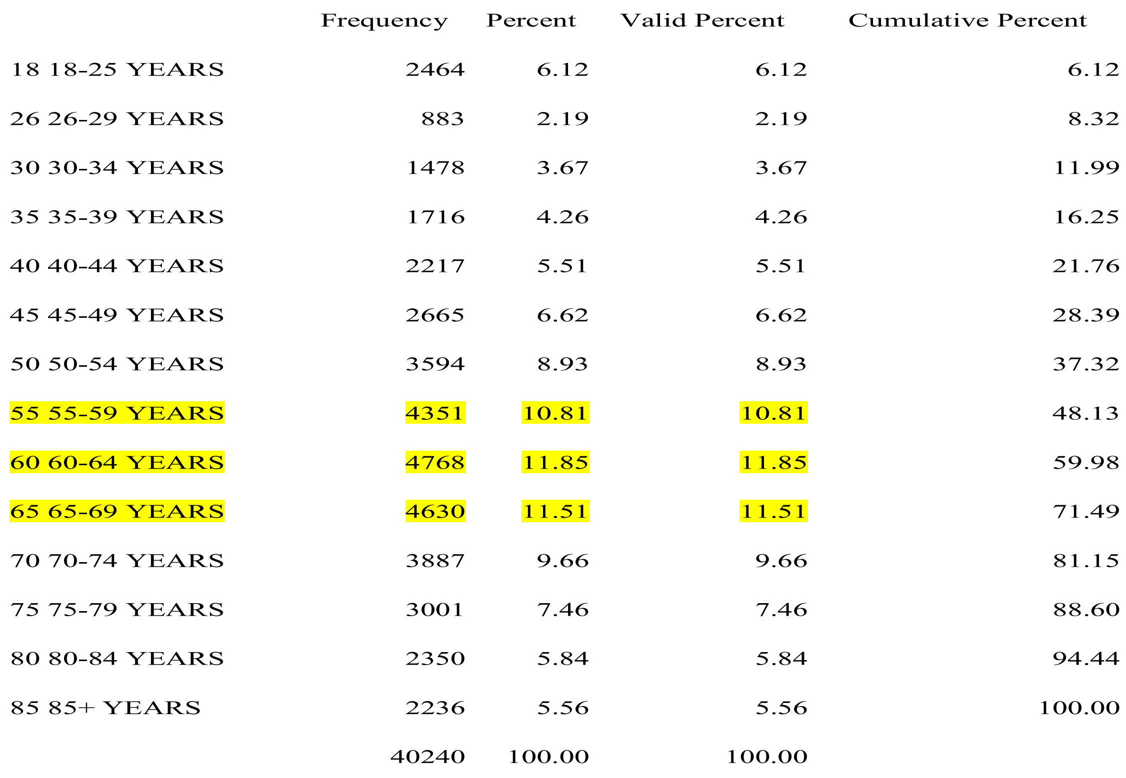
Age of Respondents

Descriptive statistics show that there were 13,749 (34.17%) of the sample who reported their age within the range of 55 to 69 years old, representing the largest group of respondents in the survey. The mean age of the sample was ±56.00 with a standard deviation of 17.74 (see Tables 10 and 11 and Figure 34).

Table 10

Frequencies and Percentage of Respondents by Age

	Frequency	%	Valid %	Cumulative %



	Frequency	Percent	Valid Percent	Cumulative Percent
18 18-25 YEARS	2464	6.12	6.12	6.12
26 26-29 YEARS	883	2.19	2.19	8.32
30 30-34 YEARS	1478	3.67	3.67	11.99
35 35-39 YEARS	1716	4.26	4.26	16.25
40 40-44 YEARS	2217	5.51	5.51	21.76
45 45-49 YEARS	2665	6.62	6.62	28.39
50 50-54 YEARS	3594	8.93	8.93	37.32
55 55-59 YEARS	4351	10.81	10.81	48.13
60 60-64 YEARS	4768	11.85	11.85	59.98
65 65-69 YEARS	4630	11.51	11.51	71.49
70 70-74 YEARS	3887	9.66	9.66	81.15
75 75-79 YEARS	3001	7.46	7.46	88.60
80 80-84 YEARS	2350	5.84	5.84	94.44
85 85+ YEARS	2236	5.56	5.56	100.00
	40240	100.00	100.00	

Note: The largest groups are between 55-69 years old.

Table 11

Summary Statistics of Respondents by Age

Variable	**Observation**	**Mean**	**Std. Dev.**	**Minimum**	**Maximum**
Age	40,240	56.20216	17.73846	18	85

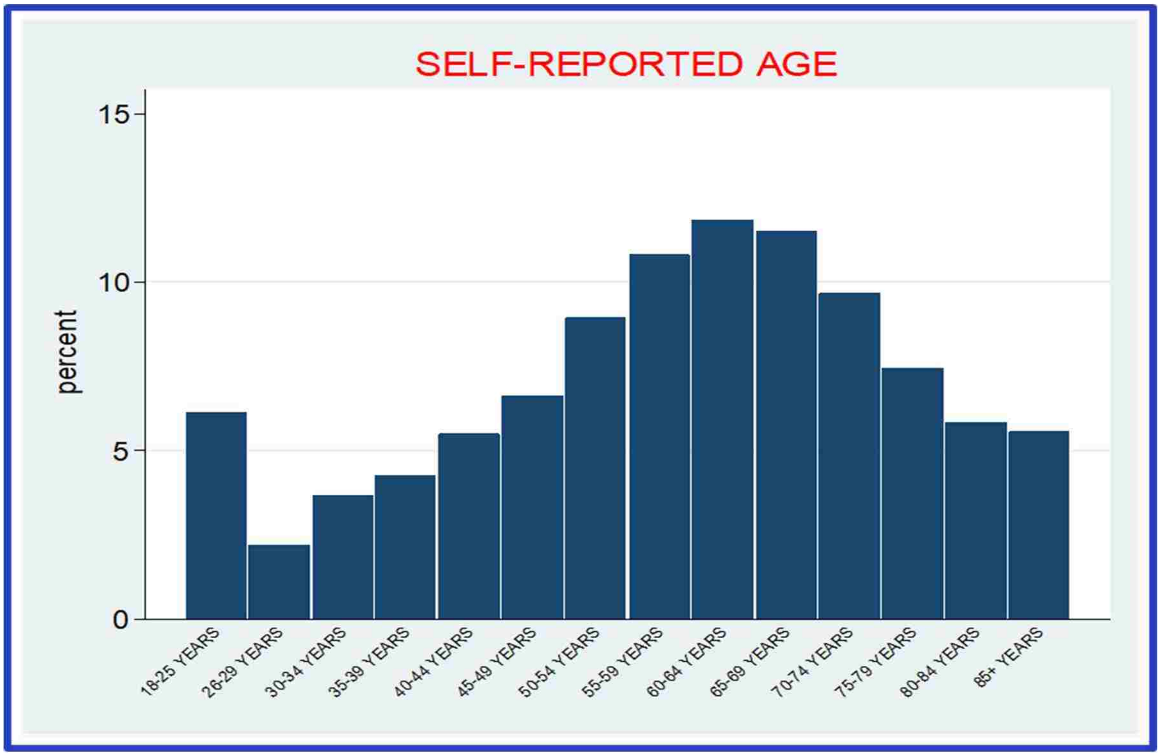


Figure 34. Bar graph of respondents by age.

Ethnicity of Respondents

The largest group was non-Latino White (25,643 or 63.735%). The second largest group was Latino (7,996 or 19.87%). The smallest group was non-Latino other, one race (141 or 0.35%) (see Figure 35 and Table 12).

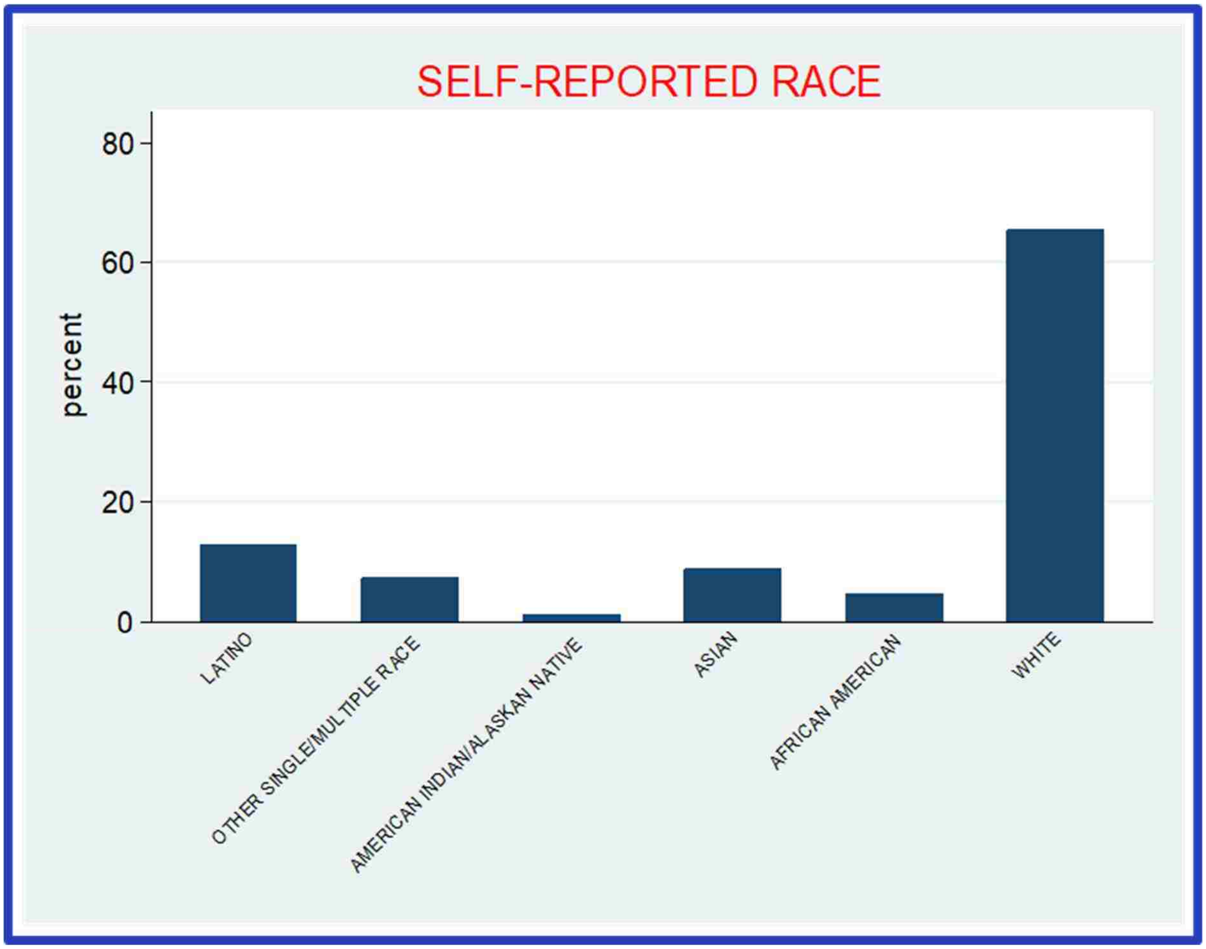
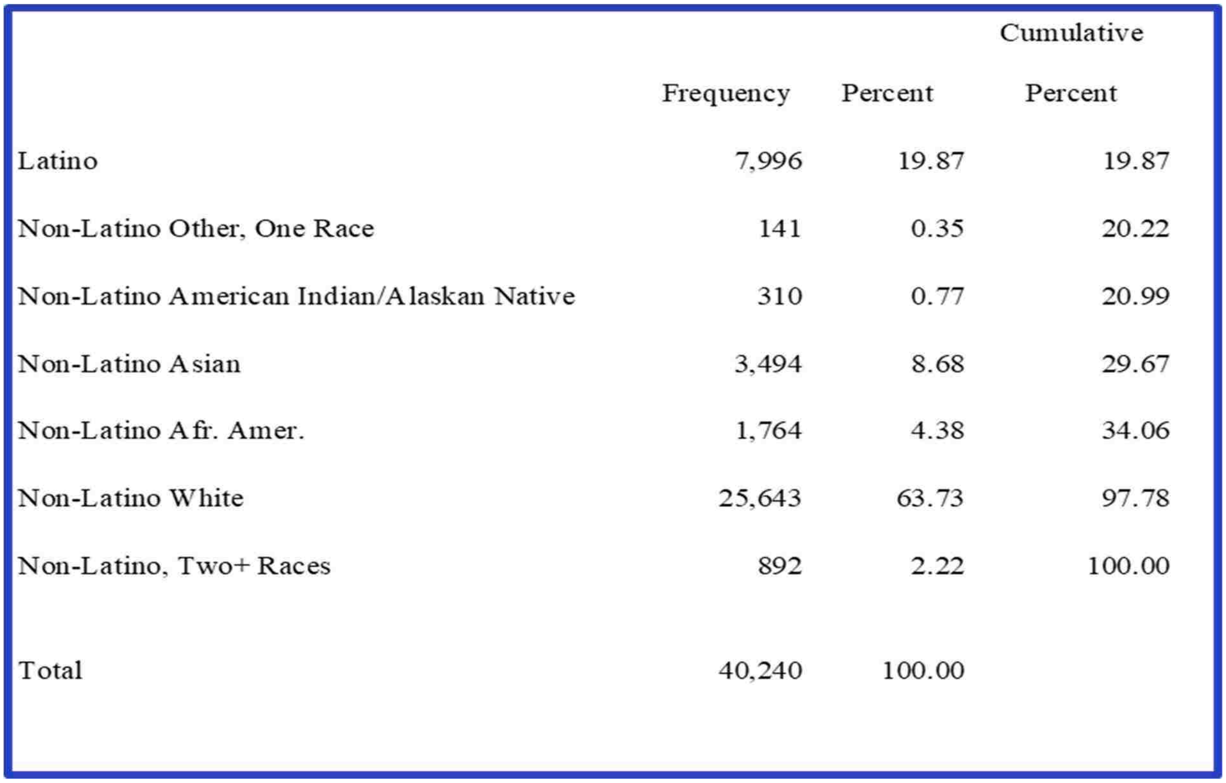


Figure 35. Bar graph of respondents by race.

Table 12

Frequencies and Percentage of Respondents by Race



	Frequency	Percent	Cumulative Percent
Latino	7,996	19.87	19.87
Non-Latino Other, One Race	141	0.35	20.22
Non-Latino American Indian/Alaskan Native	310	0.77	20.99
Non-Latino Asian	3,494	8.68	29.67
Non-Latino Afr. Amer.	1,764	4.38	34.06
Non-Latino White	25,643	63.73	97.78
Non-Latino, Two+ Races	892	2.22	100.00
Total	40,240	100.00	

Note. Both race and ethnicity are captured under race. Also race and ethnicity in CHIS are as defined by the California Department of Finance at the time of the survey.

Educational Attainment of Respondents

The largest group in the sample (9,357, 23.25%) reported having earned a BA or BS/some graduate school. The second largest group (8,598, 21.37%) reported having completed grade 12/HS diploma, and the smallest group (2,399, 5.96%) reported having no formal education or having completed grade 1-8 (see Table 13 and Figure 36).

Table 13

Frequencies and Percentage of Respondents Educational Attainment

	Frequency	Percentage	Valid	Cumulative Percent
1 No Formal Education or Grade 1-8	2399	5.96	5.96	5.96
2 Grade 9-11	1827	4.54	4.54	10.50
3 Grade 12/H.S. Diploma	8598	21.37	21.37	31.87
4 Some College	6432	15.98	15.98	47.85
5 Vocational School	1376	3.42	3.42	51.27
6 AA or AS Degree	3656	9.09	9.09	60.36
7 BA or BS Degree/Some Graduate School	9357	23.25	23.25	83.61
9 MS or MA Degree	4780	11.88	11.88	95.49
10 Ph.D. or Equivalent	1815	4.51	4.51	100.00
Total	40240	100.00	100.00	

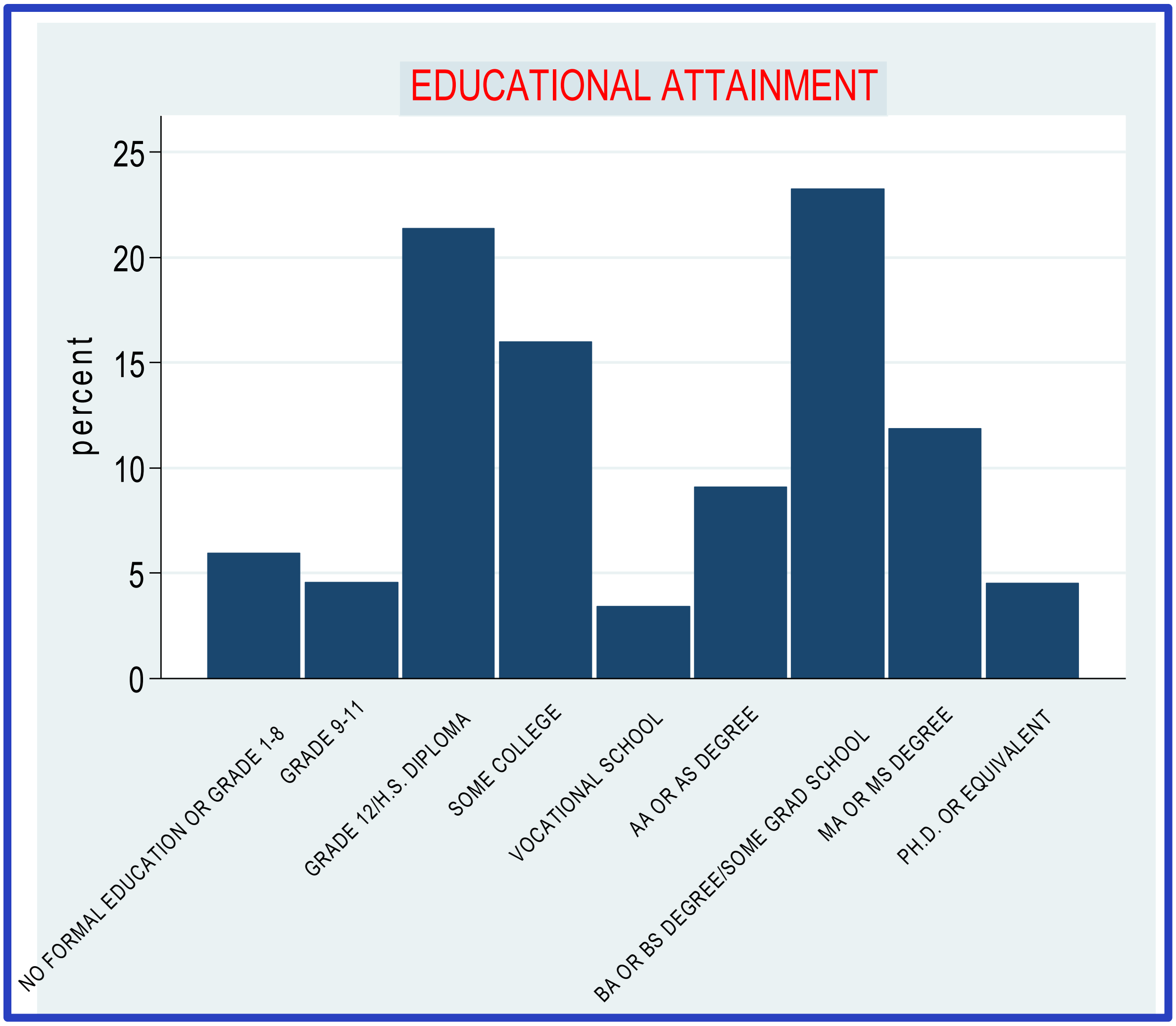


Figure 36. Bar graph of respondents according to educational attainment.

Sex of Respondents

Among the CHIS respondents, there were more females than males: 59.20% vs. 40.80%. Figure 37 depicts the distribution by sex and Table 14 provides frequencies and percentage of respondents by self-reported sex.

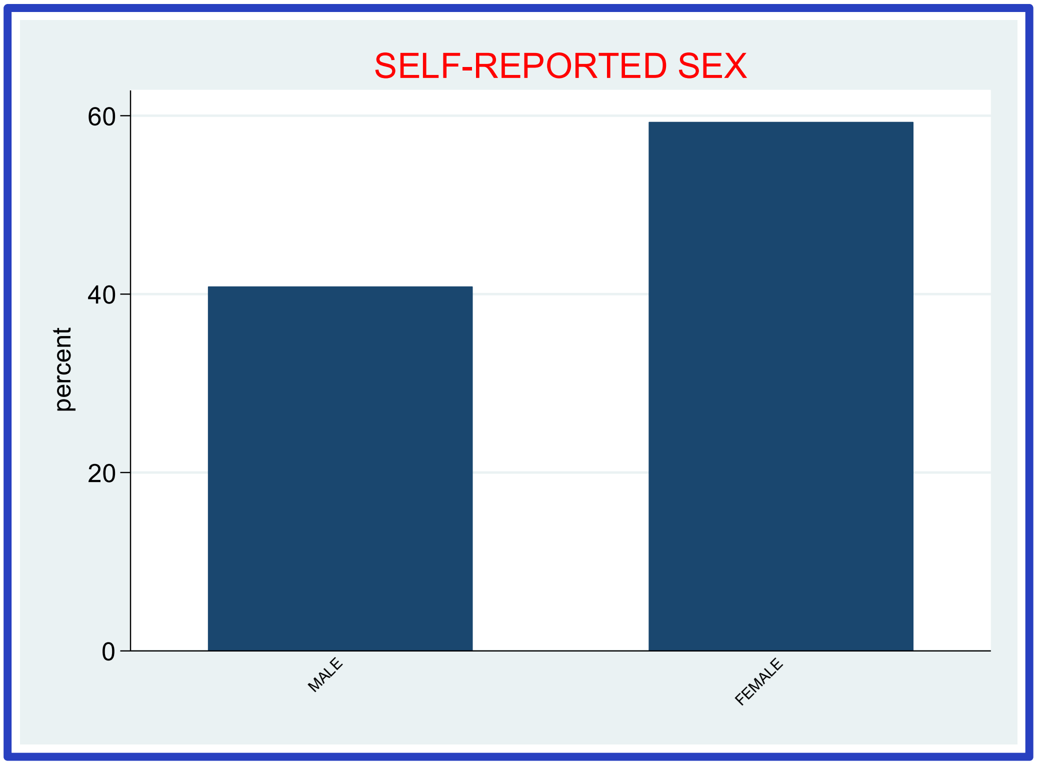


Figure 37. Bar graph of respondents by sex.

Table 14

Frequencies and Percentage of Respondents by Sex

	Frequency	Percent	Valid Percent	Cumulative Percent
Male	16418	40.80	40.80	40.80
Female	23822	59.20	59.20	100.00
Total	40240	100.00	100.00	

Household Income of Respondents

From observing the distribution, it is left-skewed with most respondents falling between 0 and ±100,000. There are fewer respondents between 100,000 and 300,000. Income appears to increase in the distribution at 300,000. Since the data are censored at 300,000, it is therefore not known where the true population parameters fall. The reported mean income was 70,842.99 (see Figure 38 and Table 15).

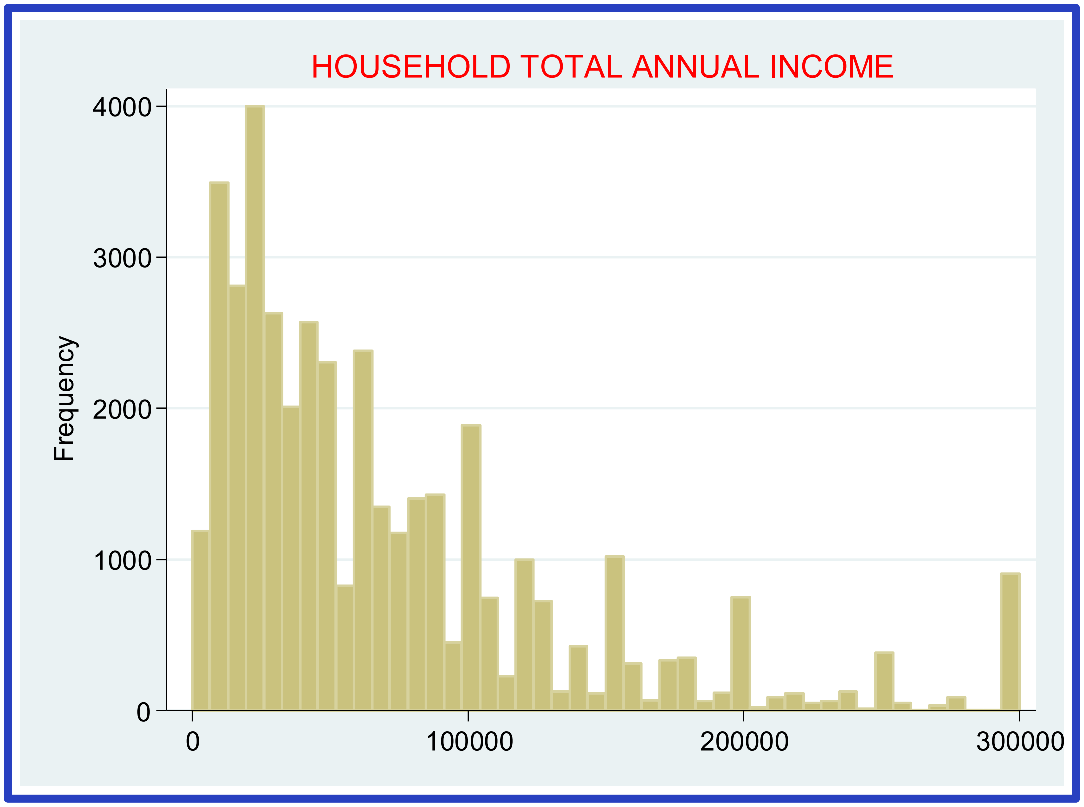


Figure 38. Bar graph of respondents' total annual income. Data censored at 300,000. The frequencies are reported in 1,000.

Table 15

Frequencies and Percentage of Respondents by Household's Total Annual Income

	Percentiles	Smallest		
1%	100	0		
5%	9600	0		
10%	12000	0	Obs	40,240
25%	24000	0	Sum of Wgt.	40,240
50%	50000	Mean		70842.99
		Largest	Std. Dev.	64907.04
75%	100000	300000		
90%	150000	300000	Variance	4.21e+09
95%	200000	300000	Skewness	1.644521
99%	300000	300000	Kurtosis	5.655259

Note. Mean annual income is $70,842.99.

Results of Inferential Statistical Analyses

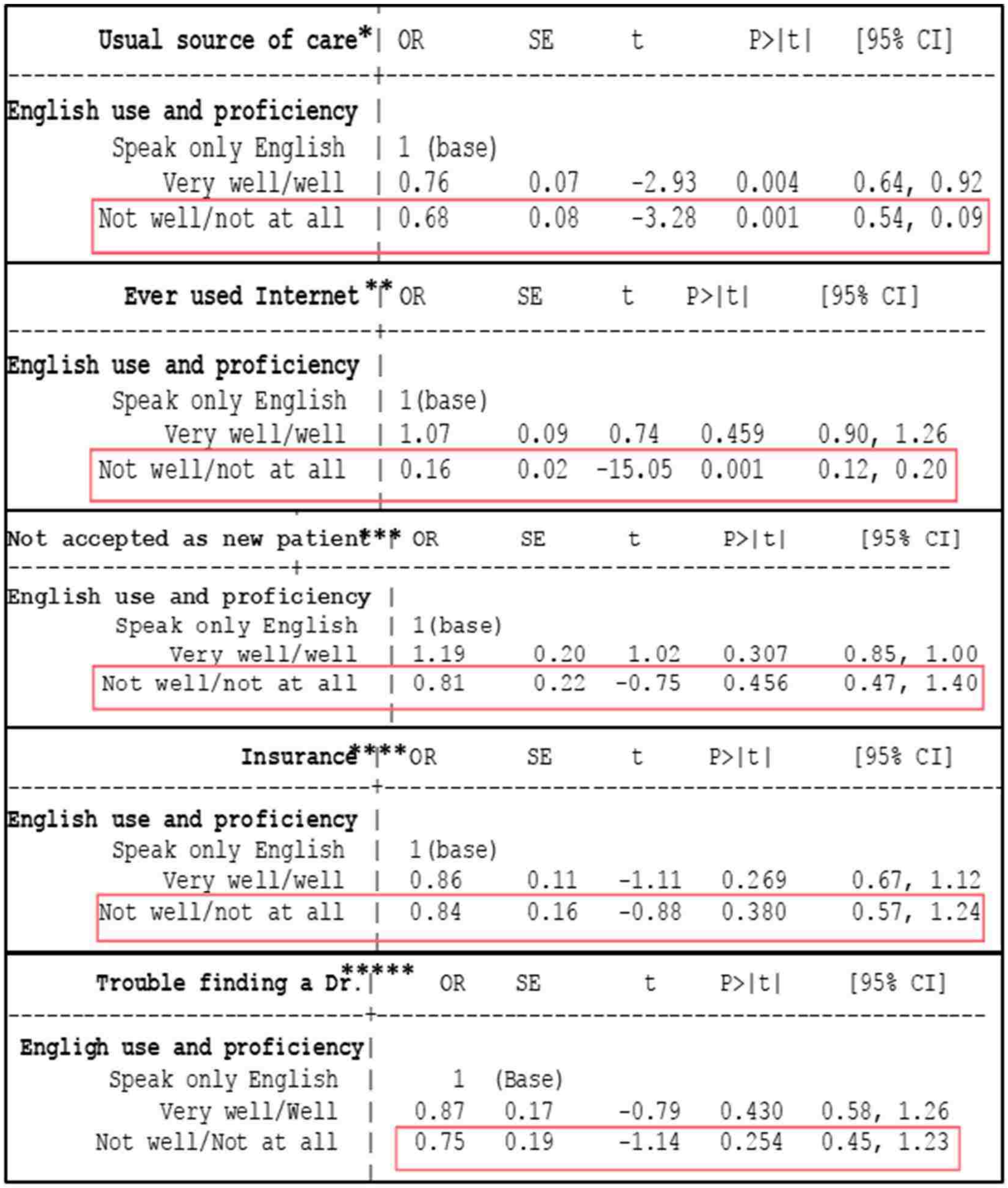
For all logistic regressions, controlling for covariates, the EO group was constrained at 1 as the variable with the highest frequency and the LEP group was compared to the E+OL group. Also, as previously discussed, access and utilization are indirectly measured by observed variables.

Results for RQ#2: Is there a *difference* in access to health services among Californian adults with limited English proficiency (LEP) as compared to adults who speak English only (EO) and adults who speak English and another language at home (E+OL)?

Five observed variables that fit the HCAB conceptual model were selected to measure access. The results were as follows: (1) *Usual Source of Care*: *p* = .001, OR = 0.68; (2) *Ever Used Internet*: p = .001, OR = 0.16; (3) *Not accepted as New Patient*: p = .456, OR = 0.81; (4) *Insurance*: p = .380, OR = 0.84; (5) *Trouble Finding a Doctor:* p = .254, OR = 0.75. For all five observed variables, LEP had a lower log of odds as compared to E+OL (see Table 16).

Table 16

Results of Logistic Regression for Access



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        Usual source of care*| OR        SE      t         P>|t|    [95% CI]
----------------------------+---------------------------------------------
English use and proficiency |
          Speak only English | 1 (base)
               Very well/well | 0.76      0.07    -2.93   0.004     0.64, 0.92
           Not well/not at all | 0.68      0.08    -3.28   0.001     0.54, 0.09

          Ever used Internet **| OR       SE      t    P>|t|      [95% CI]
----------------------------+---------------------------------------------
English use and proficiency |
          Speak only English | 1(base)
               Very well/well | 1.07      0.09   0.74   0.459     0.90, 1.26
           Not well/not at all | 0.16      0.02  -15.05  0.001     0.12, 0.20

Not accepted as new patient***| OR      SE      t       P>|t|      [95% CI]
-------------------+-------------------------------------------------
English use and proficiency |
          Speak only English | 1(base)
               Very well/well | 1.19      0.20    1.02    0.307     0.85, 1.00
           Not well/not at all | 0.81      0.22   -0.75    0.456     0.47, 1.40

                  Insurance****| OR       SE      t      P>|t|       [95% CI]
----------------------------+---------------------------------------------
English use and proficiency |
          Speak only English |  1(base)
               Very well/well |  0.86      0.11    -1.11   0.269      0.67, 1.12
           Not well/not at all |  0.84      0.16    -0.88   0.380      0.57, 1.24

      Trouble finding a Dr.|*****  OR    SE          t      P>|t|     [95% CI]
----------------------------+---------------------------------------------
 Engligh use and proficiency|
          Speak only English  |      1   (Base)
               Very well/Well  |   0.87   0.17      -0.79   0.430   0.58, 1.26
           Not well/Not at all  |   0.75   0.19      -1.14   0.254   0.45, 1.23
```

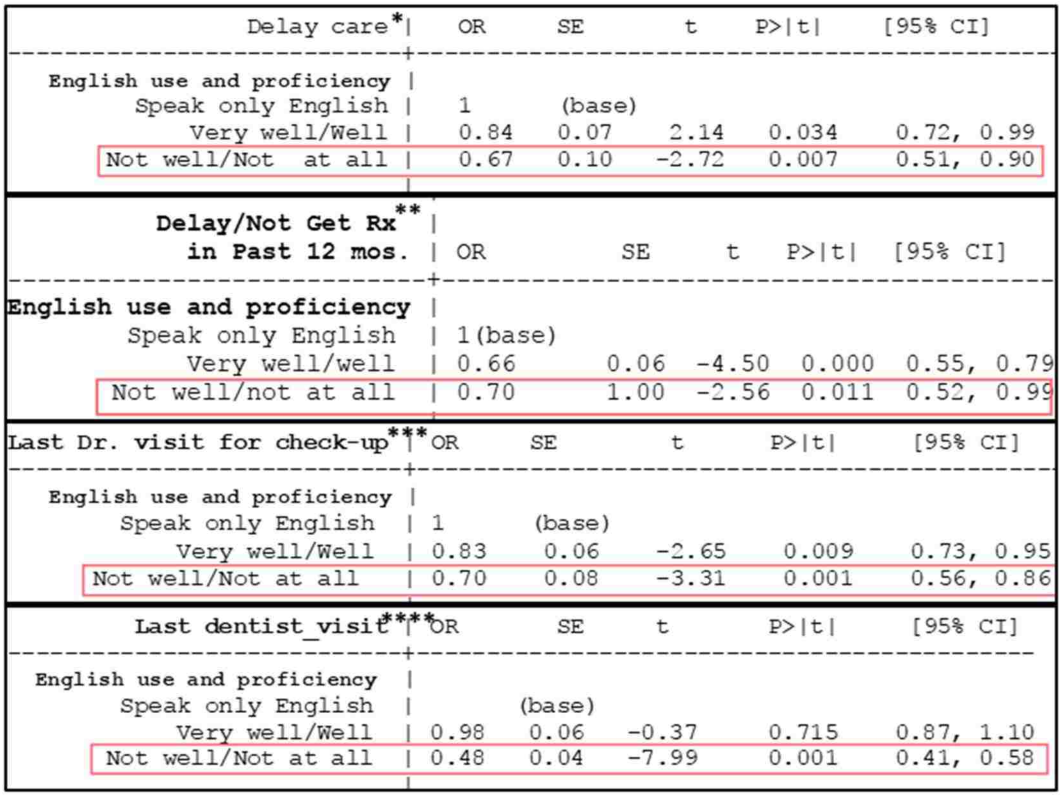
Note: OR= Odds Ratio, CI= Confidence Interval, SE = Standard Error
*   p < .05 two-tailed
** p < .05 two-tailed.
*** p > .05 two-tailed
**** p > .05 two-tailed
*****p > .05 two-tailed

Results for RQ#3: Is there a *difference* in utilization of health services among Californian adults with limited English proficiency (LEP) compared to adults who speak English only (EO) and adults who speak English and another language at home (E+OL)?

Four observed variables that fit the Da Silva, et al. (2011) utilization conceptual model were selected to measure utilization. The results were as follows: (1) *Delay Care*: p = .007, OR = 0.67. (2) Delay/Not Get Rx: p = .011, OR = 0.70. (3) *Last Doctor Visit for checkup*: p = .001, OR = 0.70. (4) *Last Dentist Visit*: p = .001, OR = 0.48. LEP showed a lower log of odds that was statistically significant on all indicators of utilization compared to E+OL, except for the variable *Delay/not get Rx* (see Table 17).

Table 17

Results of Logistic Regression for utilization



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                Delay care*|   OR      SE        t     P>|t|     [95% CI]
---------------------------+---------------------------------------------
  English use and proficiency |
          Speak only English |   1       (base)
              Very well/Well |   0.84    0.07     2.14    0.034     0.72, 0.99
         Not well/Not  at all |   0.67    0.10    -2.72    0.007     0.51, 0.90

           Delay/Not Get Rx** |
              in Past 12 mos. | OR           SE      t    P>|t|   [95% CI]
---------------------------+---------------------------------------------
English use and proficiency  |
        Speak only English   | 1(base)
            Very well/well   | 0.66        0.06  -4.50  0.000  0.55, 0.79
     Not well/not at all     | 0.70        1.00  -2.56  0.011  0.52, 0.99
Last Dr. visit for check-up***| OR      SE         t       P>|t|      [95% CI]
---------------------------+---------------------------------------------
  English use and proficiency |
        Speak only English   | 1       (base)
            Very well/Well   | 0.83    0.06     -2.65     0.009     0.73, 0.95
     Not well/Not at all     | 0.70    0.08     -3.31     0.001     0.56, 0.86
        Last dentist_visit****| OR         SE      t         P>|t|      [95% CI]
---------------------------+-------------------------------------------
 English use and proficiency  |
        Speak only English   |         (base)
            Very well/Well   | 0.98    0.06    -0.37      0.715     0.87, 1.10
      Not well/Not at all    | 0.48    0.04    -7.99      0.001     0.41, 0.58
```

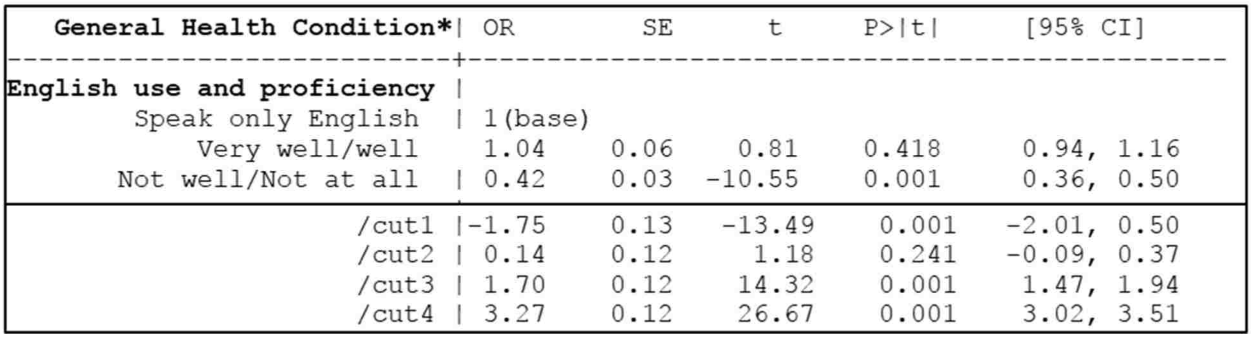
Note: OR= Odds Ratio, CI= Confidence Interval, SE = Standard Error
* p < .05 two-tailed
**p < .05 two-tailed
*** p < .05 two-tailed
****p < .05 two-tailed

Results for RQ#4: Is there a *difference* in self-rated health status among Californian adults with limited English proficiency (LEP) compared to adults who speak English only (EO) and adults who speak English and another language at home (E+OL)?

LEP showed a lower log of odds that was statistically significant as compared to E+OL. More specifically, the following statistics were obtained: t = -10.55, p = .001 (Table 18). Since an ordered logistic regression was conducted because the outcome variable is ordinal (measured on a Likert scale 1-5), ancillary parameters are also provided, which serve to differentiate the adjacent levels of the outcome variable. For example, for Cut 1, it would be estimated that subjects that had a response value of -1.75 or lower would have selected “low” as an answer. Likewise, for Cut 4, subjects that had a value of 3.27 or greater would be estimated to have selected “excellent” as an answer. Subjects with a value between -1.75 and 3.27 would therefore be estimated as either “fair” “good” or “very good.” Observation of the results shows that LEPs fall between 0.14 and -1.75. While the levels on a Likert scale do not have equal width like an interval scale, 0.42 (which is the OR for the LEP group) is closer to 0.14 than it is to 1.70. Thus, it is proper to infer that LEPs have a score closer to “fair” than “good” (meaning 2 instead of 3 as measured on the ordinal scale) (see Table 18).

Table 18

Results of Ordered Logistic Regression for Health Status



```
  General Health Condition*| OR        SE      t      P>|t|      [95% CI]
---------------------------+-----------------------------------------------
English use and proficiency |
        Speak only English  | 1(base)
            Very well/well    1.04    0.06    0.81    0.418      0.94, 1.16
       Not well/Not at all  | 0.42    0.03  -10.55    0.001      0.36, 0.50

                       /cut1 |-1.75    0.13   -13.49    0.001   -2.01, 0.50
                       /cut2 | 0.14    0.12     1.18    0.241   -0.09, 0.37
                       /cut3 | 1.70    0.12    14.32    0.001    1.47, 1.94
                       /cut4 | 3.27    0.12    26.67    0.001    3.02, 3.51
```

Note: OR= Odds Ratio, CI= Confidence Interval, SE = Standard Error
*p < .05 two-tailed

Results of Associational Statistical Test

Results for RQ#5: Is there an association between *access* and utilization among Californian adults with LEP?

Weak and moderate positive correlations with statistical significance across groups was found for the variables *Last Doctor Visit* and *Usual Source of Care*; however, LEP had the lowest effect size: F (1, 159) = 47.80, p = .001, Cohen W = 0.23 compared to EO (Cohen W = 0.28) and E+OL (Cohen W = 0.31(see Table 19). For *Delay Care* and *Trouble Finding Medical Doctor*, a weak positive correlation with statistical significance was observed across groups; however, the effect size for LEP was larger than for EO and E+OL, respectively (Cohen W = 0.24 as compared to EO (Cohen W = 0.16) and E+OL (Cohen W = 0.17). All other variables in the analysis showed low effect sizes even when the correlations were statistically significant.

Table 19

Results of Test of Correlation between access and utilization

Delay care	**Troubling finding a medical doctor**
EO	F(1, 159) =189.95, *p* = .001 χ^2 (df1) = 747.75, *p* = .001, Cohen W = 0.16
E+OL	F(1, 159) = 49.76, *p* = .001 χ^2 (df1) = 211.47, *p* = .001, Cohen W = 0.17
LEP	F(1, 159) = 61.26, *p* = .001 χ^2 (df1) = 22.12, *p* = .001, Cohen W = 0.24
	Usual source of care
EO	F(1, 159) = 354.70, *p* = .001, χ^2 (df 1) = 2.2e+03, p = .001, Cohen W = 0.28
E+OL	F(1, 159) = 269.17, *p* = .001 χ^2(df1) = 690.7172, p = .001, Cohen W = 0.31
LEP	F(1, 159) = 47.80, *p* = .001, χ^2 (df1) =214.5976, *p* = .001, Cohen W = 0.23

Note: Cohen's W effect size > .30 is moderate positive and < .25 is weak positive.

Results for RQ #6: Is there an association between *access* and SRHS among Californian adults with LEP?

Weak positive correlations with statistical significance across groups were observed for *SRHS* and *Internet use*; however, LEP had the largest effect size compared to EO and E+OL (Cohen W = 0.24 vs. 0.21 and 0.23) (see Table 20). Results from bivariate correlations for the other variables showed lower or negligible effect sizes even when statistical significance was obtained. For parsimony, all the results from the correlation analysis are not reported in this dissertation.

Table 20

Results of Test of Correlation between Access and SRHS

General health condition	**Ever used Internet**
EO	F(3.69, 586.81) = 81.75, p = 0.001 X^2 (df4) = 1.2e+e, p = .001, Cohen W = 0.21
E+OL	F(3.81, 605.06) = 23.23, p = 0.001 X^2(df4) = 373.81, p = .001, Cohen W = 0.23
LEP	F(3.85, 611.61) = 18.53, p = 0.001 X^2 (df4) = 235.98, p = .001, Cohen W = 0.24,

Note: Cohen's W effect size > .30 is moderate positive and < .25 is weak positive.

Results for RQ #7: Is there an association between *utilization* and SRHS among Californian adults with LEP?

Weak positive correlations across groups were observed. The effect size for the variables Delay care and General health (which is not reported) also showed a very low positive correlation (see Table 21).

Table 21

Results of Test of Correlation between SRHS and utilization

General health	**Delay/Not get prescription past 12 mos.**
EO	F(3.84, 610.80) = 34.24, p = 0.001 χ^2 (df4) = 624.13, p = 0.001, Cohen's W = 0.15
E+OL	F(3.82, 607.66) = 14.66, p = 0.001 χ^2(df4) = 139.33, p = 0.001, Cohen's W = 0.14
LEP	F(3.86, 614.25) = 5.77, p = 0.001, - χ^2(df4) = 49.73, p = 0.001, Cohen's W = 0.11
General health	**Last doctor visit**
EO	F(3.91, 621.47) = 6.35, p = 0.001 χ^2 (df4) = 204.01, p = 0.001, Cohen's W = .08
E+OL	F(3.93. 625.62) = 1.17, p = 0.320 χ^2(df4) = 35.98, p = .001, Cohen's W = .07
LEP	F(3.87, 615.45) = 5.54, p = 0.001 χ^2(df4) = 85.43, p = .001, Cohen's W = .15
General health	**Last dentist visit**
EO	F(3.87, 615.56) = 37.18, p = 0.001 χ^2 (df4) = 998.52, p = 0.001, Cohen's W = 0.19
E+OL	F(3.91, 622.35) = 6.92, p = 0.001 χ^2(df4) = 186.71, p = 0.001, Cohen's W = 0.15
LEP	F(3.87, 615.91) = 0.19, p = 0.93 χ^2(df4) = 7.15, p = 0.13, Cohen's W = 0.04

Measurement Models Testing and Path Analysis

Results for RQ #8: Are there recursive direct and indirect effects of *LEP* on *access*, *utilization*, and *SRHS* among Californian adults with LEP?

Prior to conducting a path analysis, measurement models were developed in Stata to test the consistency of the observed variables to measure each latent variable, respectively (see Figures 39 and 40). All respective paths from both latent variables (access and utilization) were positive and statistically significant. Also, respective Bartlett tests of sphericity were conducted to test if the variances across the observed variables are roughly equal. For access, the following results were obtained: χ^2 (df6) = 13457.904, $p < .05$ and for utilization the following results were obtained: χ^2 (df3) = 1363.223, $p < .05$. Based on these results, the null hypotheses that the variables measuring access and utilization are not intercorrelated are rejected. Thus, it is concluded that the observed variables are measuring a single contruct. Also, Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO) for access was 0.503 and for utilization 0.540. According to Field (2009), Kaiser (1974) recommends KMO values above 0.50 as acceptable fit. Correlation matrices were also developed for both access (see Table 22) and utilization (see Table 23). These matrices show no collinearity among the observed variables. There were low to moderate correlations, which is acceptable for the purpose of assessing whether the variables could be measuring one single latent variable. It is also important to note unidirectionality of the observed variaables in both measurement models.

The observed variable “Internet” was not included for access and “Delay Rx” was not included for utilization in the measurement models because such variables either did not show good fit in the respective model or had negative path loadings, which suggests that they might be measuring a concept other than the latent variable in this study. Following creation of the models, two variables labelled access and utilization were respectively generated based on the results obtained and scores on each case were created in the dataset using Stata.

Table 22

Correlations for Measurement Model for Access

	Insurance	No Dr.	Usual care	Not accepted
Insurance	1.0000			
No Dr.	0.0368	1.0000		
Usual care	0.3169	0.0553	1.0000	
Not accepted	0.0056	0.4488	0.0268	1.0000

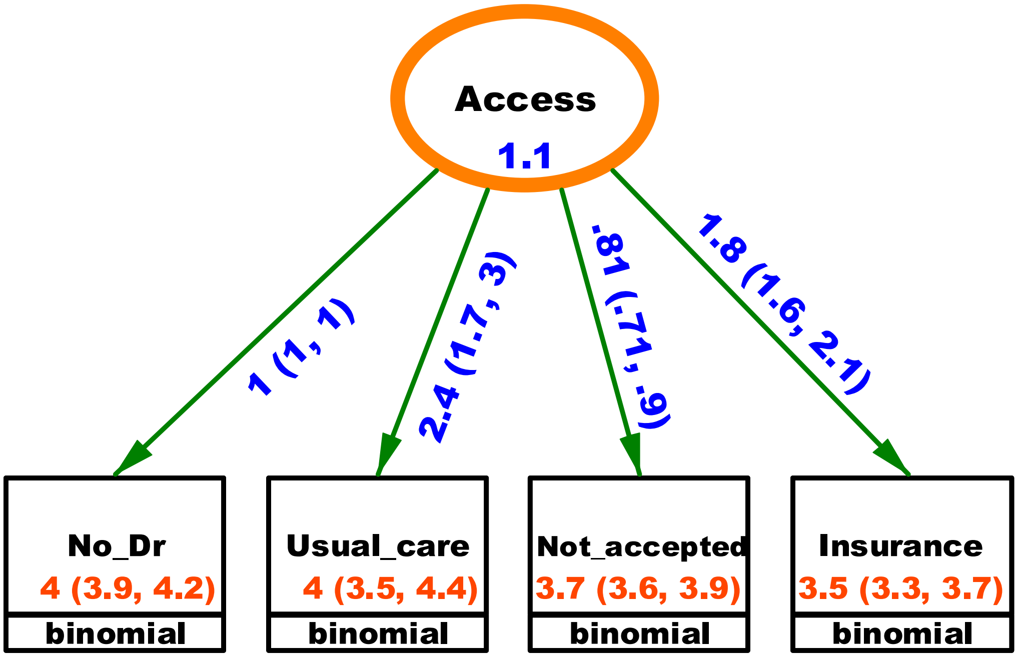


Figure 39. Researcher self-developed measurement model of access using Stata. Bartlett test of sphericity: χ^2 (df6) = 13457.904, $p < .05$. H_0: variables are not intercorrelated. Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO) = 0.503.

Table 23

Correlations for Measurement Model for utilization

	Last visit	Delay Rx	Delay care
Last visit	1.0000		
Delay Rx	-0.0228	1.0000	
Delay care	0.0823	0.2400	1.0000

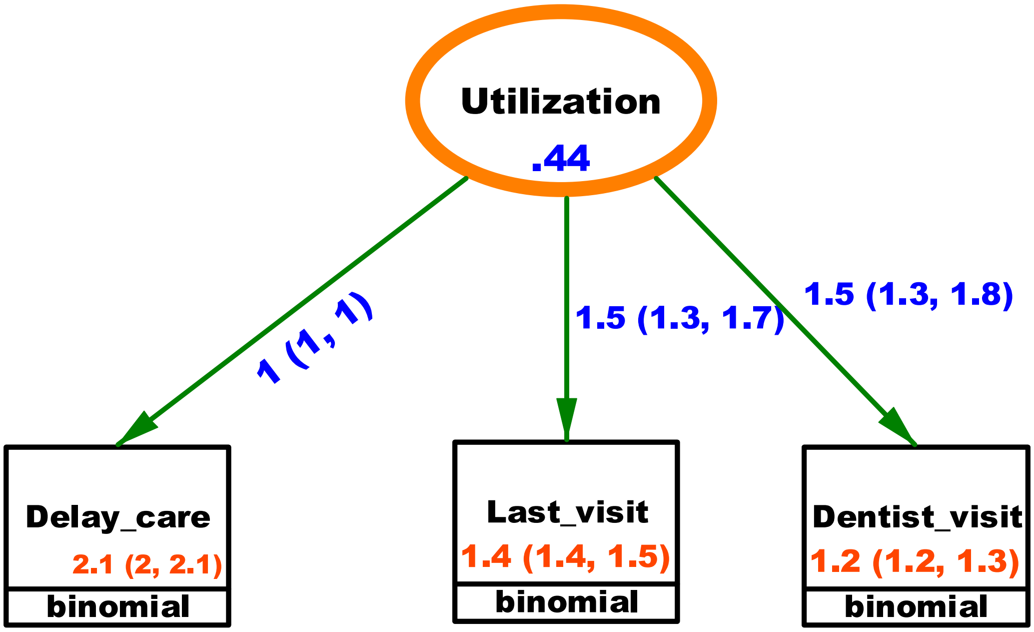


Figure 40. Researcher self-developed measurement model of utilization using Stata. Bartlett test of sphericity: χ^2 (df3) = 1363.223, $p < .05$. H_0: variables are not intercorrelated. Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO) = 0.540.

Given the results from the measurement components, a path analysis was conducted to test the fit of the BMHS theoretical model to the data. In the path analysis all covariates were controlled for. The following results were obtained and are depicted in Figure 41: (1) There was an inverse recursive effect of English on access (B = -0.27, SE = 0.05, z = -5.80, p <3.97e-09, 95% CI [-0.36, -0.18]). (2) There was an inverse recursive effect of English on utilization (B = -.80, SE = 0.09, z = -9.01, p = 2.01e-19, 95% CI [-0.97, 0-.62]). (3) There was an inverse recursive effect of English on health status (B = -.88, SE = 0.08, z = -11.25, p = 2.37e-29, 95% CI [-1.04, -0.73]). (4) There was a predictive recursive effect of access on health status and access had a mediating effect related to LEP on health status (B = 0.04, SE = 0.01, z = 2.04, p = 0.003, 95% CI [0.01, 0.06]). (5) There was a predictive recursive effect of utilization on health status and utilization had a mediating effect related to LEP on health status (B = 0.05, SE = 0.01, z = 5.86, p = 4.50e-09, 95% CI [0.03, 0.06]). As noted, all path loadings were statistically significant.

In addition, the coefficient of variation between access and utilization was 0.7, which shows that the two variables are correlated. There is, however, no collinearity, which shows that they are two distinct concepts. An error term was calculated because the two generated variables have a Gaussian distribution. No covariance was posited in the model between utilization and SRHS or access and SRHS. For generalized responses, only the errors of normally distributed variables covary (Hair, Hult, Ringle, & Sarstedt, 2017); therefore, the error term of SRHS does not covary with access or utilization because SRHS is an ordinal variable. Since SRHS is measured on a Likert scale from 1 to 5, instead of an error term, parameters to differentiate the adjacent levels of respondents' answers on SRHS are provided (see Table 24). For cut 1, it would be estimated that respondents that had a response value of -2.34 or lower would be estimated to have answered "poor." Likewise, for cut 4, subjects that had a response value of 2.70 or greater would be estimated to have answered "excellent." Subjects with a value between -2.34 and 2.70

(above the maximum value for cut 1 and below the minimum value for cut 5) would therefore be estimated to have answered either “fair” “good” or “very good.”

Finally, each covariate has an error path; however, as exogenous variables, the error paths are not accounted for in the model. Likewise, the error path of LEP as an exogenous variable is not accounted for.

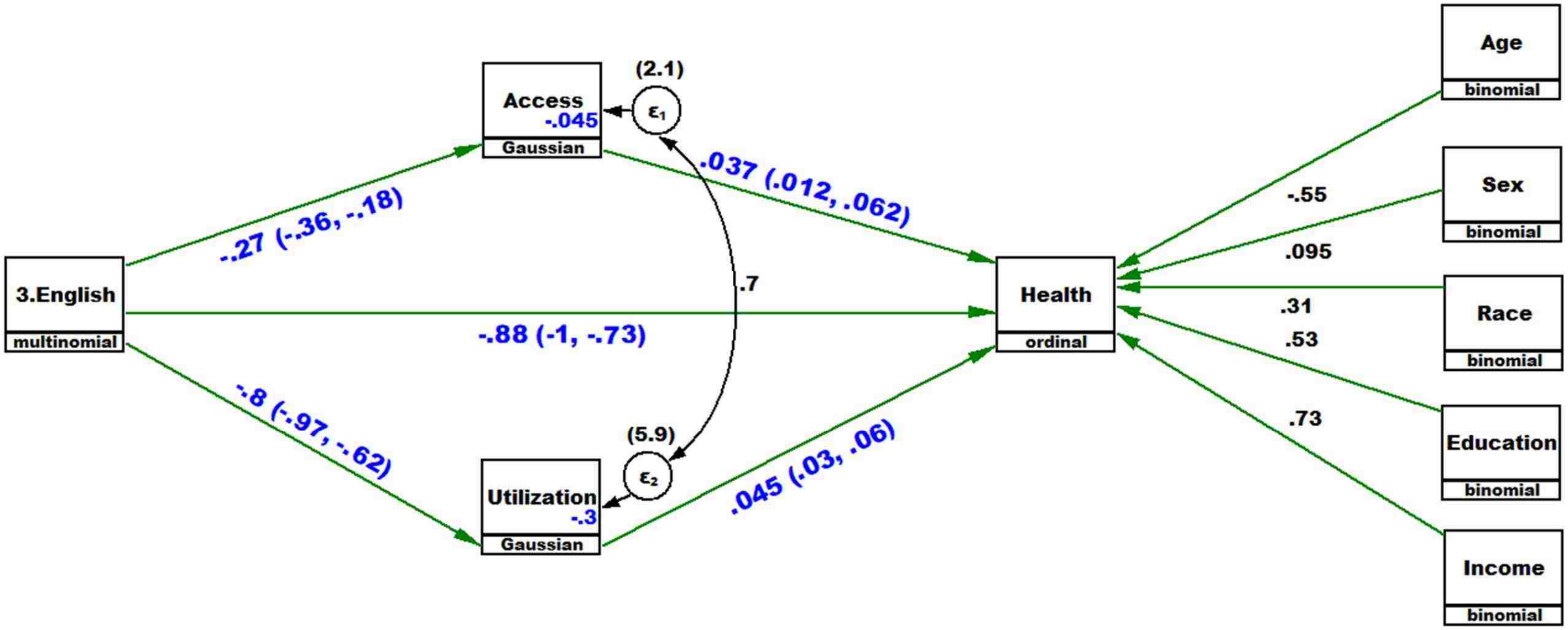


Figure 41. Researcher Self-Developed Path Analysis Model of Direct Effects of LEP on access, utilization, and SHRS and Indirect Effects on SHRS as Mediated by access and utilization. For generalized responses only the errors of normally distributed variables can covary. Health is an ordinal variable; so, no error term is accounted for. Each covariate has an error path; however, as exogenous variables, the error paths are not accounted for in the model.

Table 24

Results for Variable Health Status from Path Analysis for LEP Respondents

```
Variables      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]

Health <-
   Age        -.5499351  .0502273  -10.95   0.000     -.6491338 -.4507365
   Sex         .0954947  .0390966    2.44   0.016      .018279   .1727104
   Race        .3086548  .041208     7.49   0.000      .227269   .3900405
   Education   .5347157  .092251     5.80   0.000      .3525204  .71691
   Income      .7334741  .0565639   12.97   0.000      .6217607  .8451875
   English    -.8825712  .0784638  -11.25   0.000    -1.037537   .7276056
   Access      .0372028  .0126388    2.94   0.004      .0122412  .0621644
   Utilization .0451621  .0077007    5.86   0.000      .0299533  .0603709
---------------------------+---------------------------------------------
    cut1     -2.338718   .1243743  -18.80   0.000   -2.5843572   .093079
    cut2      -.4441202  .1109189   -4.00   0.000    -.6631846  -.2250557
    cut3      1.130014   .1126346   10.03   0.000     .9075614  1.352467
    cut4      2.70458    .1160101   23.31   0.000    2.47546    2.933699
```

In view of these results that showed that LEP had a statistically significant inverse recursive effect on access, utilization, and SRHS with a large effect size on both utilization and SRHS, the researcher conducted further testing by fitting the same path model to the data to test the EO and E+OL groups, respectively. Contrary to the results for LEP, for EO, level of English proficiency had a statistically significant predictive recursive effect on access (B = 0.22, SE = 0.03, z = 6.66, p < .05, 95% CI [0.15, 0.28]). Also, there was a statistically significant predictive recursive effect on utilization (B = 0.43, SE = 0.06, z = 7.84, p < .05, 95% CI 0.32, 0.54]). Finally, there was a statistically significant predictive recursive effect on health status (B = 0.13, SE = 0.05, z = 2.68, p < .05, 95% CI [0.04, 0.23]). There were predictive paths from both access and utilization that were statistically significant (p < .05). Interestingly, however, the path coefficients and the standard errors for the EO group were exactly the same as for the LEP group when access and utilization were treated as exogenous variables as opposed to level of English proficiency (access on SRHS: B = 0.05, SE = 0.01; (utilization on SRHS: B = 0.05, SE = 0.01) (see Figure 42).

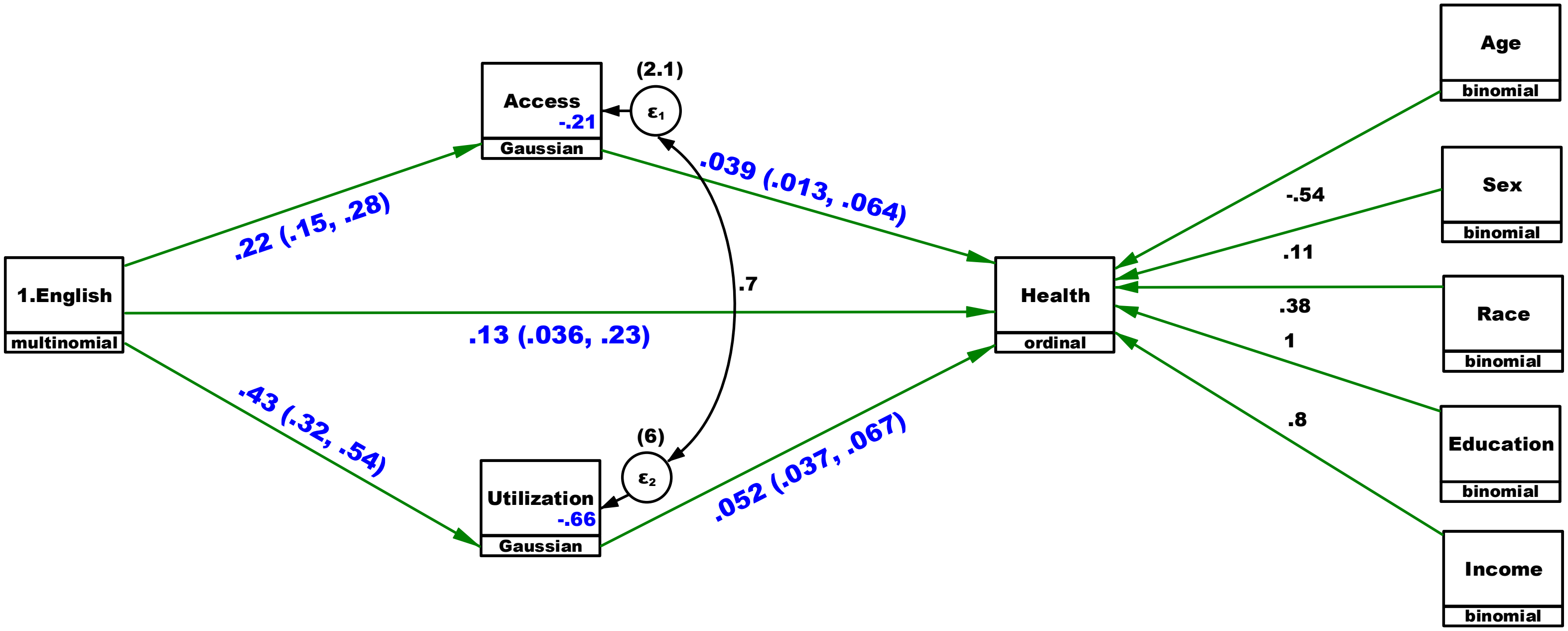


Figure 42. Researcher Self-Developed Path Analysis Model of Direct Effects of EO on access, utilization, and SHRS and Indirect Effects on SHRS as Mediated by access and utilization.

For the E+OL group, there was a statistically significant inverse recursive effect on access (path coefficient = -0.09, SE = 0.04,   z = -2.36, p < .05, 95% CI [-0.16, -0.015]). Also, there was an inverse recursive effect on utilization which was not statistically significant (path coefficient = -0.01, SE = 0.06, z = -0.14, p > .05, 95% CI -0.13, 0.11]). Finally, there was a statistically significant predictive recursive effect on health status (path coefficient = 0.28, SE = 0.05, z – 5.38, p < .05, 95% CI [0.18, 0.38]) (see Figure 43).

Similar to the EO and LEP groups, there were predictive paths from both access and utilization that were statistically significant (p < .05) as well. It is also noteworthy to observe that for the E+OL group as well the path coefficients and the standard errors are identical to those of both the LEP and EO groups when access and utilization were treated as exogenous variables as opposed to English proficiency (access on SRHS: B = 0.05, SE = 0.01; (utilization on SRHS: B = 0.05, SE = 0.01).

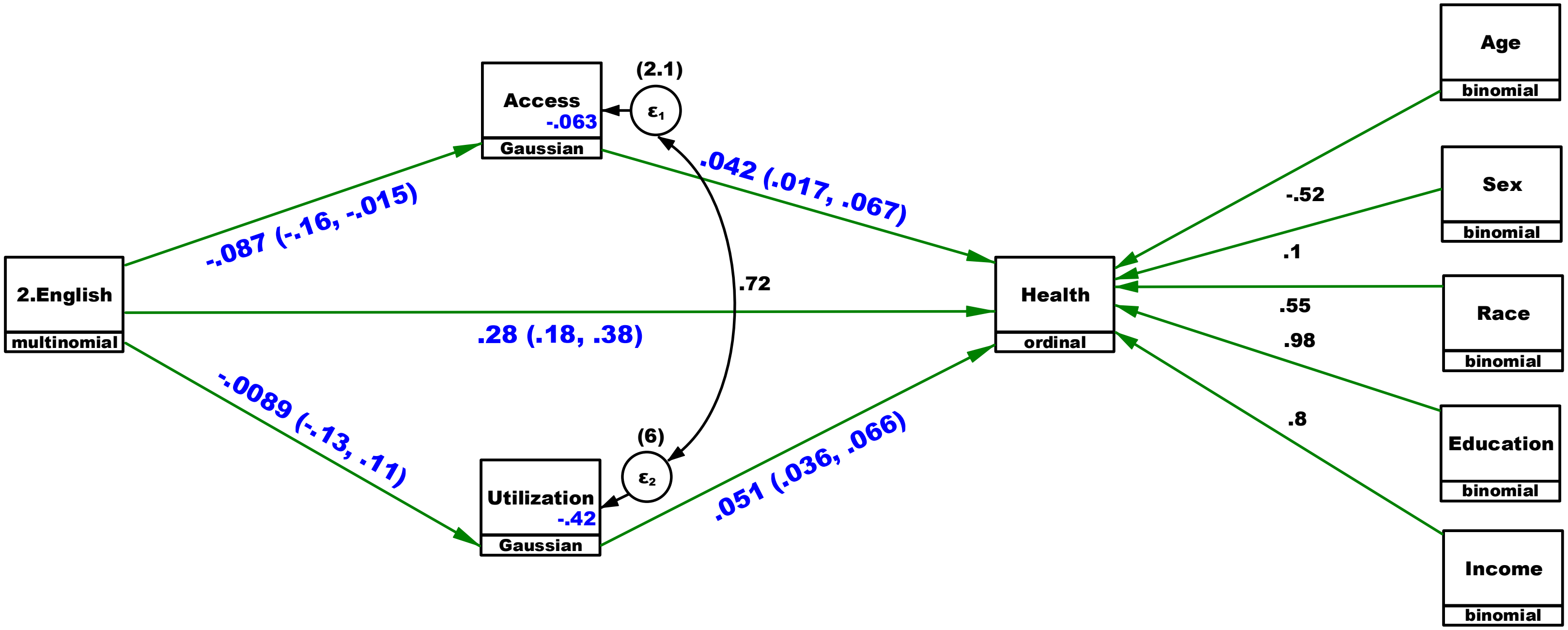


Figure 43. Researcher Self-Developed Path Analysis Model of Direct Effects of E+OL on access, utilization, and SHRS and Indirect Effects on SHRS as Mediated by access and utilization.

Summary of Results

First, results concerning the demographics of the sample are presented. Then results concerning hypotheses 1-3 in relation to research questions 2-4 that tested differences in access, utilization, and SRHS based on levels of English proficiency are summarized. Following that, results concerning hypotheses 4-6 in relation to research questions 5-7 that examined correlations among access, utilization, and SRHS are summarized. Finally, findings for research questions 8 that tested the fit of the BMHS model to the data analyzed are summarized.

Summary of Results for Logistic Regressions for RQ# 2-4. Frequencies and percentages of demographics characteristics of the sample are provided in Table 25. These aggregate results provide a more comprehensive view of the characteristics of the adult sample in the CHIS survey.

Table 25

Summary of Sample Demographics

Demographics	**n**	**%**	**Cumulative %**
Gender			
Male	16,418	40.80	40.80
Female	23,822	59.20	100.00
Age			
26-29 YEARS	883	2.19	8.32
30-34 YEARS	1,478	3.67	11.99
35-39 YEARS	1,716	4.26	16.25
40-44 YEARS	2,217	5.51	21.76
45-49 YEARS	2,665	6.62	28.39
50-54 YEARS	3,594	8.93	37.32
55-59 YEARS	4,351	10.81	48.13
60-64 YEARS	4,768	11.85	59.98
65-69 YEARS	4,630	11.51	71.49
70-74 YEARS	3,887	9.66	81.15
75-79 YEARS	3,001	7.46	88.60
80-84 YEARS	2,350	5.84	94.44
85+ YEARS	2,236	5.56	100.00
Race			
Latino	7,996	19.87	19.87
Non-Latino other, One race	141	0.35	20.22
Non-Latino American Indian/Alaskan	310	0.77	20.99
Non-Latino Asian	3,494	8.68	29.67
Non-Latino Afr. Amer.	1,764	4.38	34.06
Non-Latino White	25,643	63.73	97.78
Non-Latino, two races	892	2.22	100.00
Income			
Below CA poverty limit	7,493	18.62	18.62
>= CA poverty limit	32,747	81.38	100.00
Education			
No formal edu. or grade 1-8	2,399	5.96	5.96
Grade 9-11	1,827	4.54	10.50
Grade 12/H.S. diploma	8,598	21.37	31.87
Some college	6,432	15.98	47.85
Vocational school	1,376	3.42	51.27
AA or as degree	3,656	9.09	60.36
BA or BS degree/some grad school	9,357	23.25	83.61
MA or MS degree	4,780	11.88	95.49
Ph.D. or equivalent	1,815	4.51	100.00

Null Hypotheses 1 through 3. Concerning null hypotheses 1 through 3 that tested whether there was a respective difference in access, utilization, and SRHS based on levels of English proficiency, evidence from the data shows that there is a difference in access, utilization, and SRHS for LEP as compared to E+OL. Controlling for covariates and constraining EO to 1, LEPs had a lower log of odds for all measurements of access and utilization, with the exception of the variable *Delay/Not Get Rx* where LEP showed a higher odds (OR= 0.70 compared to E+OL = 0.66). LEPs also had a lower log of odds of SRHS. The p value for the t test that tested the null hypothesis that the coefficients were equal to 0 was statistically significant on all variables in research questions 2-4 - with the exception of three measurements of access (*Insurance, Not Accepted as New Patient,* and *Trouble Finding a Doctor*) where no statistical significance was found. Table 26 provides a comprehensive picture of the results and findings. Based on the findings, the researcher was able to decide about the hypotheses being tested.

Table 26

Summary of Finding: Research Questions 2-4

Research questions	Alternative Hypotheses	Results	Conclusions/Decisions
RQ 2: Is there a difference in access to health services among Californian adults with LEP as compared to adults who speak English only (EO) and adults who speak English and another language at home (E+OL)?	H_1: There is a difference in access to health services among Californian adults with limited English proficiency (LEP) as compared to adults who speak English only (EO) and adults who speak English and another language at home (E+OL).	-Usual Source of Care $p <.05$, OR = 0.68 (compared to 0.76). -Ever Used Internet $p < .05$, OR = 0.16 (compared to 1.07) -Not Accepted $p > .05$, OR = 0.81 (compared to 1.19) -Insurance $p > .05$, OR = 0.84 (compared to 0.86). -Trouble Finding a Dr. $p > .05$, OR = 0.75 (compared to 0.87).	**Reject H_o** for "Usual source of care" and "Internet use." **Failed to reject H_o** for "Not accepted as new patient," "Insurance" and "Trouble finding a doctor. Note that on all observed outcomes LEP had a lower log of odds compared to E+OL, holding for all covariates.[18]
RQ 3: Is there a difference in utilization of health services among Californian adults with limited English proficiency (LEP) as compared to adults who speak English only (EO) and adults who speak English and another language at home (E+OL)?	H_2: There is a difference in utilization of health services among Californian adults with limited English proficiency (LEP) as compared to adults who speak English only (EO) and adults who speak English and another language at home (E+OL)?	-Delay Care $p < .05$, OR = 0.67 (compared to 0.84). -Delay Rx $p < .05$, OR = 0.70 (compared to 0.66). -Last Doctor Visit $p < .05$, OR = 0.70 (compared to 0.83). Last Dentist Visit $p < .05$, OR = 0.48 (compared to 0.98).	**Reject H_o** for all factor variables measuring utilization. Note that on all factor variables LEP had a lower log of odds compared to E+OL (excepting Delay/Not get Rx), holding for all covariates.
RQ 4: Is there a difference in self-rated health status among Californian adults with limited English proficiency (LEP) as compared to adults who speak English only (EO) and adults who speak English and another language at home (E+OL)?	H_3: There is a difference in self-rated health among Californian adults with limited English proficiency (LEP) as compared to adults who speak English only (EO) and adults who speak English and another language at home (E+OL).	-SRHS $p < .05$, OR = 0.42 (compared to 1.04).	Reject H_o. Note that LEP had a lower log of odds of SRHS compared to E+OL, holding for all covariates.

---

[18] EO was constrained at 1 and confounders were controlled for.

Null Hypotheses 4 through 6. Concerning null hypotheses 4 to 6 that explored a relationship between variables and the magnitude of that relationship. The evidence shows that *access* and *utilization* for LEPs as measured by *Usual Source of Care* and *Last Dr. Visit* were statistically significantly correlated with a low to medium effect size across all groups with LEPs having the lowest effect size. Access and SRHS was statistically significant. There was also statistical significant for utilization. Null hypotheses 4 to 6 are rejected for the variables where statistical significance was found; thus, the researcher failed to reject the null hypotheses for the variables where statistical significance was not found (Tables 27-29).

As previously explained, however, for the purpose of this study high correlations between indicator variables are not desirable. Moderate correlations among the indicator variables are acceptable because theoretically each indicator is supposed to explain some percentage of the variance of the latent variable. In a latent variable model, indicator variables with too high a correlation coefficient might create collinearity and variables with inverse correlations might be measuring a concept other than the latent variable that they are supposed to measure.

Table 27

Summary of Finding: Research Question 5

Research Question	Alternative Hypothesis	Results	Conclusions/ Decisions
RQ 5: Is there an association between access and utilization among Californian adults with LEP?	H_4: There is an association between access and utilization among Californian adults with LEP as measured by English proficiency level.	Access and utilization as measured by usual source of care and last doctor visit are correlated with a low to medium effect size across all groups with LEPs having the lowest effect size -Usual source of care Delay care: p >.05, Cohen W = 0.02 Last Dentist visit: p <.05, Cohen W = 0.12 Last doctor visit: p <.05, Cohen W = 0.23 -Trouble finding doctor Delay care: p <.05, Cohen W = 0.24 Last Dentist visit: p > .05, Cohen W = 0.02 Last doctor visit: p > .05, Cohen W = 0.3 -Insurance Delay care: p > .05, Cohen W = 0.03 Last Dentist visit: p > .05, Cohen W = 0.03 Last doctor visit: p <.05, Cohen W = 0.07 -Internet Delay care: p > .05, Cohen W = 0.05 Last Dentist visit: p > .05, Cohen W = 0.08 Last doctor visit: p <.05, Cohen W = 0.09	Reject H_o for pairs of variables that are statistically significant. Failed to reject H_o for pairs of variables that are not statistically significant.

Table 28

Summary of Finding: Research Question 6

Research Question	Alternative Hypothesis	Results	Conclusion
RQ 6: Is there an association between access and self-rated health status among Californian adults with LEP?	H_5: There is an association between access and self-rated health status among Californian adults with LEP as measured by English proficiency level.	On all variables measuring utilization, LEP had a lower log of odds compared to E+OL. - Usual source of care SRHS: p <.05, Cohen W = 0.09 - Trouble finding doctor SRHS: p > .05, Cohen W = 0.06 -Insurance SRHS: p > .05, Cohen W = 0.05 -Internet SRHS: p <.05, Cohen W = 0.24	Reject H_o for pairs of variables that are statistically significant. Failed to reject H_o for pairs of variables that are not statistically significant.

Table 29

Summary of Finding: Research Question 7

Research Question	Alternative Hypothesis	Results	Conclusion
RQ 7: Is there an association between utilization and self-rated health among Californian adults with LEP?	H_6: There is an association between utilization and self-rated health status among Californian adults with LEP as measured by English proficiency level (EO) and adults who speak English and another language at home (E+OL).	LEP had a lower log of odds of SRHS compared to E+OL. Delay care SRHS: p <.05, Cohen W = 0.12 Last Dentist visit SRHS: p <.05, Cohen W = 0.04 Last doctor visit SRHS: p <.05, Cohen W = 0.15	Reject H_o for pairs of variables that are statistically significant. Failed to reject H_o for pairs of variables that are not statistically significant.

Null Hypotheses 7. Concerning null hypothesis 7 that tested recursive direct and indirect effects of LEP on SRHS as mediated by access and utilization, the evidence suggests that LEP negatively affects health status. The results are summarized in Table 30.

Table 30

Summary of Findings: Research Question 8

Research Question	Alternative Hypothesis	Results	Conclusions
RQ 8. Are there recursive direct and indirect effects of LEP on access, utilization, and SRHS among Californian adults with LEP?	H_7: LEP has recursive direct and indirect effects on access, utilization, and SRHS among Californian adults with LEP.	Direct effect of English to access B = -0.27, SE = 0.05, z = -5.80, p <3.97e-09, 95% CI [-0.36, -0.18]	$\beta \pm 0$; $p < .05$. There is a recursive inverse effect of LEP on access: Reject H_o
		Direct effect of English to utilization B = -.80, SE = 0.09, z = -9.01, p = 2.01e-19, 95% CI [-0.97, -0.62]	$\beta \pm 0$; $p < .05$. There is a recursive inverse effect of LEP on utilization: Reject H_o
		Direct effect of English to Health Status B = -.88, SE = 0.08, z = -11.25, p = 2.37e-29, 95% CI [-1.04, -0.73]	$\beta \pm 0$; $p < .05$. There is a recursive inverse effect of LEP on health status: Reject H_o
		Indirect effect of LEP on health status and direct and mediating effect of access on health status B = 0.04, SE = 0.01, z = 2.04, p = 0.003, 95% CI [0.01, 0.06]	$\beta \pm 0$; $p < .05$. There is a predictive recursive effect of access on health status. LEP's indirect effect on health status is mediated by access: Reject H_o
		Indirect effect of LEP on health status and direct effect of utilization on health status B = 0.05, SE = 0.01, z = 5.86, p = 4.50e-09, 95% CI [0.03, 0.06]	$\beta \pm 0$; $p < .05$. There is a predictive recursive effect of LEP on health status. LEP's indirect effect on health status is mediated by utilization: Reject H_o

Table 31 is a summary of the results of the path analyses for the three groups: EO, E+OL, and LEP. These results show that on all variables, for the direct paths, the LEP group had the lowest path loadings. For the respective direct path for access and utilization the three groups had the same path loadings and standard error. All path loadings were statistically significant.

Table 31

Summary Comparing Results of Path Analysis for EO, E+OL, and LEP

Variable	**B**	**SE**	**z**	***p***	**CI**
English to Access					
EO	0.22	0.03	6.66	2.79e-11	[0.15,0.28]
E+OL	-0.09	0.04	-2.36	0.018	[-0.16 -0.14]
LEP	-0.27	0.05	-5.89	3.97e-09	[-0.36, -0.18]
English to Utilization					
EO	0.43	0.06	7.84	4.63e-15	[0.32,0.54]
E+OL	-0.01	0.06	-0.14	0.89	[-0.13,0.11]
LEP	-0.80	0.09	-9.01	2.01e-19	[-0.97,0.62]
English to Health Status					
EO	0.13	0.05	2.68	0.007	[0.03,0.23]
E+OL	0.28	0.05	5.38	7.42e-08	[0.18,0.38]
LEP	-0.88	0.08	-11.25	2.37e-29	[-1.04,-0.73]
Access to Health Status					
EO	0.04	0.01	3.00	0.002	[0.01,0.06]
E+OL	0.04	0.01	3.35	0.001	[0.02,0.07]
LEP	0.04	0.01	2.94	0.003	[0.01,0.06]
Utilization to Health Status					
EO	0.05	0.01	6.81	1.00e-11	[0.04,0.07]
E+OL	0.05	0.01	6.62	3.61e-11	[0.03,0.06]
LEP	0.05	0.01	5.86	4.50e-09	[0.03,0.06]

Conclusions of Chapter IV

The results in this study provide evidence to support findings in the form of conclusions concerning the hypotheses. These findings allow for rejection of or failure of rejection of null hypotheses.

Chapter V

DISCUSSION

General Discussion

As discussed in the introduction of chapter I, serious adverse health impacts have been documented with respect to LEP patients (e.g., mortality and patient medication errors) (Prentice & Pizer, 2007; Regenstein et al., 2012). It is however only recently that there has been a growing recognition for the need for culturally- and linguistically-competent healthcare institutions to provide quality health care and services to the increasingly growing population of LEPs (Joint Commission, 2015; Office of Minority Health, 2013).

Recall that as of 2013, the LEP population was estimated at 25.9 million (Batalova & Zong, 2016). Also, it is projected that by 2060, nearly one in five of the nation's total population will be foreign-born (U.S. Census Bureau, 2015). It was previously discussed that there is a direct positive relationship between increases in the prevalence of foreign-born and increases in LEP individuals. In view of these projections and facts, it was discussed that health research concerning LEP and access, utilization, and SRHS is imperative.

The discussion in this chapter centers around the results and findings from this study and the knowledge that emerged from such findings. Keeping in mind that this study was undertaken with the purpose of reaching three objectives. Namely, (1) gain insights into whether there are differences in access, utilization and SRHS among LEPs compared to EOs and E+OLs, (2) examine whether there are correlations between access, utilization, and SRHS, and (3) explore whether there are recursive direct and indirect effects of levels of English proficiency on access, utilization, and SRHS with a relational ordering.

This chapter proceeds first from this general discussion that reiterates the significance of this study. Then, it is followed by a discussion of the results and findings in relation to the research questions. Following that, a discussion in relation to the literature and the theoretical and conceptual frameworks that guided the study is presented. Then, a new theoretical framework for studying LEP and health outcomes based on findings from this study is proposed for future studies on the topic. After that, there is a discussion about the rationale for the findings and their implications and practical applications. Following that, limitations of the study are discussed. Finally, insights gained from analyzing data from a large state health survey to conduct scientific research is shared and research contributions are discussed. The dissertation concludes with recommendations for future research.

Discussion of Results and Findings in Relation to the Research Questions

This section will proceed with a discussion of results and findings in relation to the research questions as the three objectives of the study are kept in mind. Each of the researcher's objectives relied on a corresponding presumption. It was also presumed that findings could provide new knowledge that could inform designing of interventions to reduce health disparities among LEPs.

The first presumption that was tested (namely, that there is a difference in access, utilization, and SRHS for LEPs compared to EOs and E+OLs) corresponds with the first objective in the purpose of the study covered by research questions 2-4. For RQ2, *Usual source of care* and *Internet use* had statistical significance for LEP. Statistical significance was not found for *Insurance, Not accepted as a new patient*, and *Trouble finding a doctor*. LEPs showed a lower log of odds of access on all indicators compared to E+OLs – constraining EOs at 1 and controlling for all covariates.

In view of these findings, it can be properly inferred that in the CHIS dataset, among the variables selected, *Usual source of care* and *Internet use* measured most of the explained variance in access for LEPs. This means that in the LEP population access is best predicted by whether an individual has a usual source of care and access to the Internet. In the literature reviewed, having a usual source of care was generally an indicator of access. *Internet use*, however, is a newer concept that has emerged in the health research literature as an indicator of access. Lack of Internet has been shown in recent studies to affect access negatively. It is therefore important to note that the findings in this study show that LEPs had a substantially lower chance of having ever used the Internet (OR = 0.16) compared to E+OLs (OR =1.07). Also, although there was statistical significance, 65% of the LEP group had never used the Internet compared to 16% for the EO and E+L groups, respectively. This means that there is a disparity in Internet access among LEPs compared to EOs and E+OLs.

Concerning *Insurance, Not accepted as a new patient*, and *Trouble finding a doctor* that had no statistical significance, these findings must be interpreted in light of the findings of disparity in terms of a lower chance of LEPs having a usual source of care and Internet access. Findings from previous studies show that one of the reasons for a disparity in having a usual source of care is lack of insurance. Likewise, a disparity in having a usual source of care and lack of insurance might contribute to a person not seeking to be accepted as a new patient, which explains the low frequency of yes responses among LEPs. Also, lack of Internet access might contribute to a person's lack of ability to find a doctor. Accordingly, although *Not accepted as new patient* and *Trouble finding a doctor* are negative outcomes and LEPs had a lower odds on these outcomes, it does not necessarily follow that the lower odds of these negative outcomes is a positive outcome for LEPs. These findings have to be interpreted in the context of the disparity observe in *Usual source of care*, *Internet use*, and *Insurance*. A more rational interpretation for these findings therefore is that, compared to EOs and E+OLs, LEPs might not seek to become new patients since they have a lower chance of having insurance coverage. This might also mean that LEPs do not seek to find a doctor at the same rate that EOs and E+OLs do – therefore the finding of lower incidence rate for having trouble finding a doctor. So, in practicality, taken aggregately and as interpreted, the results suggest that there are disparities in access for LEPs compared to EOs and E+OLs.

For RQ3, for the four variables selected to measure utilization, the results from the logistic regression show a difference of lower odds of utilization as measured by *Delay care, Last visit,* and *Dentist visit* and a difference of higher odds as measured by *Delay Rx.* Similar to the analysis for access in RQ2, the results for utilization in RQ3 must be interpreted not just in terms of higher and lower odds but, more importantly, they must be framed in a proper context in terms of the outcome being analyzed (i.e., whether it is positive or negative). For example, a lower log of odds of *Delay care* for LEP appears to suggest a positive outcome since *Delay care* is a negative outcome. In the context of not having a *Usual source of care,* however, it cannot be concluded that the lower odds of *Delay care* is a positive outcome. A more rational explanation is that LEPs might be less inclined to attempt to find a health care provider since they have less of a chance to have a usual source of care. It can be reasonably presumed that therefore the LEP respondents answered “no” to the question concerning delayed care. Also, a lower chance of having had a preventive care and dentist were both negative outcomes for LEPs. These findings should also be understood in the context of the disparity in *Usual source of care* and *Internet use*.

The very low outcome of dentist visit (OR = 0.48) might be linked to the fact that for access, LEPs had a lower chance of having insurance. These findings lend support to the literature reviewed.

For RQ4, the results from the logistic regression show a difference of lower log of odds of SRHS as measured on a Likert scale from 1 (poor) to 5 (excellent). As previously discussed in the results section of this dissertation, the scores for LEPs on the Likert scale appear to have been between “fair” (=2) and “good” (=3); however, given the actual log of odds of SRHS for LEPs, the score was closer to 2, which means a rating of fair. This finding also has to be examined in the context of the findings in RQs2 and 3 which showed that there are disparities in access and utilization for LEPs. Previous studies have shown that disparities in access and utilization are key correlates of low quality of life in LEP groups.

One of the challenges in conducting this study was in measuring access and utilization that are constructs indirectly measured by underlying factors, which are subject to change by many external factors that affect population health management. Findings from previous studies strongly support that the indicators selected as underlying factors to measure the constructs have been previously operationalized in a manner similar to the approach taken in is study. A finding of no statistical significance for *Not accepted as new patient, Insurance,* and *Trouble finding a doctor* as measures of access is surprising since the literature reviewed overwhelmingly documents that these variables have been shown in previous studies to be indicators of access. A finding of a lower chance of LEPs delaying prescriptions as a measure of utilization is also surprising for the same reason.

These findings lend support to the inference that, in practicality, the underlying factors that measure access and utilization are dynamic and constantly and concurrently influenced by contemporary driving forces in the form of realities such as socio-economic, political, and environmental changes. These driving forces include (1) health policy (creation of or changes in laws, regulations, and other standards), (2) health systems structure and care team (heterogeneity in standard of care and operating procedures based on the type of health care institution such as not-for-profit versus for profit, physicians, nurses, interpreters, care coordinators, etc.), (3) influencers and third-party payers (pharmaceutical and medical device manufacturers in terms of what clinical research will be conducted and in what population or disease state will investments be made; government, insurance carriers, and employers in terms of standards of coverage, payment, and reimbursement: what will be covered), and (4) community (patient's social capital, communication, culture, religion, advocacy groups, etc.). An understanding of how these driving forces affect LEP patients, might offer greater insight into factors that truly measure access and utilization for LEP patients at a given time.

The second presumption that was tested was that there are correlations between access, utilization, and SRHS. This presumption corresponds to the second objective of the study as covered by RQs5-7. Positive correlations for all pairs of variables were observed. It can therefore be concluded that the variables are not independent. Also, based on the uniform directionality in their correlation, it can be concluded that the observed variables could be measuring a single concept. Effect sizes as measured by Cohen W ranged from low to medium and there was no statistical significance for some correlations. As previously discussed, in this study, a finding of low to medium correlations is acceptable because what was being tested is whether the variables in the statistical model are correlated and could together measure a single concept. High correlations were not desirable because that could suggest collinearity (i.e., redundant questions in the CHIS survey).

The third presumption was that the data would confirm the postulations in the BMHS model of unidirectional correlations among variables as covered by RQ8. The findings from conducting a path analysis show that LEPs had a statistically significant inverse effect on access with a small effect size and a statistically significant inverse effect on utilization and SRHS with large effect sizes. Further, LEP had an indirect relational effect on SRHS as mediated by access and an indirect relational effect on SRHS as mediated by utilization. Finally, although predictive and statistically significant, the respective direct path from access and utilization to SRHS had low effect sizes.

The results of the path analysis for the LEP group mean that for a one-unit increase in lack of English proficiency, holding for confounders and assuming that lack of English proficiency enters the model only as a main effect, the odds of access is decreased by 27%. Likewise, utilization is decreased by 80% and SRHS is decrease by 88%. In addition, for each one-unit increase in access, holding for confounders (which includes LEP) and assuming that access enters the model only as an exogenous variable (main effect), SRHS is increased by 4%. Likewise, applying the same criteria used for access, for each one-unit increase in utilization, SRHS is increased by 5%. In addition, access and utilization respectively mediate the path of LEP to SRHS. Finally, since utilization covaries with access (Coefficient of variation = 0.7), a proper inference that can be made is that as access decreases, utilization also decreases.

In summary, taken together the findings concerning all the research questions provide a broader lens to look at LEPs in the context of the U. S. healthcare system. Overall, these findings suggest that someone who is LEP has a lower chance of having access to and utilization of health care and a higher chance of having a lower perception of a desirable health status. These findings together provide insights for understanding the broader impacts of LEP on access, utilization, and SRHS and suggest that there are disparities for LEPs based on a lack of equity in access and utilization.

Discussion in Relation to the Literature

Limited English proficiency (LEP). LEP has been defined by various sources which include governmental entities and researchers. This study, looked at LEP through the lens of the definition provided by the U.S. Department of Health and Human Services (HHS), which provides that the term LEP applies to "*individual[s] with limited English proficiency" . . . whose primary language for communication is not English* [emphasis added] and who ha[ve] a limited ability to read, write, speak, or understand English" (42 CFR Part 92.4; Fed. Reg., 2016). The sample in this study falls under this definition in that respondents self-identified their level of English proficiency as "not well" or "not at all" and English was not their primary language.

Access in the literature. Recall that access has been defined in the literature as the specific characteristics of a health care institution that allow a broad range of individuals to reach, enter, and use health care services (Donabedian, 1973). These characteristics include geographic availability, organization, price, and acceptability. This definition however focuses on the health care institution as the analytical unit and does not take into account characteristics that are attributes of an individual. While this definition might be generally appropriate, in the context of this study, it lacks a perspective for conceptualizing access with respect to LEPs.

The HCAB conceptual model was therefore selected as a more suitable model to enable selection of variables to measure access. In addition to factoring the characteristics of an institution, HCAB provides a taxonomy that allows for classification, analysis, and reporting of modifiable health care access barriers at the individual level (Carrillo et al., 2011). More importantly, the HCAB model provides a framework for studying LEPs by providing a basis for understanding LEP as a cognitive category of health care access barriers in terms of knowledge and communication barriers that LEPs face. For example, The HCAB model guided the researcher in selecting a variable such as *Internet use* as a cognitive barrier for LEPs. As previously discussed, results from assessment of the measurement model of access showed that the variables selected to measure access using the HCAB model fairly consistently measured access as a single latent variable.

Findings from previous studies related to LEP and access. Using the HCAB model as a guide to explore access among LEPs, this study found that, compared to the E+OL group, the LEP group showed lower odds for all measurements selected in accordance with the model – holding for covariates and constraining the EO group at 1. Where statistical significance was not found for certain indicators of access, a practical explanation for the lack of statistical significance was discussed. For example, it was previously explained that the lack of statistical significance for *Insurance* could be explained by the fact that LEPs had a lower odd of U*sual source of care*, which the literature shows is a predictor of *Insurance*. Results from this study were compared to three similar previous studies on LEP that are described immediately below.

DuBard & Gizlice (2008) previously studied language-associated disparities among the U.S. Hispanic adult population and found that access was worse for Spanish-speaking vs. English-speaking Hispanics. Also, Flores & Tomany-Korman (2008) found that children in non-English primary language households had no usual source of care and no medical or preventive dental visits during the previous year in addition to having problems obtaining specialty care. Finally, Cordasco, et al. (2011) assessed the relationship between distance to the nearest safety net clinic and access in non-rural uninsured adults in California by language proficiency. The findings support that having LEP is a barrier to health care access, which is worse when combined with increased distance to the nearest safety net clinic. Findings from the current study are consistent with findings from these three previous studies; therefore, this study strengthens the existing knowledge-based literature concerning access.

Utilization in the literature. Recall that traditionally utilization has been studied in terms of the volume of interactions between health professionals and patients (Da Silva, 2011). The utilization model posited by Da Silva (2011) however supported a broader framework for evaluating utilization in this study. That framework takes into account indicators that are not directly linked to volume of interactions only but that indirectly estimates volume and also documents the qualitative aspects of interaction between patient and provider (Da Silva et al., 2011). Using that model, variables that measured qualitative aspects of care such as *Delay care* and *Delay Rx* were included in the analyses in addition to variables that measure volume of interactions such as *Doctor visit* and *Dentist visit*. In this study, results from analysis of the measurement model of utilization showed that the variables selected to measure utilization using the Da Silva (2011) model fairly consistently measured utilization as a single latent variable.

Findings from previous studies related to utilization. As previously discussed, results from the current study show that, with the exception of *Delay Rx*, LEPs showed lower odds for all indicators of utilization compared to the E+OL group and holding for confounders and constraining the EO group at 1. The findings were compared to three similar previous studies on LEP and are described immediately below.

Graham, et al. (2008) found utilization to be associated with lower cost and that there was more access to preventive care with reduced language barriers. Aratani & Liu (2015) found that non-English speaking Asian children were significantly less likely to discontinue public mental health services than their English-speaking White counterparts. This finding is generally not supported by findings in this study. It is also not supported by other previous studies the researcher reviewed on the topic. Of note is the fact that the Aratani study used race as a criterion for comparison on English language; however, the justification for selecting only one race for the comparison was not reported. Njeru, et al. (2015) found that patients who required interpreter services had higher rates of inpatient health care use. Findings from this study are generally consistent with findings from the previous studies reviewed - with the exception of the study by Aratani & Liu (2015); therefore, the findings strengthen the knowledge-based literature concerning utilization.

Self-rated health status in the literature. For an informed discussion of the concept of self-rated health status, an understanding of the notion of health itself is first needed. It is helpful to recall that health has been defined as “[a] state of complete physical, mental and social well-being and not merely the absence of disease or infirmity" (World Health Organization, 1948). Although of late this definition has been challenged as no longer fitting in view of the rise of chronic diseases. A proposition has been made to change the emphasis towards adaption and self-management in view of social, physical, and emotional challenges associated with chronic diseases (Huber et al., 2011).

In this study, the researcher’s operational definition of self-rated health status borrows from the World Health Organization’s definition of health. Thus, self-rated health status in this study was viewed as a rating on a scale of the degree to which one perceives that she is in "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity." In practicality, SRHS is a subjective measure of one’s own health. As previously discussed, because of its subjectivity and, since it is an important dimension of overall health status and has been extensively used in the public health field, questions concerning the objective health status of patients in relation to self-evaluated health status have been raised.

It was discussed in this dissertation that two previous studies using empirical evidence such as laboratory parameters and mortality data have found that SRHS was consistent with objective health status (Lima-Costa et al., 2012; Wu et al., 2013). Based on findings from these and other related studies, it has thus been previously proposed that SRHS data can serve as a global measure of health status in general population (Wu et al., 2013).

Findings from this study concerning SRHS allowed for an understanding of how individuals feel about themselves beyond objective measures that can be captured using laboratory parameters. It is important to capture these subjective measures as well in view of findings from previous studies where objective and subjective measures of health status were compared and congruence was shown. Another advantage that studying SRHS provides is real-world evidence at the individual level for a more comprehensive assessment of health status by including the patient's perspective as a dimension of health status.

Findings from previous studies related to LEP and SRHS. Findings from the current study show that, holding for confounders and constraining EOs at 1, LEPs self-rated lower on SRHS compared to EOs and E+OLs. Comparing those findings to findings from previous studies, Gee & Ponce (2010) found LEP to be key correlates of quality of life among Asian ethnic groups. Also, Kim, et al. (2011) found that LEPs had poorer self-rated health and higher psychological distress than EOs and E+OLs). Additionally, Yu et al. (2010) examined health status and health services access and utilization among children in California from multi-ethnic Asian groups and found less favorable and heterogeneous access and utilization patterns among Asian children versus non-Hispanic White children. Findings from the current study are consistent with findings from these three previous studies; therefore, similar to the findings in this study concerning access and utilization, the findings concerning SRHS strengthen the existing knowledge-based evidence.

In summary, comparing findings from previous studies concerning LEPs where the same outcome variables were operationalized in a fashion similar to this study, the findings from this study are similar to overall findings from previous studies. Thereby the findings from this study strengthen the overall knowledge-based evidence concerning access, utilization, and SRHS among LEPs.

Discussion in Relation to the Theoretical Framework

Here the researcher first links the notion of LEP in the context of access, utilization, and SRHS back to the BMHS model as the main framework that helped with a foundation for understanding relationships between access, utilization, and perceived health status. LEP is also linked back to the HCAB and utilization conceptual models that respectively enabled the measuring of access and utilization through selection of observed variables to measure the two concepts. Taken together, these three models supported the researcher's conceptualization of relationships and recursive direct and indirect effects of LEP on access, utilization, and SRHS and enabled an understanding of practical implications of the findings. Based on these three models and the literature reviewed concerning previous studies on the topic, the researcher was able to draw a preliminary conceptual framework that allowed the study to proceed with exploring differences and relationships among LEP, access, utilization, and SRHS.

The BMHS model has gone through four phases of change since its conception in 1968. Understanding, defining, and measuring access and utilization have been, however, fundamentally the underpinnings of the BMHS model since its conception and continued to be so throughout the five phases of the model (Andersen, 2008). It was not, however, until the development of the phase 4 change that health status outcome was added to the model. Since its initial version, the model has evolved to provide for a lens to look at access and utilization through the following conceptualizations: (1) predisposing factor, (2) health care system, (3) personal health practices, (4) health status outcomes, and (5) community factors and quality of patient-provider communication. Each phase is additive as the initial model remains foundational (Andersen, 2008).

Andersen (2008) proposed that understanding of health services use must evolve over time and be in response to emerging issues in health policy and health services delivery. This supports why, in addition to the BMHS model, the HCAB model was used to guide the researcher's conceptualization of where LEP fits in the hypothesized progressive path of access and utilization to SRHS because the HCAB model provides a framework for conceiving English proficiency as a cognitive barrier to access. Likewise, the Da Silva (2011) utilization model complemented the BMHS model in this study because it expands the traditional conceptualization of utilization as volume of health care services delivered to other qualitative measures of utilization.

The researcher has previously discussed the consistency of the measurement indicators selected by using the HCAB and the Da Silva (2011) utilization models. The researcher's understanding that the notion of LEP must be added to the discussion of access and utilization as a determinant of SRHS was informed by the BMHS model that provides that access and utilization must be understood in the context of emerging issues. Although LEP is a phenomenon that has been embedded in American society for a long time, the continuous and sharp increase in immigration rates since the 1970s and prediction for further growth in prevalence of LEP groups have rendered this phenomenon significant to be studied in the context of population health.

Combining these three frameworks, findings from this study support the ideas advanced by each model. Andersen (2008) posited that "[i]mproving access to care can be greatly facilitated by a new generation of access models and indicators." This research analyzed *Internet use* as a new generation of indicators of access. Also, through the lens of the BMHS model, access and utilization emerged as highly complex constructs with indicators that are largely dependent on concurrent socio-economic and environmental realities. Rather than through a strict definition, therefore, these concepts can best be understood in the context of attributes at the individual level coupled with the effects of other influencing factors.

For example, in the current health care and services delivery system, ensuring quality access and utilization is largely a function of effective collaboration among stakeholders and influencers that are driving forces in the health care delivery and management system. Their decisions can ensure a value-based system and affordable while ensuring patient safety and quality of care and services. Likewise, their decisions can foster disparity in health care and service among groups. Those stakeholders and influencers were previously discussed in this chapter of the dissertation as: (1) health policy, (2) health systems structure and care team, (3) payers and influencers, and (4) community. Figure 44 depicts examples of stakeholders and influencers within the health care delivery system and provides examples of areas in which decisions can facilitate or hinder health outcomes for LEPs.

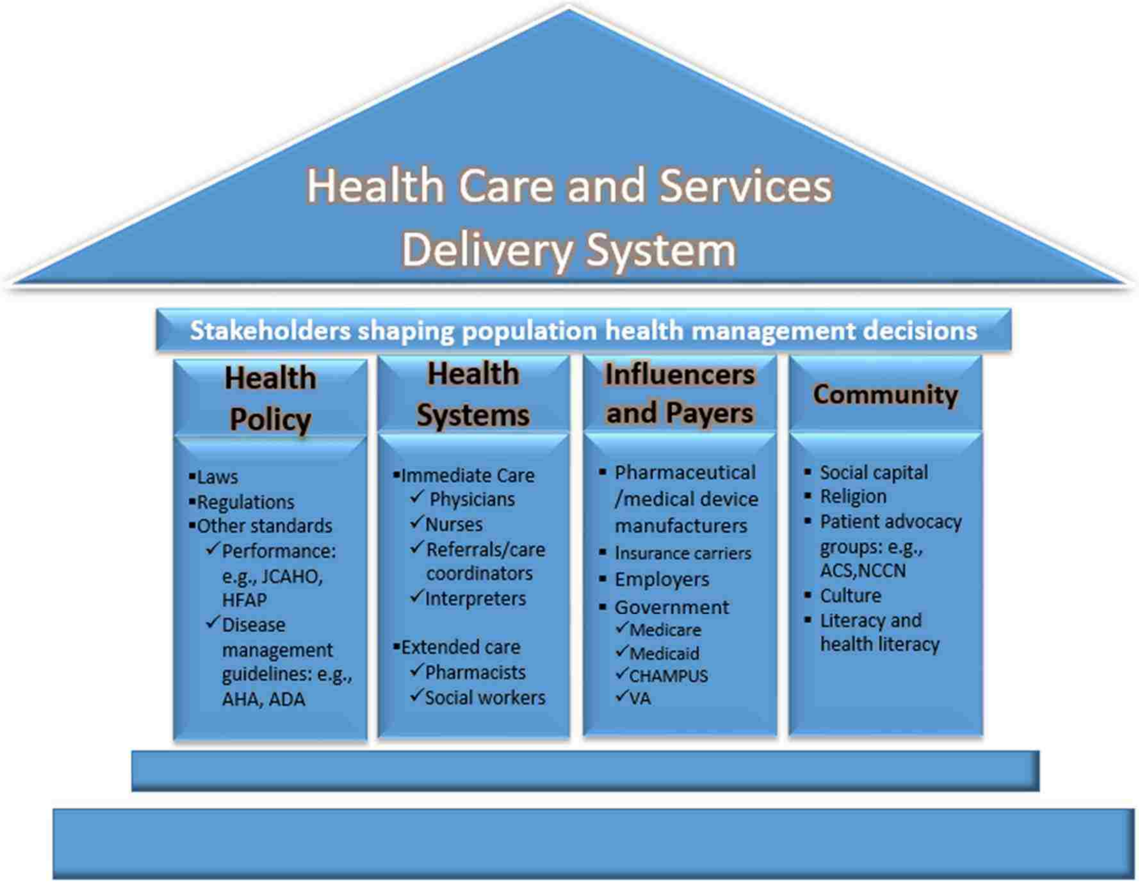


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Figure 44: Researcher self-developed conceptualization of factors influencing population health management decisions. This is for illustrative purposes. No order is suggested in the placement of stakeholders.

Proposed LEP Health Outcomes Assessment and Decision Tool

The practical implications of the findings from this study, which will be discussed in an upcoming section, support the idea that health status is a complex construct with multi-faceted dimensions. One of those dimensions is patient self-reported outcomes – without which an assessment of health status would be incomplete.

It was previously discussed that access and utilization are correlated with desired health outcomes and are affected by extraneous contemporary factors, which are moving targets subject to socio-economic, political, and environmental realities. Given that fact, rather than through a fixed definition, access and utilization as constructs are better understood and measured in terms of an analysis of the effects of those extraneous contemporary factors on a patient based on some specific attribute of the patient - such as being LEP.

The concepts of access and utilization added multiple layers of complexity to this study because not only they are indirectly measured but also they are dynamic and highly subject to contemporary realities and changes. Also, repurposing primary data added even more complexity to this study. For example, the data analyzed were collected between 2013-2014. Certain observed variables that were included in the study as measurement of access might not have been included if it were conducted before the advent of electronic health records (e.g., Internet use). For example, in the recent past, there are more studies that support Internet use as a measure of access (Moreno et al., 2016).

For this study, the researcher needed a tool that could simultaneously support the systematic assessment, measurement, and analysis of the variables in order to create empirical knowledge concerning access, utilization, and SRHS in LEPs. To that end, the researcher conducted a thorough search of the literature for conceptual frameworks that could explain relationships among the variables in the study and simultaneously enable measurement of latent variable with a relational ordering. A model that would have been considered a well-suited tool would have been able to support conceptualizations of the multiplicity of posited relationships among exogenous and mediating factors with direct and indirect recursive paths to health outcomes while allowing for measurement of latent variables to render them analyzable. In the literature reviewed, however, the researcher did not find such a tool.

Since the 1920s, the U.S. government has been capturing health data through conducting national health surveys in order to inform policy making (Andersen, 2008). Another objective of health surveys is to obtain information for “assessing the performance of the health care system and its impact on people of varying sociodemographic, economic, and illness levels” (Andersen, 2008). Despite the long-standing prevalence of LEPs and predictions by the Census Bureau of continual increases, it was not, however, until the recent past that the notion of LEP emerged as a determinant of access, utilization, and health status and researchers in the health research field began to study the concept as a phenomenon distinct from cultural competence. Given the fact that the development of the initial BMHS in 1968 was predicated on data from national health surveys, it is therefore not surprising that the model did not specifically factor LEP as a determinant of access and utilization when it was originally conceived. It was not, however, until the year 2008 in phase 5 of the model that the notion of “quality of patient-provider communication” was added.

Based on the experience gained from repurposing secondary data from a large state health survey to conduct scientific research and obtain empirical evidence and the knowledge developed as a result of findings from this study, the researcher conceptualized, developed, and is proposing a model that can support future studies on the topic of LEP and SRHS. The proposed model frames the condition of being LEP as a socio-cognitive barrier to access to care and therefore, in a health care delivery setting, an attribute of a patient who has the condition. Carrillo (2011) posited that communication is a cognitive barrier to access. Also, according to Bandura’s (1986) social cognitive theory, LEP may be considered a socio-cognitive barrier to access.

A two-factor measurement component is superimposed on the structural component of the model to allow for analysis of latent variables. Additional factors can be added to the model depending on the number of constructs being studied. Using Structural Equation Modelling (SEM) will allow for multivariate statistical analysis where there are latent variables in the model in order to create real-world evidence.

The recursivity posited in the preliminary model remains with a relational ordering starting from extraneous contemporary factors. These factors are dynamic and exert a predictive effect on LEP and mediated effect on other variables in the model individually and jointly. The direct effect of these factors on LEPs are not evaluated. Rather, since they constantly change, their impacts are evaluated in terms of indicators that measure access and utilization (as latent constructs) at a given time in the measurement model. In the model, LEP has a path to health status that is mediated by access and utilization. Further, other demographic characteristics of an LEP are covariates that are controlled for. Also, access and utilization covary.

Implementation of the proposed model allows creation of empirical evidence consisting of "healthometrics" collected from real-world outcomes through systematic assessment, measurement, and analysis of health care and services needs from a population health perspective. Healthometrics is operational defined as empirical evidence obtained from the application of statistical and mathematical theories in health sciences to test hypothesis and future outcomes based on findings that enable better decision making for the design of interventions to mitigate downward patient impact. The empirical evidence can support critical health policy and health establishment decision making concerning LEPs. This model can be used to analyze not only LEPs as a unit of analysis but also other phenomena in health sciences research that include complex correlation among variables that are indirectly measured. The researcher's preliminary conceptual framework that was previously discussed (see Figure 45) served as a foundation for the proposed model illustrated in Figure 46. The proposed model is best for use with large samples such as data collected from large health surveys.

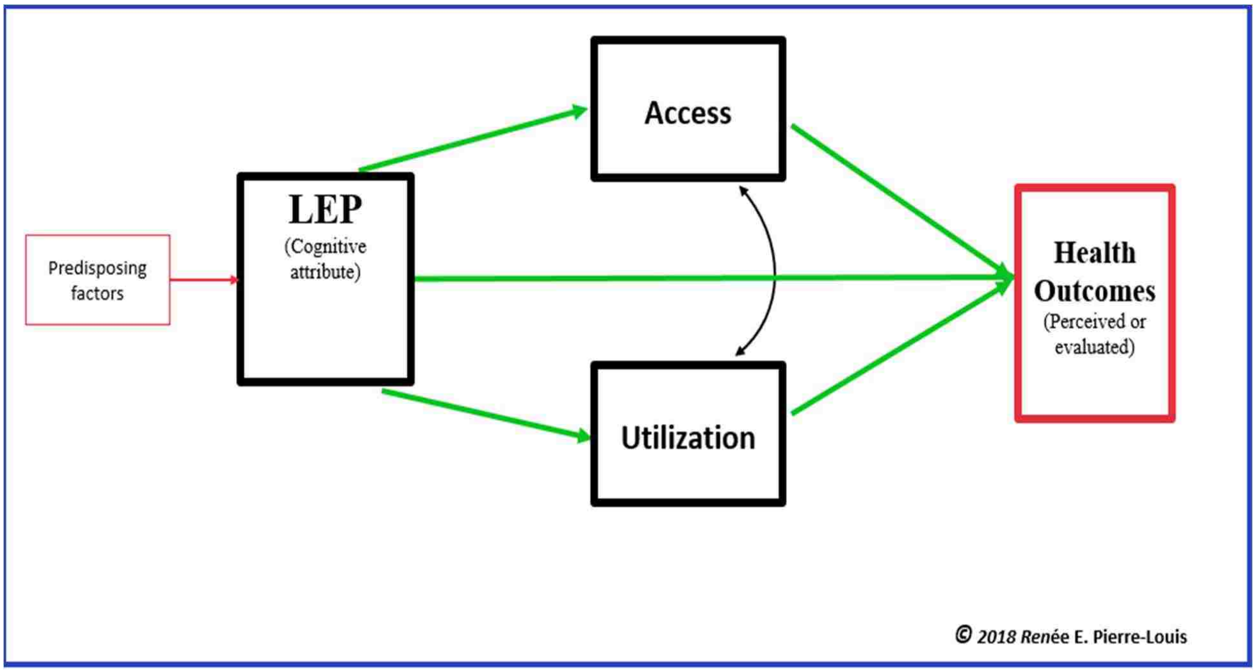

Figure 45. Researcher self-developed preliminary conceptual framework that guided the study.

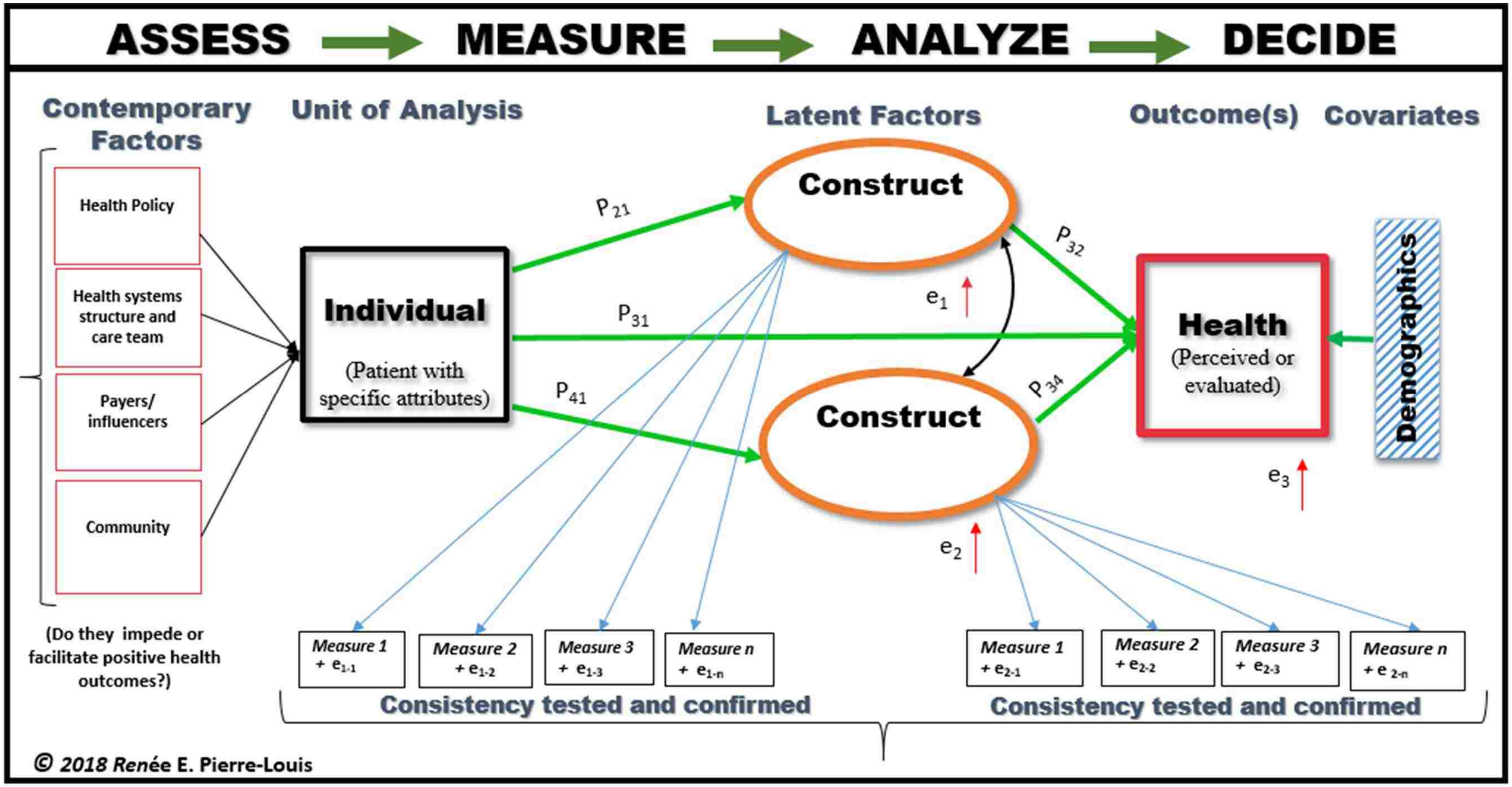

Figure 46. Researcher self-developed LEP Health Outcomes Assessment and Decision Tool. The model is based on Structural Equation Modeling techniques (SEM). It comprises (1) a two-factor latent measurement component [19] and (2) a structural component. Recursivity is posited with a relational ordering in the model. *Individual* represents the LEP patient and is the unit of analysis. The *constructs*, which are latent variables and represent access and utilization, serve to mediate pathways from exogenous variables to the outcome (Health). *Controlled Factors* are confounders that are controlled for in the model; thus, although they have error paths, they are not accounted for. For any questions or further information regarding the LEP Health Outcomes Assessment and Decision Tool, please contact the researcher at rpierrel@optonline.net.

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[19] This is for illustrative purposes. More latent or observed variables can be added to the model.

Rationale for Findings

The researcher has amply discussed the rationale for the findings of lower odds and lack of statistical significance of certain measurements of access. Nuances between indicators measuring a negative and positive outcome have also been amply discussed to further explain how lack of statistical significance on certain indicator variables is associated with the outcome on certain other variables. For example, it was discussed that the lack of statistical significance on the variable *Insurance* could be associated with the statistically significant lower odds of *Usual source of care* for LEPs.

Findings such as a correlation between the observed variables in the measurement models were expected – although it was presumed that the magnitude of correlations would be higher. It was not expected that the variable *Internet use* would not be a good fit in the path analysis model given that currently the ability to use the *Internet use* is critical because of growing trends at primary care doctors' offices where patients are being asked to use technology for communication such as completing forms before an appointment, making appointments, viewing laboratory results, refilling medications, and communicating with their physician, pharmacist, or nurse (Moreno et al., 2016).

The rationale for the variable *Internet use* not being a good fit in the measurement model might rest in the fact that data from 2013-2014 were being analyzed. Also, the variable *Delayed Rx* was not a good fit in the path analysis model. This might be explained by the implementation of the Affordable Care Act of 2010, which became effective in 2014. As previously discussed, this law contains a specific provision that benefits LEPs that the U.S. Department of Health and Human Services had to implement (42 CFR Part 92.4; Fed. Reg., 2016).

Further, a practical explanation concerning the discrepancy between the literature and the related finding in this study where certain selected observed variables were not significant in the logistic regression or in the correlational analyses could rest in the dynamic and ever-changing nature of the measurement factors of access. Recall that the indicators are affected by contemporary political, socio-economic, and environmental realities. It is for example surprising that while *Internet use* was found to be statistically significant in measuring access that *Insurance* status was not. This observation supports the idea advanced by the researcher earlier in this dissertation that to truly measure access, contemporary realities must be taken into account.

In addition, concerning the statistically significant inverse effects of LEP on both utilization and SRHS with high effect sizes, the researcher offers a practical explanation for these observations as well as an explanation that is grounded in the literature. Practically, when people lack access, they delay getting medical care and prescription medicines and that might contribute to worsened conditions and therefore low rating of perceived health status. This is also supported by the literature reviewed as previously discussed. In this study, a covariance of 0.70 between access and utilization was obtained from the path analysis. In the literature, in addition to previous studies that have shown a relationship between SRHS and objective health status (Lima-Costa et al., 2012; Wu et al., 2013), a previous study that compared the impact of access to healthcare on perceived health status in three groups of countries found that access statistically significantly contribute toward subjective health (Precupețu & Pop, 2017).

Finally, the findings from the path analysis show that there is no difference for the three groups (EO, E+OL, and LEP) when levels of English proficiency's path to health status is mediated in the statistical model. This finding is quite surprising. It can be instructive to stakeholders in the healthcare and services delivery system in supporting interventions that could foster more equitable access and utilization and thereby reducing health disparities among LEPs.

Practical Applications

The findings from this study have several practical applications. Main stakeholders in the health care sector were previously categorized and discussed as the five pillars in the health care and delivery system. Although each pillar individually plays a critical role, together they jointly and concurrently impact patients who are LEPs through decision making; therefore, there are practical applications for each.

In terms of health policy, to achieve the objective of population health management, the reality of LEP in the U.S. should be accounted for when standards are established. For example, in addition to laws and regulations, sector guideline developers could ensure that provisions are made to ensure consistency across health systems in providing safe and quality care and services to LEPs. An example of how this has been actualized is the issuance of the National Standards for Culturally and Linguistically Appropriate Services in Health Care (CLAS) by the U.S. Office of Minority Health.

While the introduction of CLAS sets national standards and provides a framework to health care professionals for providing culturally- and linguistically-appropriate health care and services, the knowledge-based evidence supports that there continues to be disparities in health outcomes among LEPs compared to English-proficient individuals. More therefore needs to be done to eliminate such disparities. For example, in terms of health systems structure and care team, periodical re-evaluation of structures and processes to ensure that they continue to effectively support the changing health needs in patient populations is recommended. In terms of payers such as government entities, insurance carriers, and employers, support of interventions that aim at facilitating access to care for LEPs is recommended. Stakeholders such as pharmaceutical and medical device manufacturers have a critical role to play in supporting population health management where those industries have strategic interests. Greater involvement of those industries in supporting population health in underserved groups is essential. In that regard, there are two key areas where much improvement is needed: (1) Support for more patient-centered education and initiatives that aim at developing population awareness of disease prevention and management and, more importantly, health-promoting behaviors. (2) Better clinical trial management processes to ensure that participants have greater understanding of the studies in which they participate, equitable inclusion of groups that have been traditionally underrepresented in clinical trials, greater transparency about the meaning and implications of clauses in the informed consent document, and greater consideration for bioethical issues in the implementation of the informed consent process at the point of care. It is also clear that there are many opportunities for community engagement through leveraging structures that either already exist in communities or can be improved or created. For example, concerning the topic under study, religious groups such as churches, synagogues, and mosques that have multi-cultural members who are LEPs can be leveraged to foster patient engagement by using trust capital. The recommendations made in this section are practical interventions that stakeholders can apply toward closing the gaps in health equity in LEPs.

Implications of Findings

The CHIS sample was weighted to the California Department of Finance's population estimates for 2013-2014 as a fixed criterion (N ± 28,350,722). Findings from this study are therefore generalizable to the California non-institutionalized adult population because statistical weights were used in the statistical analyses. Also, given the large sample size in the study, the findings are meaningful and instructive. The practical future implications of these findings might transcend the boundaries of the research questions explored if predicted growth by the Census Bureau in the population of foreign-born is actualized. The findings may serve to inform policy makers in making decisions that support population health management in terms of promotion of positive health outcomes and reduction of factors that contribute to health disparities in the LEP population.

A finding of lower access, utilization, and desirable health status for LEPs is an immediately actionable finding for stakeholders in the healthcare sector. Interventions, therefore, that aim at eliminating health disparities among LEPs and controlling associated increase in health care spending should be explored. Findings from this study also provide support for the need for health care systems to implement periodic re-evaluations of their structures and operational processes to ensure that the structures and processes are effectively meeting the health care needs of LEPs.

Conclusions of Chapter V

This closing section of the dissertation addresses relevant insights gained from this study and that are judged worthy of sharing, limitations, and recommendations for future research. Finally, it restates the significance of this study and concludes the report on the study.

Relevant Insights and Recommendations

Scientific research using publicly-available health data to develop theories that support improving patient care while decreasing research cost are needed. For publicly-available health data, however, researchers should consider first assessing if a dataset is researchable without the involvement of the data owner prior to investing resources in the research. Questions that might be investigated could include whether the data were systematically collected so that analyzability is not jeopardized. What was the primary objective(s) for collecting the data? Are there codes needed for conducting data analysis that have not been made public? Are there portions of the data (e.g., confidential data, etc.) that are not made public? Are all variables listed in documents/reports actually contained in the data? What institutional process(es) do prospective researchers have to follow to get access to confidential data, if needed? What statistical software program can be used to analyze the data? Will the researcher have to pay for assistance if there are questions about the data?

Although using large datasets to gain insights for business decisions is not a new phenomenon, turning raw data into empirical evidence still remains a challenge for health sciences researchers. Since secondary data often were not collected with the primary aim of specific research in mind, researchers should exercise caution in repurposing the data. A key understanding that a researcher must have is about the objective for collecting the primary data in the first place.

Study Limitations

Due diligence was exercised in this study by systematically applying scientific research principles throughout all phases to ensure that the results would be valid. Certain limitations however remain.

First, while this study used a very large sample, generalizability of the findings is limited to the population of California only because the sample in the CHIS survey was weighted to the California Department of Finance estimates of the California population as a criterion. Also, the data are self-reported, which invites a potential lack of objectivity. Further, although CHIS data have been collected on an ongoing basis since 2001, longitudinal analysis could not be performed on the CHIS 2013-2014 data because the sample is different for each data collection cycle. Also, use of more recent data might have shown different indicators for access and utilization. Additionally, there were substantial number of cases with missing values in the data because of questions that were not applicable to all respondents. Although those variables fit the HCAB and Da Silva (2011) utilization models, they were not analyzable in the context of this study because of the substantial amount of “innaplicables” that would have biased the results. Then, in the literature reviewed, specific sub-populations are analyzed and comparisons to groups equal in size are made. In this study, however, while the results are valid and findings are generalizable to the entire California population, comparisons were made between groups that were not of equal sizes. Finally, causal inferences from findings in this study are not appropriate since the predictor is an attribute variable.

Recommendations for Future Research

Future research could include longitudinal studies conducted in LEP groups to explore whether estimates obtained in this study from cross-sectional data are the result of an actual ongoing phenomenon (i.e., LEP) and not attributable to confounding variables. Also, this study can be replicated in other geographical locations. Further, qualitative studies using structured interviews rather than surveys in order to get a deeper understanding of how contemporary factors impede or facilitate access and appropriate and timely utilization of services could provide greater insights into the needs of LEP patients. A limitation of structured surveys is that they are experimental and outcomes are manipulated by questions that are asked or not asked. Also, structured surveys might limit the perspective of respondents through predefined answers that are often not scaled. Greater understanding of needs could better inform development of interventions aimed at reducing factors associated with health disparities due to lack of English proficiency.

Dissertation Significance

As discussed throughout this dissertation, the catalyst for this study was not only the current prevalence of the LEP population but also projections of significant growth of the foreign-born by the Census Bureau. Recall that the problem investigated rested on the association of growth in LEP prevalence concurrent with growth in the prevalence of the foreign-born. In view of the Census Bureau's projections, it is therefore essential to understand the health care needs of LEPs and how the health care system can best serve them.

Findings from this study contribute to the advancement of the knowledge-based literature in health research concerning limited English proficiency and health needs by providing scientific evidence for a growing issue with significant implications on population health. In addition, based on the findings and other insights gained from this study, a new theoretical framework is proposed for use in future research. The framework was developed because the literature reviewed revealed a need for better methods for studying access, utilization, and health outcomes in LEPs. This framework enables a more comprehensive perspective of the problem and also contains a tool for assessing, measuring, and quantitatively analyzing direct and indirect effects of LEP on latent variables such as access and utilization. As this study proposes an improved methodology for studying the problem and enabling more accurate decision-making, it is the researcher's sincere hope that the model will be of use to future researchers with an interest in this population that is currently not well studied in the literature.

Delivering effective health care and services to linguistically- and culturally-diverse populations requires both a wider and more engaged network of collaboration among stakeholders in the health care delivery system. More importantly, however, there is a continued need for more scientific research that can provide empirical evidence through health care analytics by leveraging big data to help uncover hidden patterns and trends and patient preferences and enable decision making that provide greater benefits to patients. While findings from the current study strengthens the position in previous research that limited English proficiency has inverse effects on access, utilization, and self-rated health status, more research on this topic is imperative.

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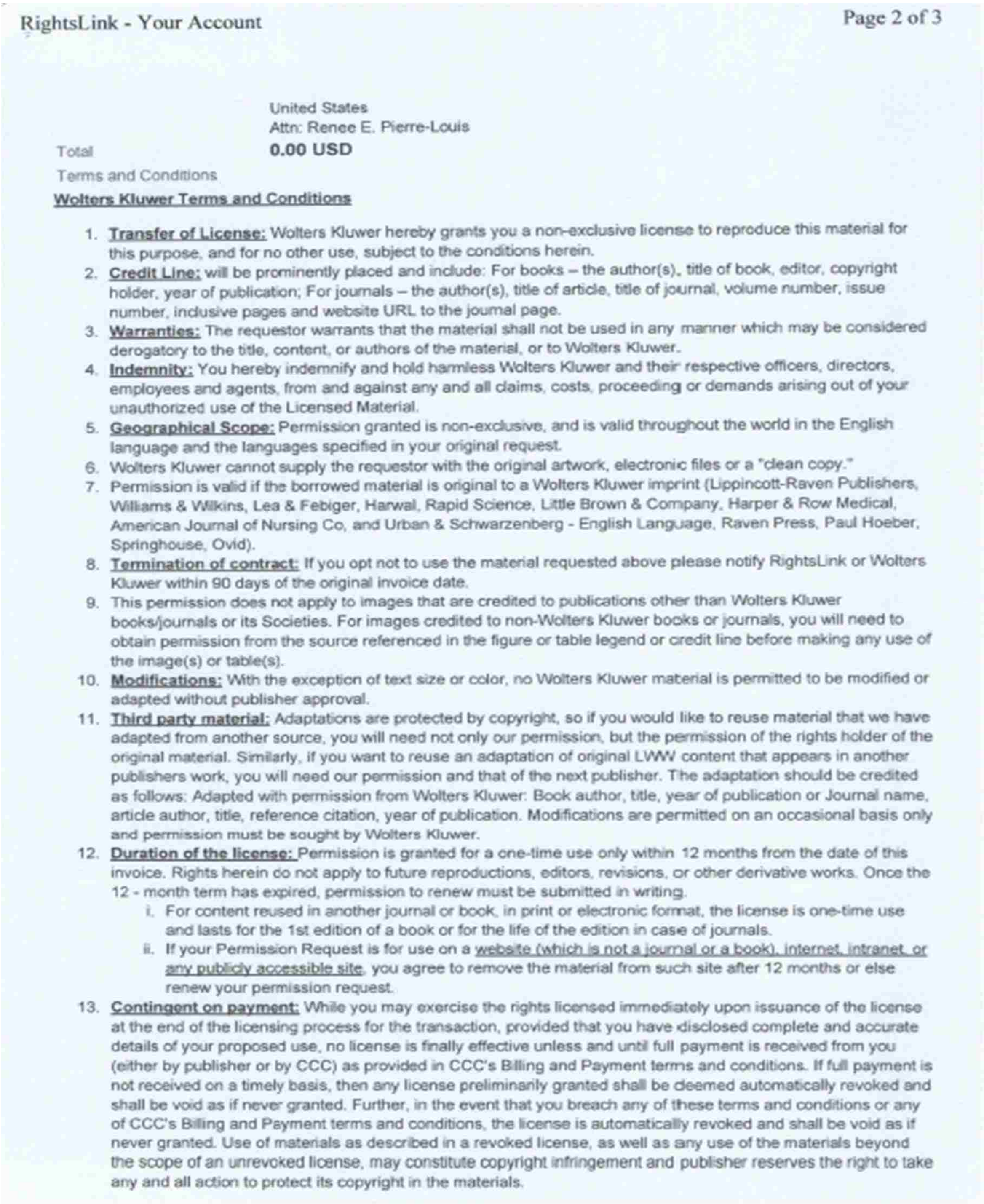

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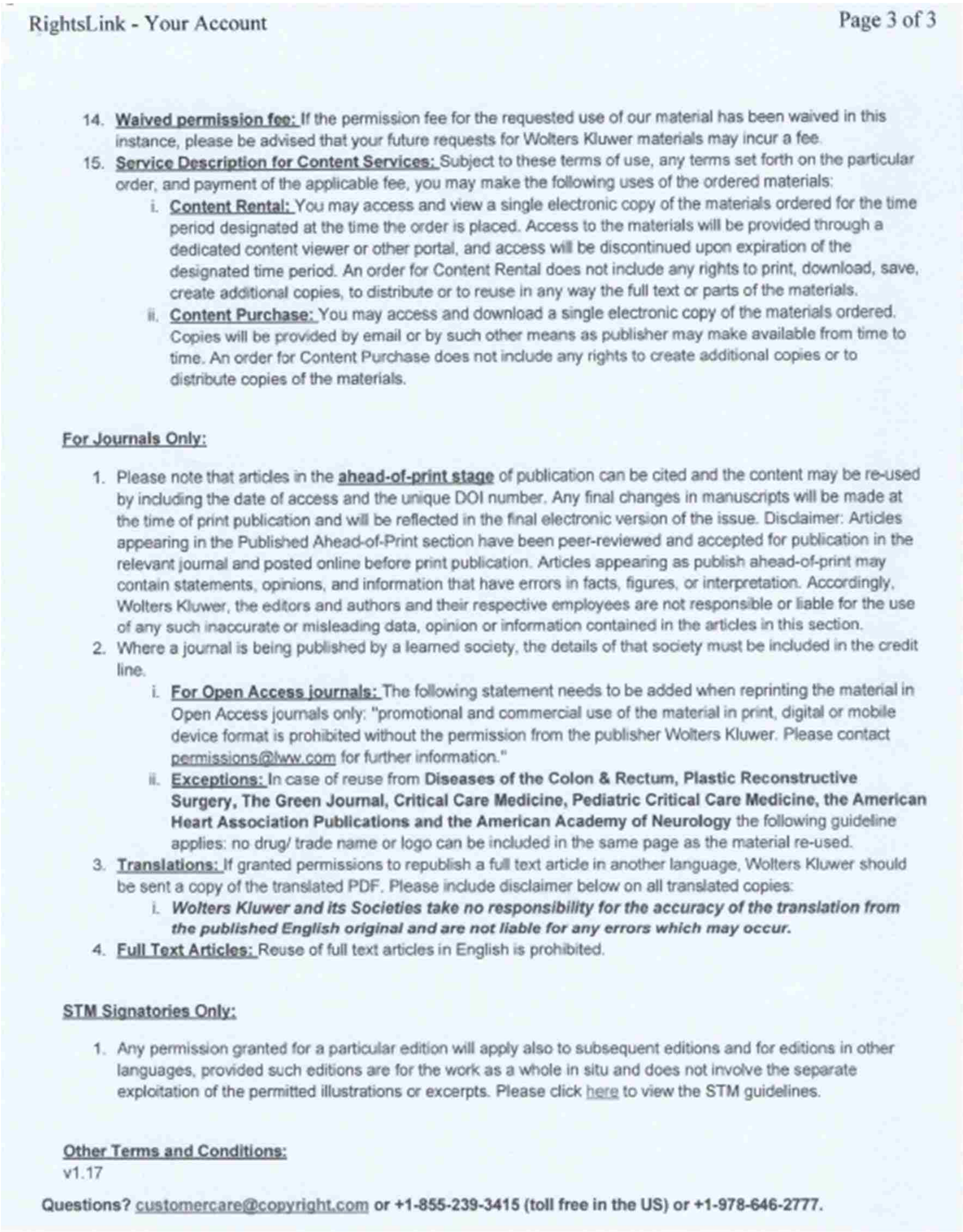

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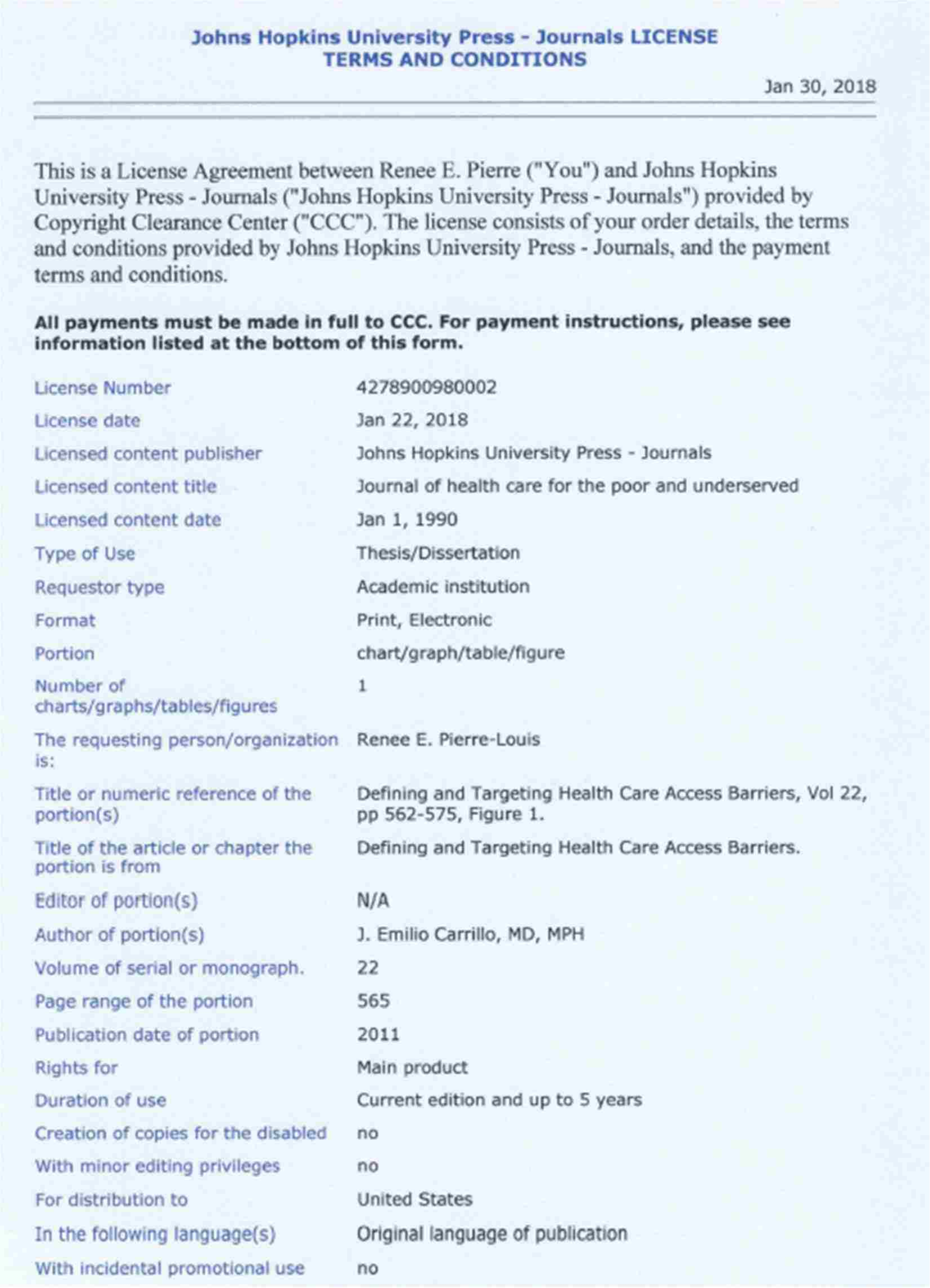

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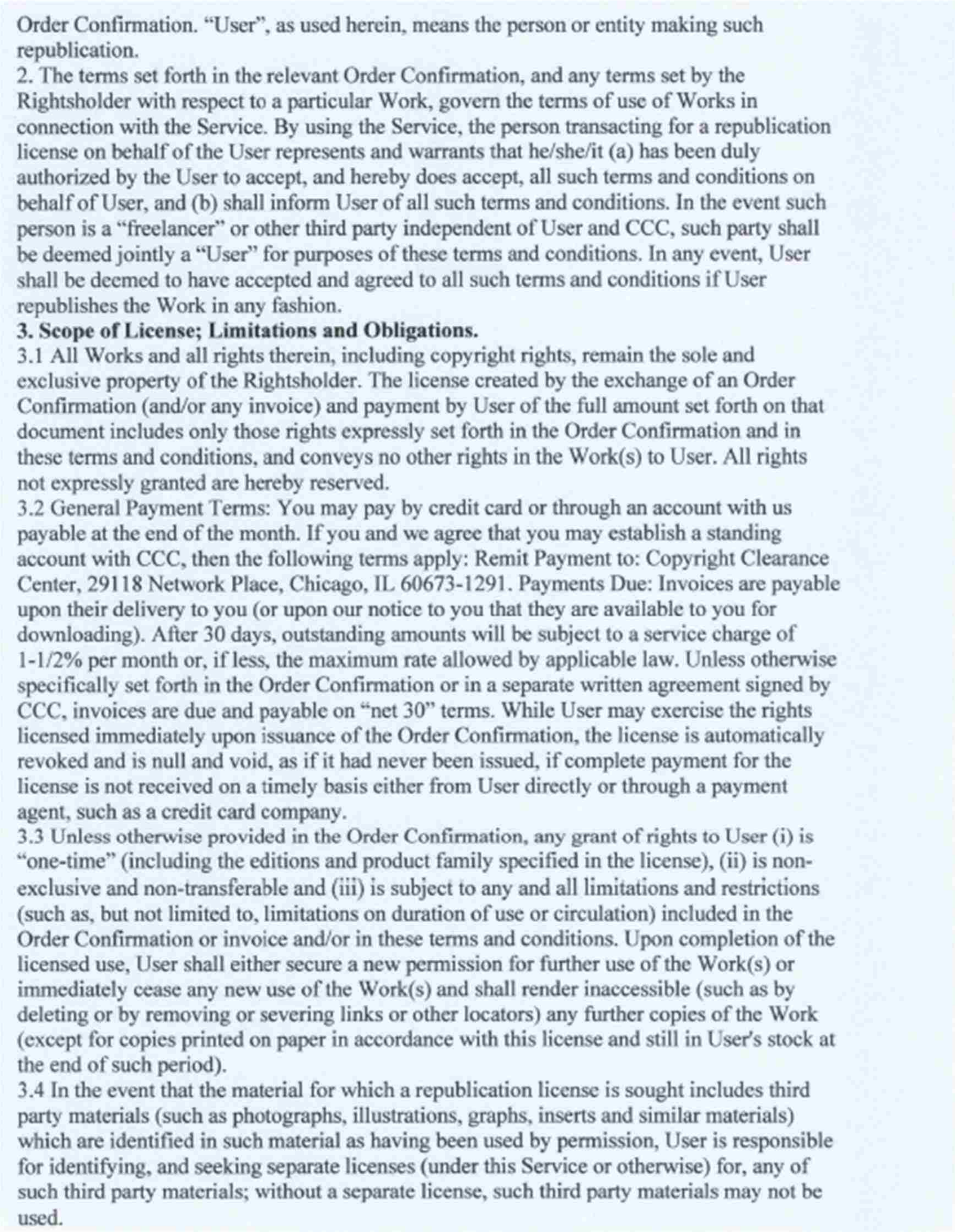

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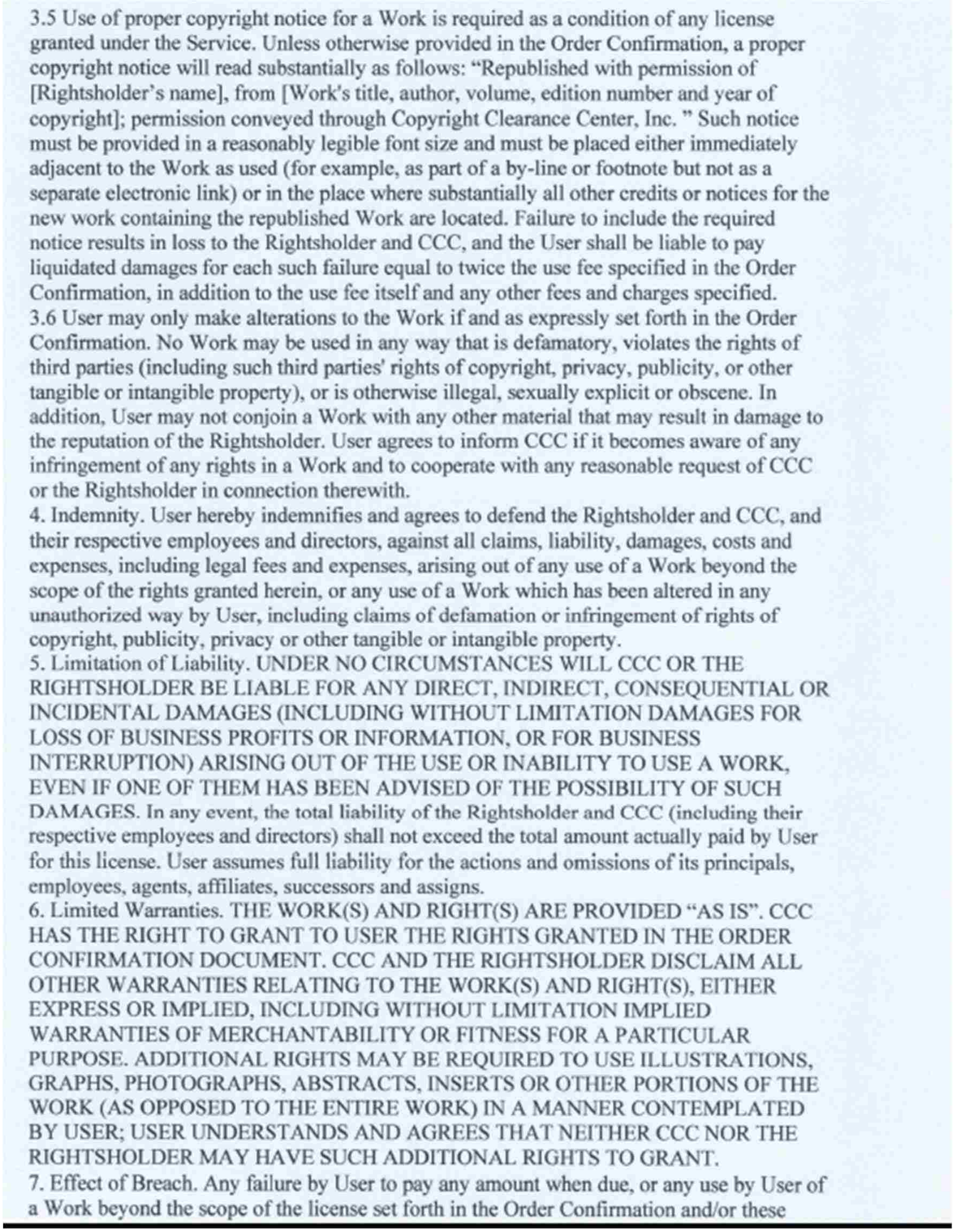

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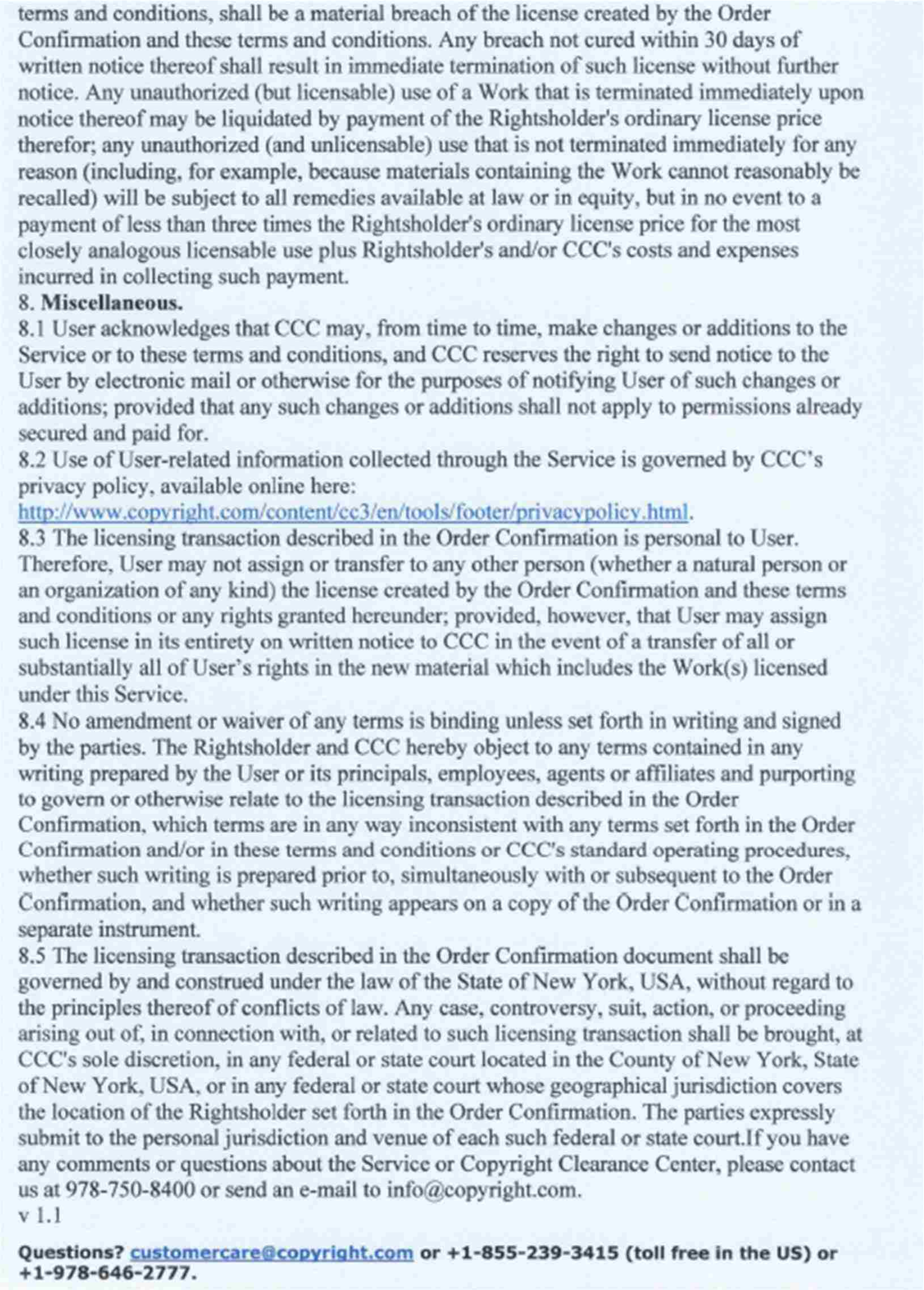

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8.4 No amendment or waiver of any terms is binding unless set forth in writing and signed by the parties. The Rightsholder and CCC hereby object to any terms contained in any writing prepared by the User or its principals, employees, agents or affiliates and purporting to govern or otherwise relate to the licensing transaction described in the Order Confirmation, which terms are in any way inconsistent with any terms set forth in the Order Confirmation and/or in these terms and conditions or CCC's standard operating procedures, whether such writing is prepared prior to, simultaneously with or subsequent to the Order Confirmation, and whether such writing appears on a copy of the Order Confirmation or in a separate instrument.

8.5 The licensing transaction described in the Order Confirmation document shall be governed by and construed under the law of the State of New York, USA, without regard to the principles thereof of conflicts of law. Any case, controversy, suit, action, or proceeding arising out of, in connection with, or related to such licensing transaction shall be brought, at CCC's sole discretion, in any federal or state court located in the County of New York, State of New York, USA, or in any federal or state court whose geographical jurisdiction covers the location of the Rightsholder set forth in the Order Confirmation. The parties expressly submit to the personal jurisdiction and venue of each such federal or state court.If you have any comments or questions about the Service or Copyright Clearance Center, please contact us at 978-750-8400 or send an e-mail to info@copyright.com.

v 1.1

Questions? customercare@copyright.com or +1-855-239-3415 (toll free in the US) or +1-978-646-2777.

From: J Emilio Carrillo MD <ecarrill@nyp.org>
Sent: Monday, August 15, 2016 9:13 PM
To: Renee Pierre-Louis
Cc: Victor
Subject: Re: HCAB conceptual framework

Dear Renee,

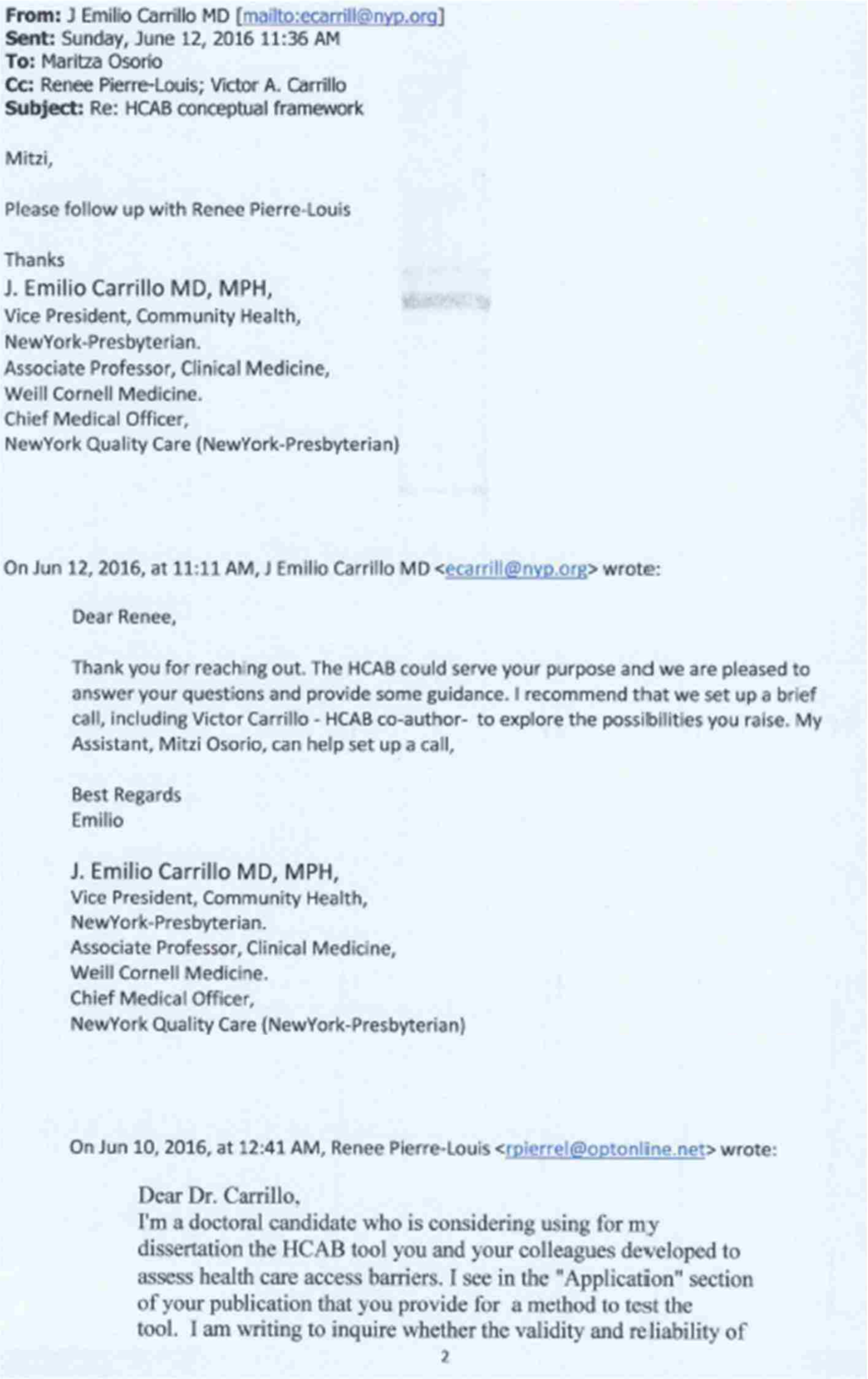
Yes, you may do so. Please provide the attribution and keep us posted. We are pleased to answer your questions as you proceed

Best Regards
Emilio

J. Emilio Carrillo MD, MPH,
Vice President, Community Health,
NewYork-Presbyterian.
Associate Professor, Clinical Medicine,
Weill Cornell Medicine.
Chief Medical Officer,
NewYork Quality Care (NewYork-Presbyterian)

On Jul 31, 2016, at 1:59 AM, Renee Pierre-Louis <rpierrel@optonline.net> wrote:

> Dear Dr. Carillo,
> Thank you for taking the time to discuss the HCAB model with me in relation to my dissertation. I would like to use the model as an illustrative figure in my dissertation; therefore, I kindly request your permission to do so. I will only use the model for educational purposes only.
> I'd appreciate a response from you. Thanks.
>
> Renée
>
> Renée Pierre-Louis
> Phone: [redacted]
>
> **From:** Renee Pierre-Louis [mailto:rpierrel@optonline.net]
> **Sent:** Monday, June 13, 2016 8:48 AM
> **To:** 'J Emilio Carrillo MD' <ecarrill@nyp.org>; 'Maritza Osorio' <mosorio@nyp.org>
> **Cc:** 'Victor A. Carrillo' <vac9009@nyp.org>
> **Subject:** RE: HCAB conceptual framework
>
> Dr. Carrillo, Thank you very much for the reply.
>
> Mitzy, my cell # is [redacted] Please call me and we can set up some time. I'll make myself available at whatever time is convenient for everyone.



From: J Emilio Carrillo MD [mailto:ecarrill@nyp.org]
Sent: Sunday, June 12, 2016 11:36 AM
To: Maritza Osorio
Cc: Renee Pierre-Louis; Victor A. Carrillo
Subject: Re: HCAB conceptual framework

Mitzi,

Please follow up with Renee Pierre-Louis

Thanks
J. Emilio Carrillo MD, MPH,
Vice President, Community Health,
NewYork-Presbyterian.
Associate Professor, Clinical Medicine,
Weill Cornell Medicine.
Chief Medical Officer,
NewYork Quality Care (NewYork-Presbyterian)

On Jun 12, 2016, at 11:11 AM, J Emilio Carrillo MD <ecarrill@nyp.org> wrote:

> Dear Renee,
>
> Thank you for reaching out. The HCAB could serve your purpose and we are pleased to answer your questions and provide some guidance. I recommend that we set up a brief call, including Victor Carrillo - HCAB co-author- to explore the possibilities you raise. My Assistant, Mitzi Osorio, can help set up a call,
>
> Best Regards
> Emilio
>
> J. Emilio Carrillo MD, MPH,
> Vice President, Community Health,
> NewYork-Presbyterian.
> Associate Professor, Clinical Medicine,
> Weill Cornell Medicine.
> Chief Medical Officer,
> NewYork Quality Care (NewYork-Presbyterian)
>
> On Jun 10, 2016, at 12:41 AM, Renee Pierre-Louis <rpierrel@optonline.net> wrote:
>
>> Dear Dr. Carrillo,
>> I'm a doctoral candidate who is considering using for my dissertation the HCAB tool you and your colleagues developed to assess health care access barriers. I see in the "Application" section of your publication that you provide for a method to test the tool. I am writing to inquire whether the validity and reliability of

the tool has been tested after the paper was published. If so, would you be kind enough to send me the relevant information? If not, are you aware of other researchers who have used this tool in addition to its application by the New York-Presbyterian Hospital and whether there are associated publications?

My research topic centers around access, utilization, health status among limited English- as compared to English-proficient individuals. I am specifically interested in the tool because it takes into account cognitive barriers.

Thanks you.

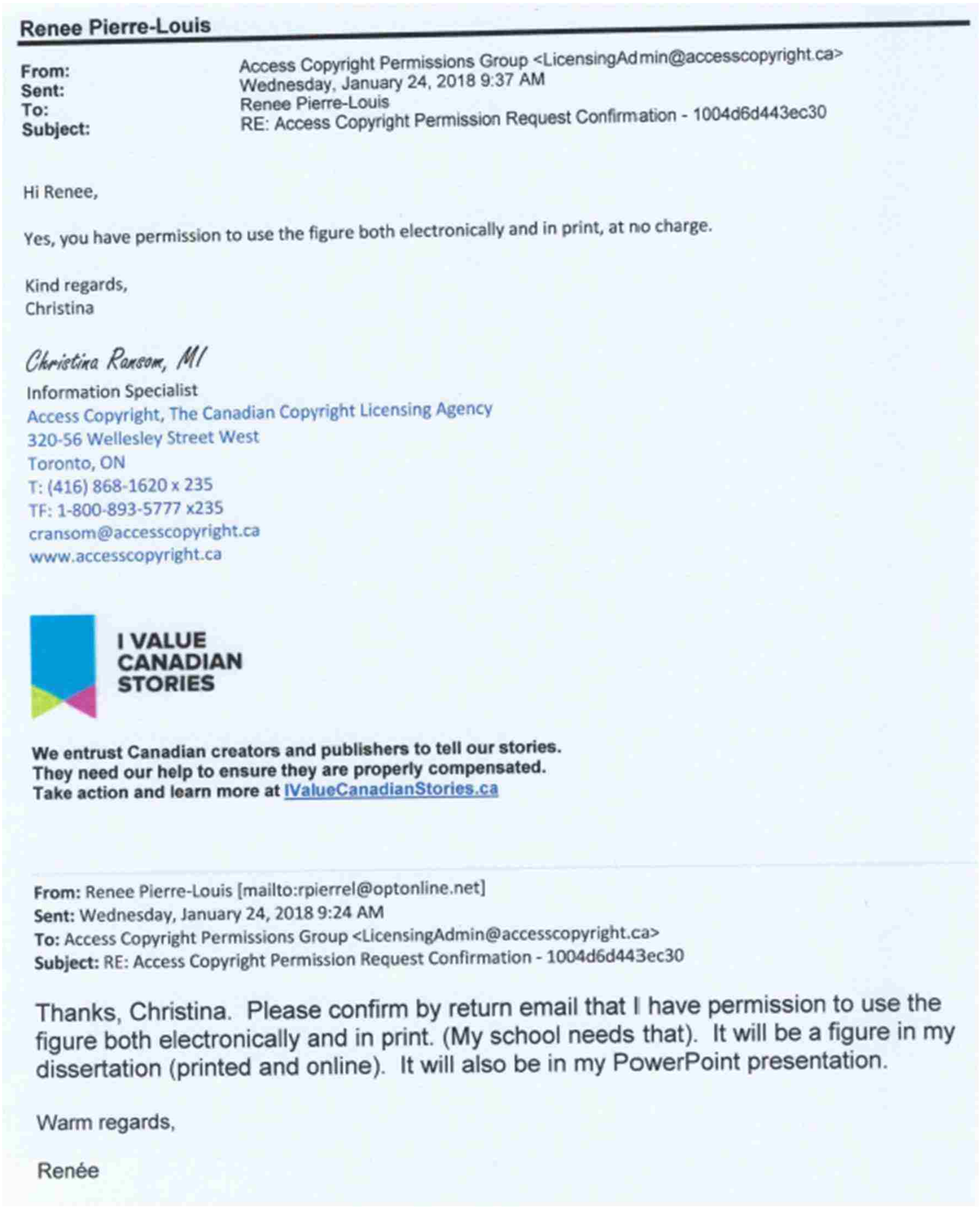
Renée

Renée E. Pierre-Louis
[redacted]

[illegible]
http://infonet.nyp.org/QA/HospitalManual

APPENDIX C

Copyrights License to Reprint the Evaluation of Health Services Utilization Conceptual Model and Author's Permission to Use Copyrighted Materials



Renee Pierre-Louis

From: Access Copyright Permissions Group <LicensingAdmin@accesscopyright.ca>
Sent: Wednesday, January 24, 2018 9:37 AM
To: Renee Pierre-Louis
Subject: RE: Access Copyright Permission Request Confirmation - 1004d6d443ec30

Hi Renee,

Yes, you have permission to use the figure both electronically and in print, at no charge.

Kind regards,
Christina

Christina Ransom, MI
Information Specialist
Access Copyright, The Canadian Copyright Licensing Agency
320-56 Wellesley Street West
Toronto, ON
T: (416) 868-1620 x 235
TF: 1-800-893-5777 x235
cransom@accesscopyright.ca
www.accesscopyright.ca

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From: Renee Pierre-Louis [mailto:rpierrel@optonline.net]
Sent: Wednesday, January 24, 2018 9:24 AM
To: Access Copyright Permissions Group <LicensingAdmin@accesscopyright.ca>
Subject: RE: Access Copyright Permission Request Confirmation - 1004d6d443ec30

Thanks, Christina. Please confirm by return email that I have permission to use the figure both electronically and in print. (My school needs that). It will be a figure in my dissertation (printed and online). It will also be in my PowerPoint presentation.

Warm regards,

Renée

Renée E. Pierre-Louis
[redacted]

From: Access Copyright Permissions Group [mailto:LicensingAdmin@accesscopyright.ca]
Sent: Wednesday, January 24, 2018 9:18 AM
To: rpierrel@optonline.net
Subject: RE: Access Copyright Permission Request Confirmation - 1004d6d443ec30

Hi Renee,

As this is an open access article, you are able to go ahead and use it at no charge for academic purposes.

Kind regards,
Christina

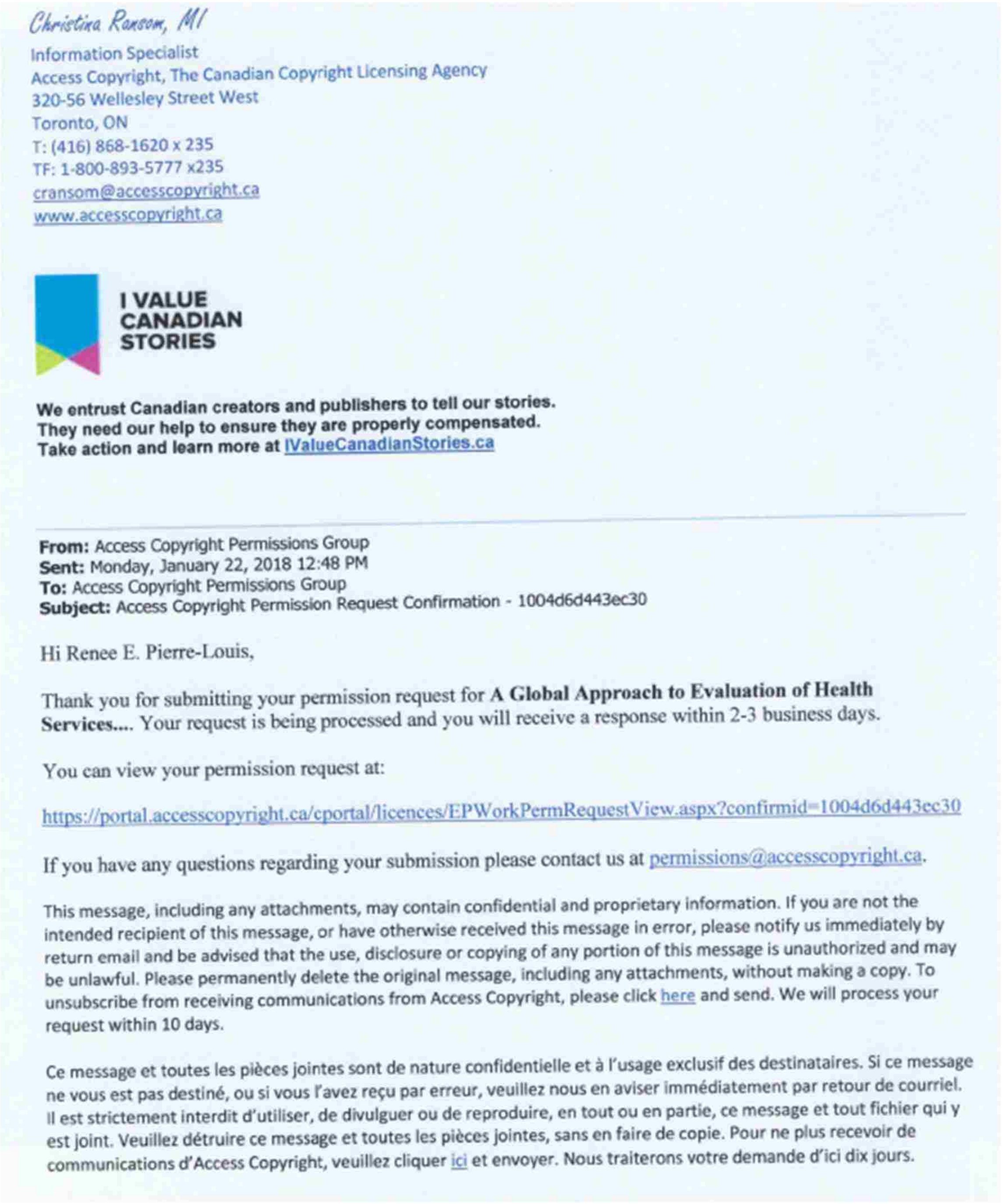
Christina Ransom, MI
Information Specialist
Access Copyright, The Canadian Copyright Licensing Agency
320-56 Wellesley Street West
Toronto, ON
T: (416) 868-1620 x 235
TF: 1-800-893-5777 x235
cransom@accesscopyright.ca
www.accesscopyright.ca

From: Access Copyright Permissions Group
Sent: Monday, January 22, 2018 3:57 PM
To: rpierrel@optonline.net
Subject: RE: Access Copyright Permission Request Confirmation - 1004d6d443ec30

Hi Renee,

Thanks for submitting your request. We are in contact with the rightsholder for this publication and will get back to you as soon as possible.

Kind regards,
Christina



Christina Ransom, MI
Information Specialist
Access Copyright, The Canadian Copyright Licensing Agency
320-56 Wellesley Street West
Toronto, ON
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cransom@accesscopyright.ca
www.accesscopyright.ca

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From: Access Copyright Permissions Group
Sent: Monday, January 22, 2018 12:48 PM
To: Access Copyright Permissions Group
Subject: Access Copyright Permission Request Confirmation - 1004d6d443ec30

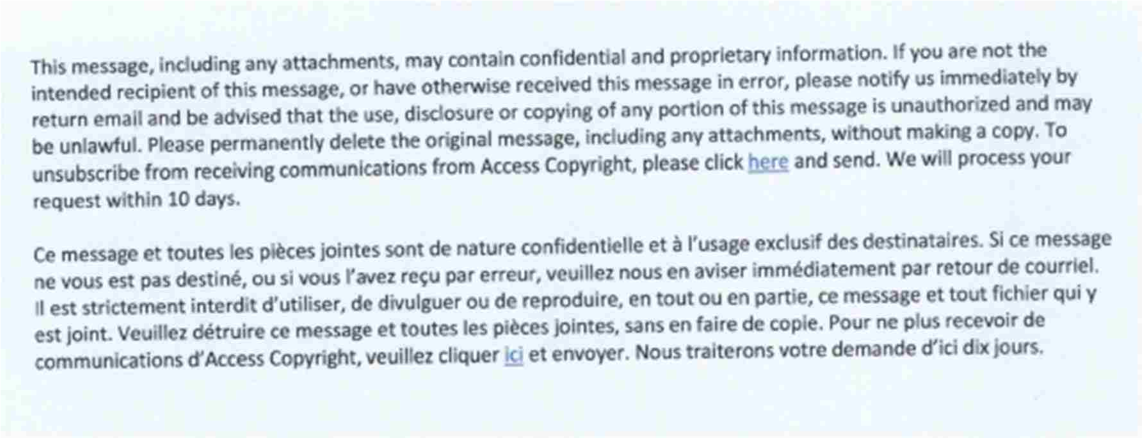
Hi Renee E. Pierre-Louis,

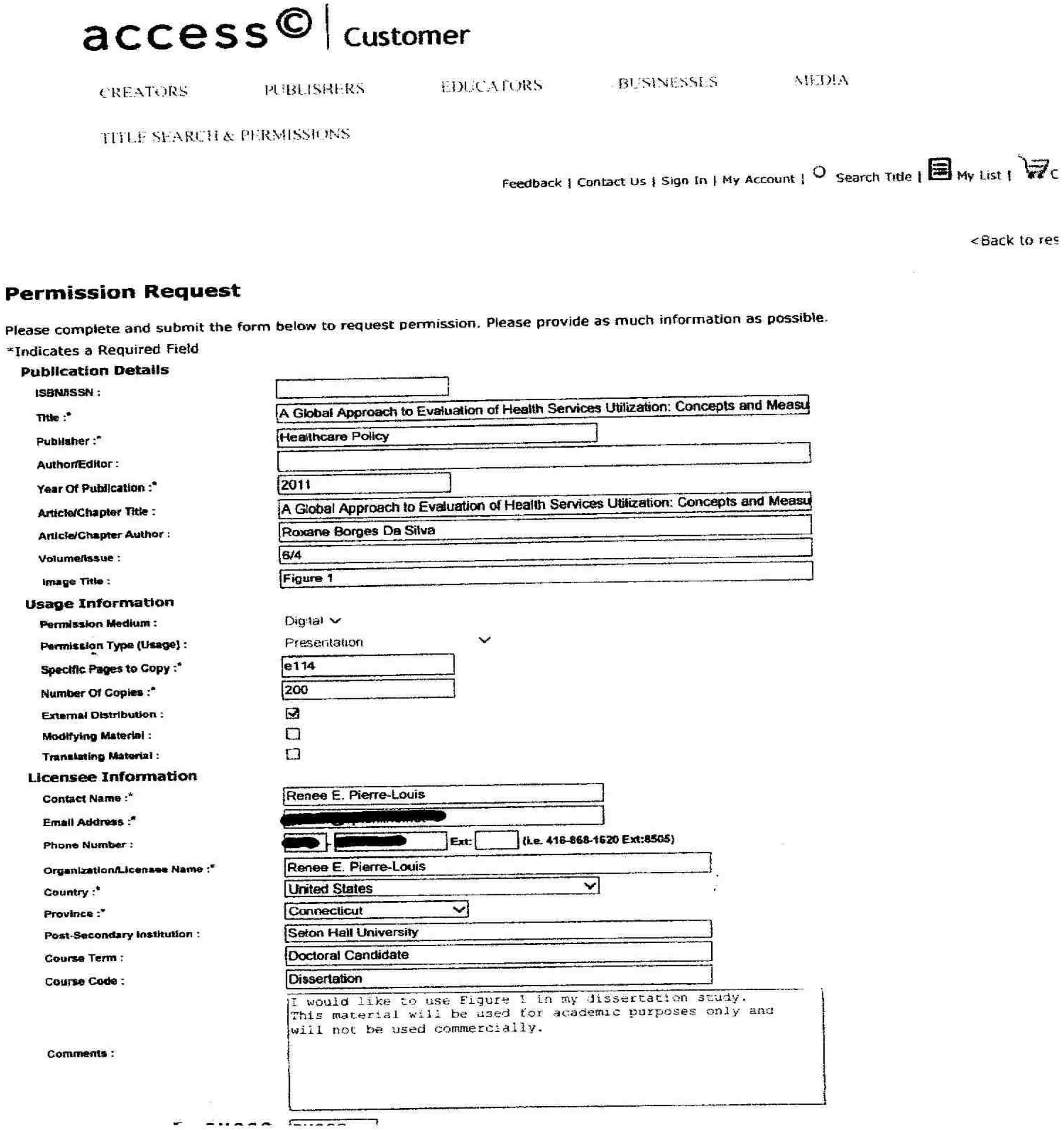
Thank you for submitting your permission request for **A Global Approach to Evaluation of Health Services....** Your request is being processed and you will receive a response within 2-3 business days.

You can view your permission request at:

https://portal.accesscopyright.ca/cportal/licences/EPWorkPermRequestView.aspx?confirmid=1004d6d443ec30

If you have any questions regarding your submission please contact us at permissions@accesscopyright.ca.





Permission Request

Please complete and submit the form below to request permission. Please provide as much information as possible.

*Indicates a Required Field

Publication Details

ISBN/ISSN :	
Title :*	A Global Approach to Evaluation of Health Services Utilization: Concepts and Measu
Publisher :*	Healthcare Policy
Author/Editor :	
Year Of Publication :*	2011
Article/Chapter Title :	A Global Approach to Evaluation of Health Services Utilization: Concepts and Measu
Article/Chapter Author :	Roxane Borges Da Silva
Volume/Issue :	6/4
Image Title :	Figure 1

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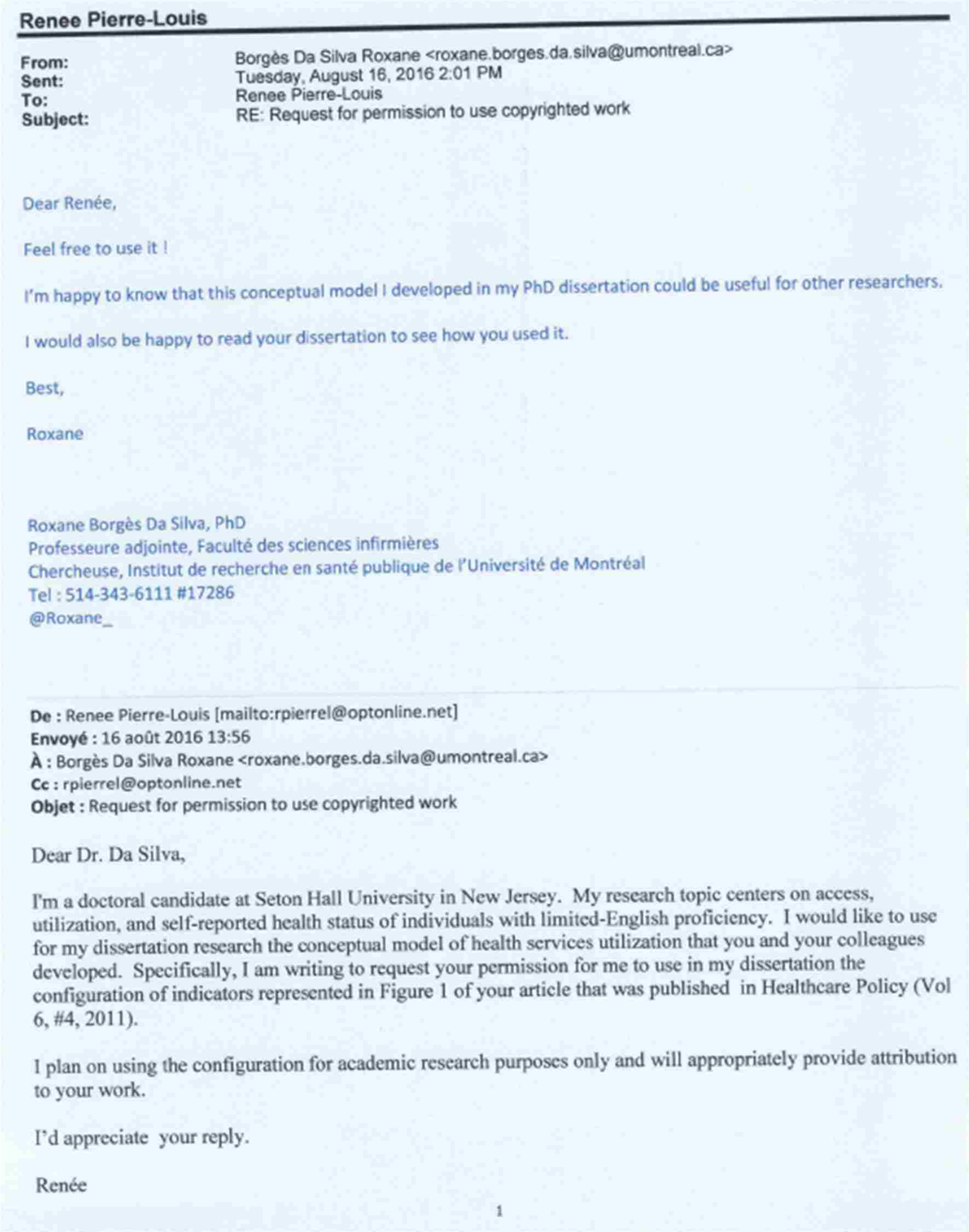
Licensee Information

Contact Name :*	Renee E. Pierre-Louis
Email Address :*	[redacted]
Phone Number :	[redacted] [redacted] Ext: (i.e. 416-868-1620 Ext:8505)
Organization/Licensee Name :*	Renee E. Pierre-Louis
Country :*	United States
Province :*	Connecticut
Post-Secondary Institution :	Seton Hall University
Course Term :	Doctoral Candidate
Course Code :	Dissertation
Comments :	I would like to use Figure 1 in my dissertation study. This material will be used for academic purposes only and will not be used commercially.



Renee Pierre-Louis

From: Borgès Da Silva Roxane <roxane.borges.da.silva@umontreal.ca>
Sent: Tuesday, August 16, 2016 2:01 PM
To: Renee Pierre-Louis
Subject: RE: Request for permission to use copyrighted work

Dear Renée,

Feel free to use it !

I'm happy to know that this conceptual model I developed in my PhD dissertation could be useful for other researchers.

I would also be happy to read your dissertation to see how you used it.

Best,

Roxane

Roxane Borgès Da Silva, PhD
Professeure adjointe, Faculté des sciences infirmières
Chercheuse, Institut de recherche en santé publique de l'Université de Montréal
Tel : 514-343-6111 #17286
@Roxane_

De : Renee Pierre-Louis [mailto:rpierrel@optonline.net]
Envoyé : 16 août 2016 13:56
À : Borgès Da Silva Roxane <roxane.borges.da.silva@umontreal.ca>
Cc : rpierrel@optonline.net
Objet : Request for permission to use copyrighted work

Dear Dr. Da Silva,

I'm a doctoral candidate at Seton Hall University in New Jersey. My research topic centers on access, utilization, and self-reported health status of individuals with limited-English proficiency. I would like to use for my dissertation research the conceptual model of health services utilization that you and your colleagues developed. Specifically, I am writing to request your permission for me to use in my dissertation the configuration of indicators represented in Figure 1 of your article that was published in Healthcare Policy (Vol 6, #4, 2011).

I plan on using the configuration for academic research purposes only and will appropriately provide attribution to your work.

I'd appreciate your reply.

Renée

Renée E. Pierre-Louis

[redacted]

APPENDIX D

Questionnaire Items from 2013-2014 CHIS

Access

1. “During the past 12 months, did a doctor’s office tell you that they would not take you as a new patient?”

- Yes 1
- No 2
- Refused .... -7
- Don’t know .... -8

2. Is there a place that you usually go to when you are sick or need advice about your health?

- Yes 1
- No... 2
- Doctor/My doctor.......................... 3
- Kaiser 4
- More than 1 place..........................5
- Refused ....-7
- Don’t know ....-8

3. Have you ever used the Internet? (Interviewer’s note: This includes sending or receiving email, using Facebook, twitter, etc. include using a computer, phone, tablet, or any other electronic device for accessing the Internet).

- Yes 1
- No 2
- Refused .... -7
- Don’t know .... -8

4. Are you currently insured?

- Yes 1
- No 2
- Refused .... -7
- Don't know .... -8

5. During the past 12 months, did you have any trouble finding a general doctor who would see you?

- Yes 1
- No 2
- Refused .... -7
- Don't know .... -8

Utilization

1. "During the past 12 months, did you delay or not get the medical care you felt you needed – such as seeing a doctor, a specialist, or other health professional?"

- Yes 1
- No 2
- Refused .... -7
- Don't know .... -8

2. "About how long has it been since you last saw a doctor or medical provider for a routine check-up?"

- One year ago or less 0

- More than 1 up to 2 years ago....... 1
- More than 2 up to 5 years ago....... 2
- More than 5 years ago 3
- Never 4
- Refused .... -7
- Don't know .... -8

3. During the past 12 months, did you delay or not get a medicine that a doctor prescribed for you?

- Yes 1
- No 2
- Refused .... -7
- Don't know ....-8

4. About how long has it been since you visited a dentist or dental clinic? Including hygienists and all types of dental specialists.

- Have never visit 0
- 6 months ago or less 1
- More than 6 months ago up to a year................ 2
- More than 1 year up to two years ago.............. 3
- More than 2 yeas up to five years ago 4
- More than 5 years ago 5
- Refused ....-7
- Don't know ....-8

Self-Rated Health Status

Would you say that in general your health is excellent, very good, good, fair, or poor?”

- Excellent 1
- Very good 2
- Good 3
- Fair 4
- Poor 5
- Refused .... -7
- Don’t know .... -8

English Language Proficiency

Since you speak a language other than English at home, we are interested in your opinion of how well you speak English. Would you say you speak English: (1) Very well, (2) well, (3) not well, or (4) not at all

- Very well 1
- Well 2
- Not well, or 3
- Not at all 4
- Refused .... -7

- Don't know .... -8

Age

Are you between 18 and 29, between 30 and 39, between 40 and 44, between 45 and 49, between 50 and 64, or 65 or older?

- Between 18 and 29 1
- Between 30 and 39 2
- Between 40 and 44 3
- Between 45 and 49 4
- Between 50 and 64 5
- 65 or older 6
- Refused .... -7
- Don't know .... -8

Sex

Are you male or female?

- Male 1
- Female 2
- Refused .... -7

Race and ethnicity

Mexican/Mexican American/Chicano	1
Salvadoran	4
Guatemalan	5
Costa Rican	6
Honduran	7
Nicaraguan	8
Panamanian	9
Puerto Rican	10
Cuban	11
Spanish-American (from Spain)	12
Latino, other specify	13
Latino	14
Native Hawaiian	16
Other Pacific Islander	17
American Indian or Alaska native	18
Asian	19
Black or African American	20
White	21
Race, other specify	22
Bangladeshi	30
Burmese	31
Cambodian	32

- Chinese 33
- Filipino 34
- Hmong 35
- Indian (India) 36
- Indonesian 37
- Japanese 38
- Korean 39
- Laotian 40
- Malaysian 41
- Pakistani 42
- Sri Lankan 43
- Taiwanese 44
- Thai 45
- Vietnamese 46
- Asian, other specify 49
- Samoan/American Samoan 50
- Guamanian 51
- Tongan 52
- Fijian 53
- Pacific Islander, other specify 55
- Both/all/multiracial 90

Educational attainment

What is the highest grade of education you have completed and received credit for?

No Formal Education 30

Grade School

- 1st Grade 1
- 2nd Grade 2
- 3rd Grade 3
- 4th Grade 4
- 5th Grade 5
- 6th Grade 6
- 7th Grade 7
- 8th Grade 8

High School or Equivalent

- 9th Grade 9
- 10th Grade 10
- 11th Grade 11
- 12th Grade 12

4-Year College or University

- 1st Year (Freshman) 13
- 2nd Year (Sophomore) 14
- 3rd Year (Junior) 15
- 4th Year (Senior) (BA/BS) 16
- 5th Year 17

Graduate or Professional School

- 1st Year Grad or Prof School 18
- 2nd Year Grad or Prof School
  (MA/MS) 19
- 3rd Year Grad or Prof School 20
- More Than 3 Years Grad or
  Prof School (Ph.D.) 21

2-Year Junior or Community College

- 1st Year 22
- 2nd Year (AA/AS) 23

Vocational, Business, or Trade School

- 1st Year 24
- 2nd Year 25
- More than 2 Years 26
- Refused .... -7
- Don't Know (Out of range) .... -8

Income

What is your best estimate of your household's total annual income from all sources before taxes in 2012/2013?

$______________ AMOUNT[20]

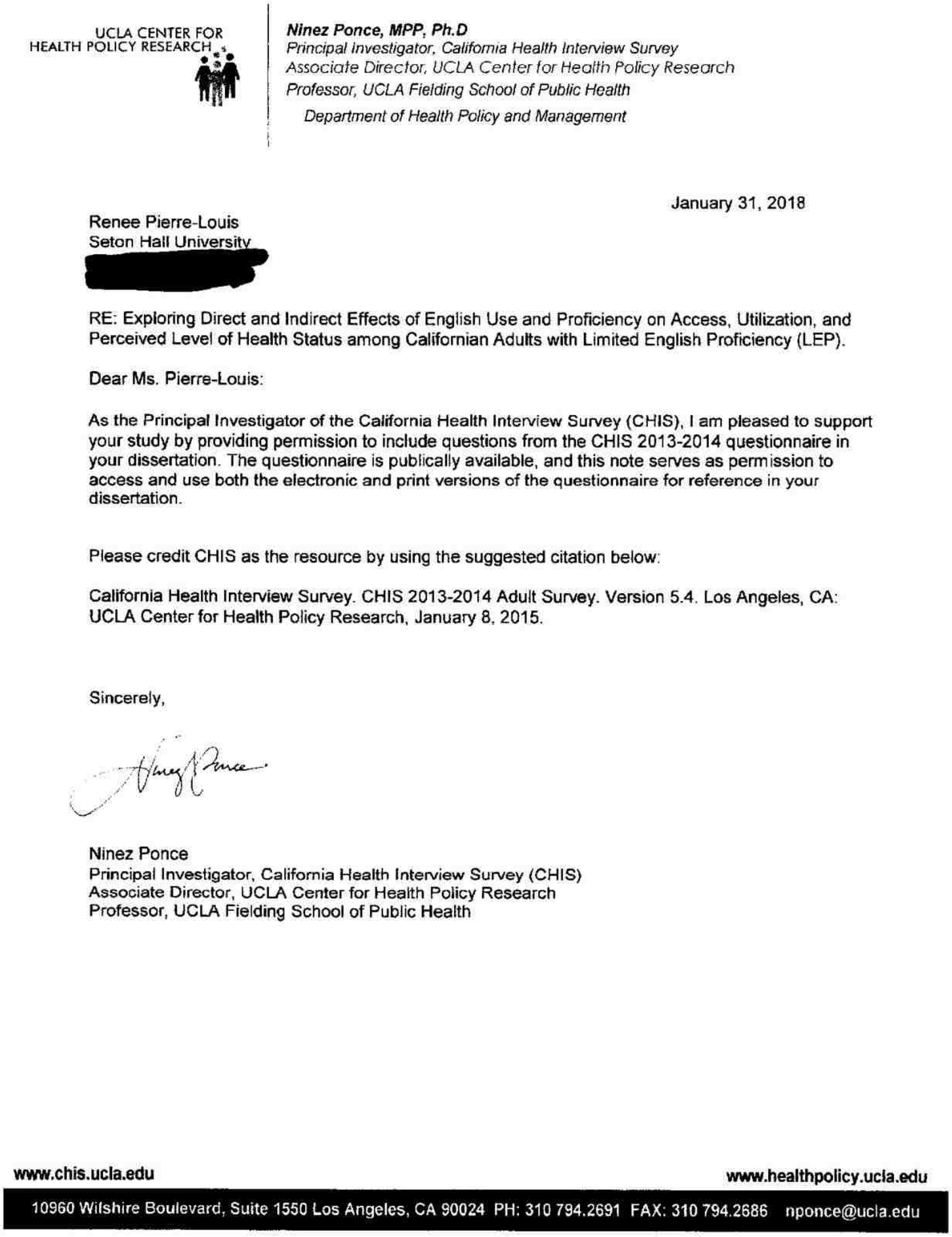
- Refused .... -7
- Don't know (out of range) .... -8

---

[20] For this item, the following note was included in the CHIS questionnaire: "[IF NEEDED, SAY: "Include money from jobs, social security, retirement income, unemployment payments, public assistance and so forth. Also, include income from interest, dividends, net income from business, farm, or rent and any other money income."] [IF AMOUNT GREATER THAN $999,995, ENTER "999,995"].

APPENDIX E

Reprint Permission from UCLA, Health Policy Research Center



UCLA CENTER FOR
HEALTH POLICY RESEARCH

Ninez Ponce, MPP, Ph.D
Principal Investigator, California Health Interview Survey
Associate Director, UCLA Center for Health Policy Research
Professor, UCLA Fielding School of Public Health
Department of Health Policy and Management

January 31, 2018

Renee Pierre-Louis
Seton Hall University
[redacted]

RE: Exploring Direct and Indirect Effects of English Use and Proficiency on Access, Utilization, and Perceived Level of Health Status among Californian Adults with Limited English Proficiency (LEP).

Dear Ms. Pierre-Louis:

As the Principal Investigator of the California Health Interview Survey (CHIS), I am pleased to support your study by providing permission to include questions from the CHIS 2013-2014 questionnaire in your dissertation. The questionnaire is publically available, and this note serves as permission to access and use both the electronic and print versions of the questionnaire for reference in your dissertation.

Please credit CHIS as the resource by using the suggested citation below:

California Health Interview Survey. CHIS 2013-2014 Adult Survey. Version 5.4. Los Angeles, CA: UCLA Center for Health Policy Research, January 8, 2015.

Sincerely,

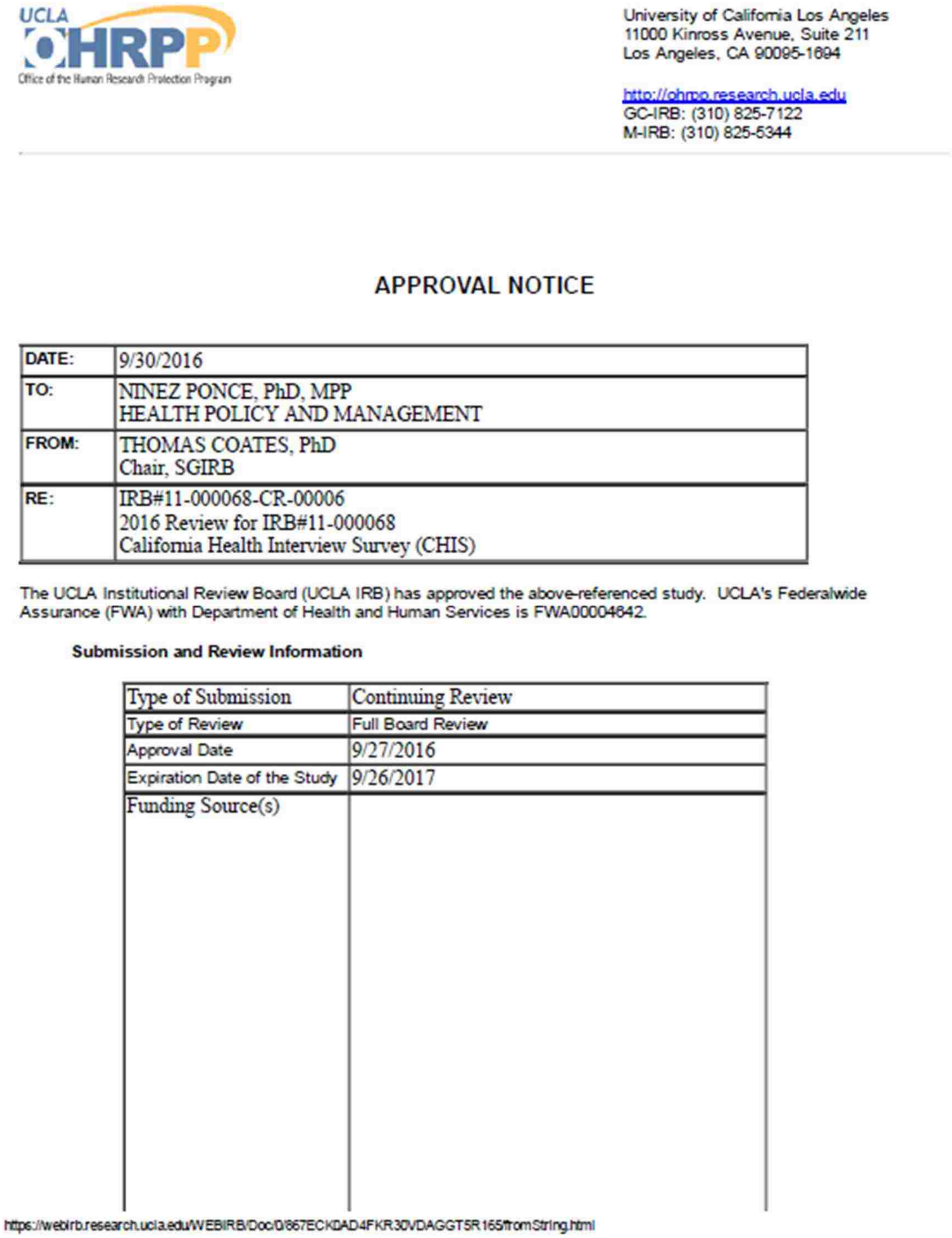
Ninez Ponce
Principal Investigator, California Health Interview Survey (CHIS)
Associate Director, UCLA Center for Health Policy Research
Professor, UCLA Fielding School of Public Health

www.chis.ucla.edu **www.healthpolicy.ucla.edu**

10960 Wilshire Boulevard, Suite 1550 Los Angeles, CA 90024 PH: 310 794.2691 FAX: 310 794.2686 nponce@ucla.edu

APPENDIX F

UCLA IRB Approvals for CHIS 2013-2014



University of California Los Angeles
11000 Kinross Avenue, Suite 211
Los Angeles, CA 90095-1694

http://ohrpp.research.ucla.edu
GC-IRB: (310) 825-7122
M-IRB: (310) 825-5344

APPROVAL NOTICE

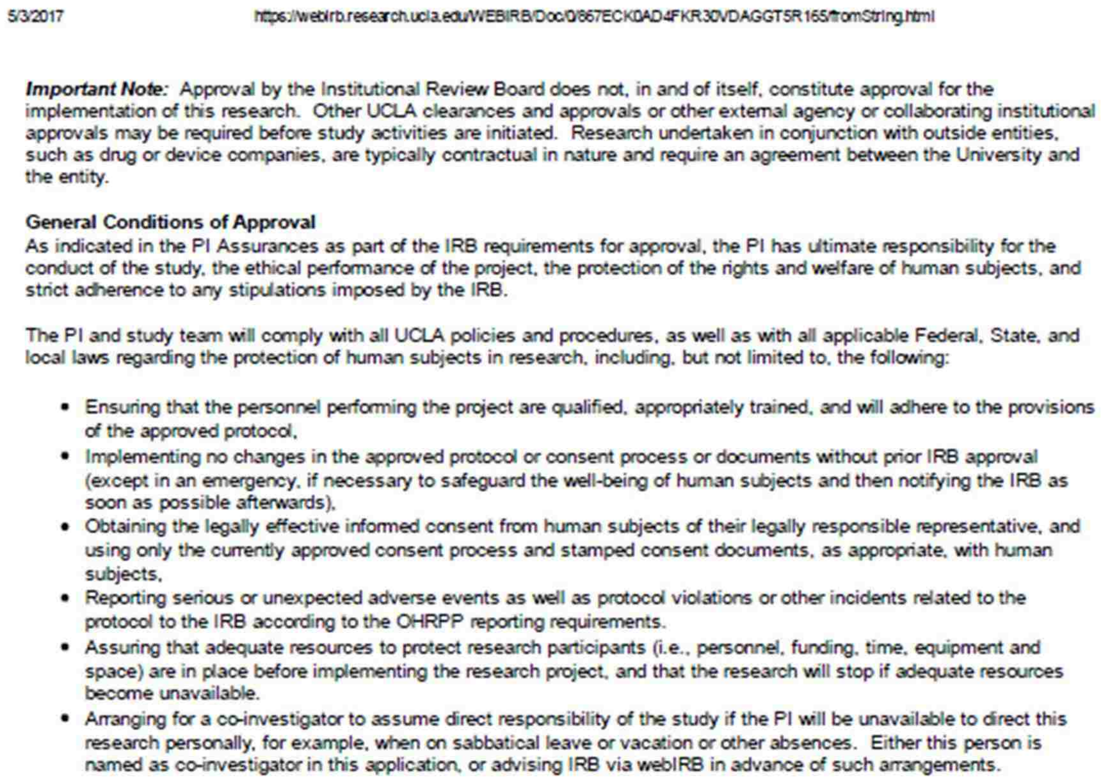
DATE:	9/30/2016
TO:	NINEZ PONCE, PhD, MPP HEALTH POLICY AND MANAGEMENT
FROM:	THOMAS COATES, PhD Chair, SGIRB
RE:	IRB#11-000068-CR-00006 2016 Review for IRB#11-000068 California Health Interview Survey (CHIS)

The UCLA Institutional Review Board (UCLA IRB) has approved the above-referenced study. UCLA's Federalwide Assurance (FWA) with Department of Health and Human Services is FWA00004642.

Submission and Review Information

Type of Submission	Continuing Review
Type of Review	Full Board Review
Approval Date	9/27/2016
Expiration Date of the Study	9/26/2017
Funding Source(s)	

https://webirb.research.ucla.edu/WEBIRB/Doc/0/867ECKDAD4FKR30VDAGGT5R165/fromString.html



5/3/2017 https://webirb.research.ucla.edu/WEBIRB/Doc/0/867ECK0AD4FKR30VDAGGT5R165/fromString.html

Important Note: Approval by the Institutional Review Board does not, in and of itself, constitute approval for the implementation of this research. Other UCLA clearances and approvals or other external agency or collaborating institutional approvals may be required before study activities are initiated. Research undertaken in conjunction with outside entities, such as drug or device companies, are typically contractual in nature and require an agreement between the University and the entity.

General Conditions of Approval

As indicated in the PI Assurances as part of the IRB requirements for approval, the PI has ultimate responsibility for the conduct of the study, the ethical performance of the project, the protection of the rights and welfare of human subjects, and strict adherence to any stipulations imposed by the IRB.

The PI and study team will comply with all UCLA policies and procedures, as well as with all applicable Federal, State, and local laws regarding the protection of human subjects in research, including, but not limited to, the following:

- Ensuring that the personnel performing the project are qualified, appropriately trained, and will adhere to the provisions of the approved protocol,
- Implementing no changes in the approved protocol or consent process or documents without prior IRB approval (except in an emergency, if necessary to safeguard the well-being of human subjects and then notifying the IRB as soon as possible afterwards),
- Obtaining the legally effective informed consent from human subjects of their legally responsible representative, and using only the currently approved consent process and stamped consent documents, as appropriate, with human subjects,
- Reporting serious or unexpected adverse events as well as protocol violations or other incidents related to the protocol to the IRB according to the OHRPP reporting requirements.
- Assuring that adequate resources to protect research participants (i.e., personnel, funding, time, equipment and space) are in place before implementing the research project, and that the research will stop if adequate resources become unavailable.
- Arranging for a co-investigator to assume direct responsibility of the study if the PI will be unavailable to direct this research personally, for example, when on sabbatical leave or vacation or other absences. Either this person is named as co-investigator in this application, or advising IRB via webIRB in advance of such arrangements.

APPENDIX G

Seton Hall University Institutional Review Board Approval

SETON HALL UNIVERSITY
1856

May 31, 2017

Renée Pierre-Louis
[redacted]

Dear Ms. Pierre-Louis,

The Seton Hall University Institutional Review Board has reviewed your research proposal entitled "Access, Utilization, and Self-Rated Health Status to Access Influence of Limited English Proficiency" and has categorized it as exempt.

Enclosed for your records is the signed Request for Approval form.

Please note that, <u>where applicable</u>, subjects must sign and must be given a copy of the Seton Hall University current stamped Letter of Solicitation or Consent Form before the subjects' participation. All data, as well as the investigator's copies of the signed Consent Forms, must be retained by the principal investigator for a period of at least three years following the termination of the project.

Should you wish to make changes to the IRB approved procedures, the following materials must be submitted for IRB review and be approved by the IRB prior to being instituted:

- Description of proposed revisions;
- *If applicable*, any new or revised materials, such as recruitment fliers, letters to subjects, or consent documents; and
- *If applicable*, updated letters of approval from cooperating institutions and IRBs.

At the present time, there is no need for further action on your part with the IRB.

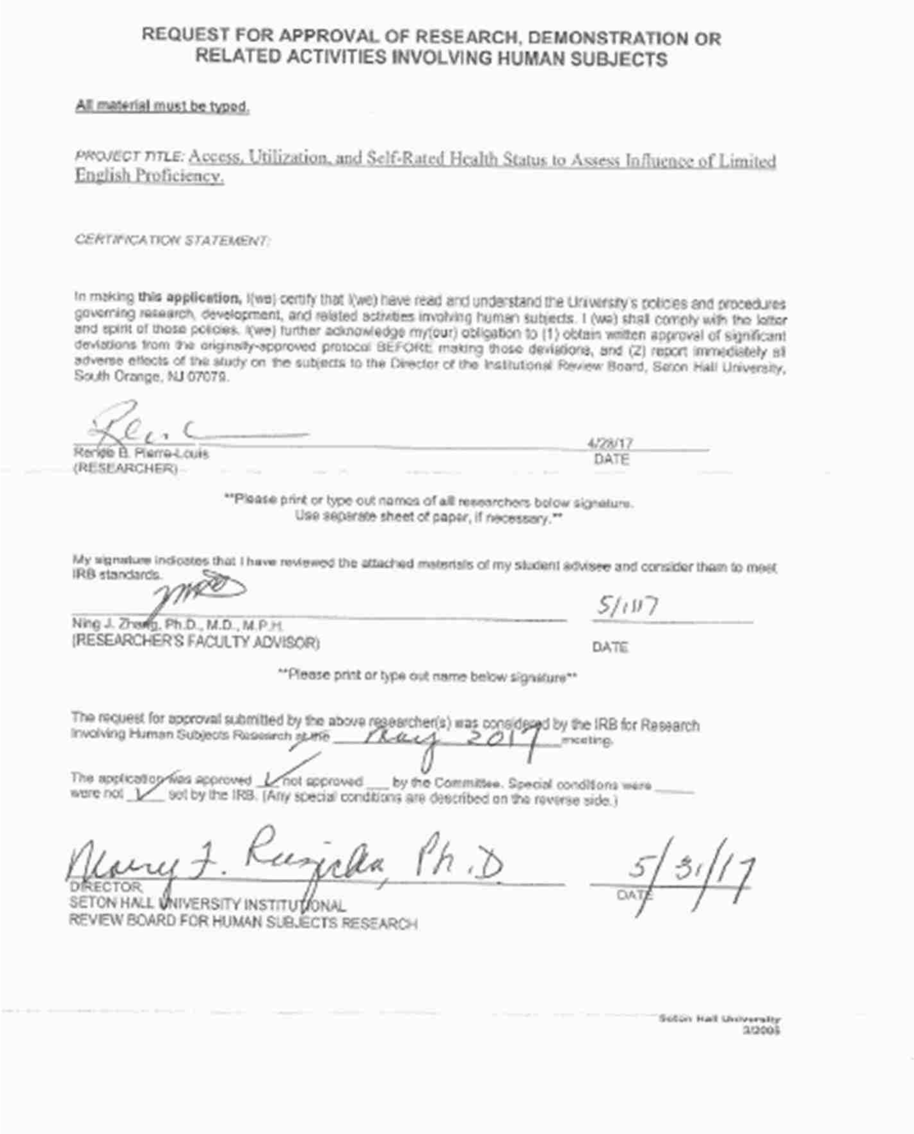
In harmony with federal regulations, none of the investigators or research staff involved in the study took part in the final decision.

Sincerely,

Mary F. Ruzicka, Ph.D

Mary F. Ruzicka, Ph.D.
Professor
Director, Institutional Review Board

cc: Dr. Ning Zhang



REQUEST FOR APPROVAL OF RESEARCH, DEMONSTRATION OR RELATED ACTIVITIES INVOLVING HUMAN SUBJECTS

All material must be typed.

PROJECT TITLE: Access, Utilization, and Self-Rated Health Status to Assess Influence of Limited English Proficiency.

CERTIFICATION STATEMENT:

In making **this application,** I(we) certify that I(we) have read and understand the University's policies and procedures governing research, development, and related activities involving human subjects. I (we) shall comply with the letter and spirit of those policies. I(we) further acknowledge my(our) obligation to (1) obtain written approval of significant deviations from the originally-approved protocol BEFORE making those deviations, and (2) report immediately all adverse effects of the study on the subjects to the Director of the Institutional Review Board, Seton Hall University, South Orange, NJ 07079.

Renée B. Pierre-Louis
(RESEARCHER)

4/28/17
DATE

**Please print or type out names of all researchers below signature.
Use separate sheet of paper, if necessary.**

My signature indicates that I have reviewed the attached materials of my student advisee and consider them to meet IRB standards.

Ning J. Zheng, Ph.D., M.D., M.P.H.
(RESEARCHER'S FACULTY ADVISOR)

5/1/17
DATE

Please print or type out name below signature

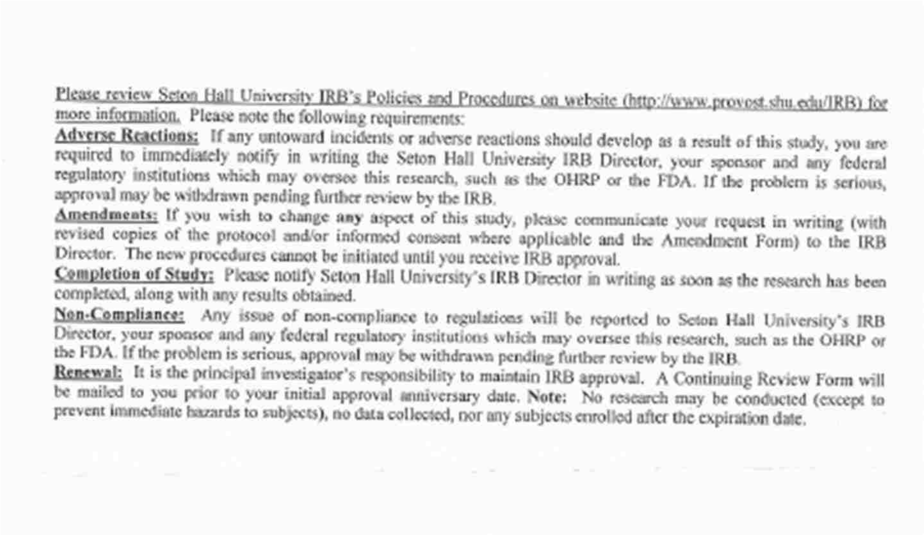
The request for approval submitted by the above researcher(s) was considered by the IRB for Research Involving Human Subjects Research at the May 2017 meeting.

The application was approved ✓ not approved ___ by the Committee. Special conditions were ____ were not ✓ set by the IRB. (Any special conditions are described on the reverse side.)

Mary F. Ruzicka, Ph.D
DIRECTOR,
SETON HALL UNIVERSITY INSTITUTIONAL
REVIEW BOARD FOR HUMAN SUBJECTS RESEARCH

5/31/17
DATE

Seton Hall University
3/2005



Please review Seton Hall University IRB's Policies and Procedures on website (http://www.provost.shu.edu/IRB) for more information. Please note the following requirements:

Adverse Reactions: If any untoward incidents or adverse reactions should develop as a result of this study, you are required to immediately notify in writing the Seton Hall University IRB Director, your sponsor and any federal regulatory institutions which may oversee this research, such as the OHRP or the FDA. If the problem is serious, approval may be withdrawn pending further review by the IRB.

Amendments: If you wish to change **any** aspect of this study, please communicate your request in writing (with revised copies of the protocol and/or informed consent where applicable and the Amendment Form) to the IRB Director. The new procedures cannot be initiated until you receive IRB approval.

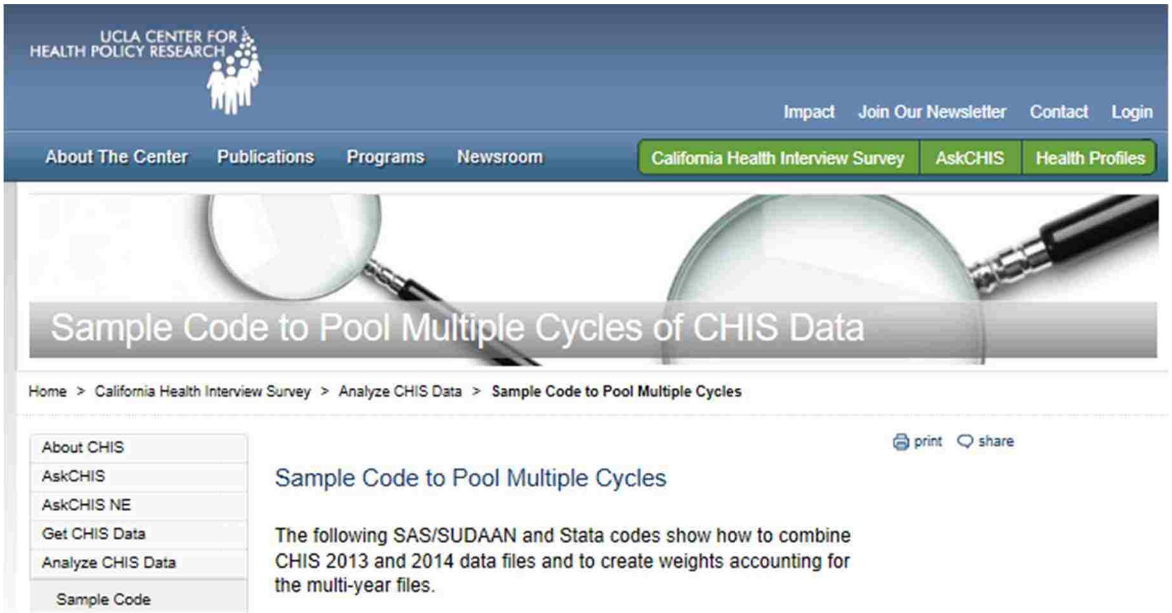
Completion of Study: Please notify Seton Hall University's IRB Director in writing as soon as the research has been completed, along with any results obtained.

Non-Compliance: Any issue of non-compliance to regulations will be reported to Seton Hall University's IRB Director, your sponsor and any federal regulatory institutions which may oversee this research, such as the OHRP or the FDA. If the problem is serious, approval may be withdrawn pending further review by the IRB.

Renewal: It is the principal investigator's responsibility to maintain IRB approval. A Continuing Review Form will be mailed to you prior to your initial approval anniversary date. **Note:** No research may be conducted (except to prevent immediate hazards to subjects), no data collected, nor any subjects enrolled after the expiration date.

APPENDIX H

CHIS Data Pooling Process

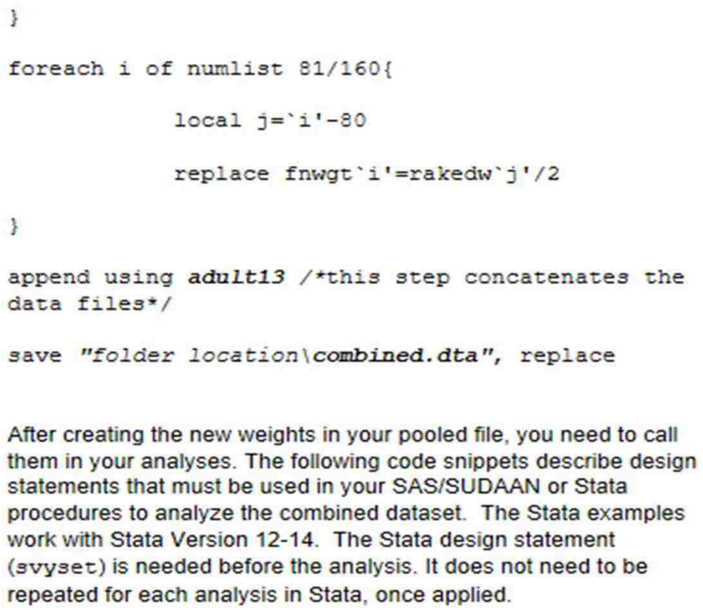


Sample Code to Pool Multiple Cycles

The following SAS/SUDAAN and Stata codes show how to combine CHIS 2013 and 2014 data files and to create weights accounting for the multi-year files.

Stata:

```
log using "folder location\data_step.log", replace

***CHIS 2013 Adult data****

use "your folder location\CHIS 2013 data"

gen year=2013

gen fnwgt0=rakedw0/2

for new fnwgt1-fnwgt160: gen X=0

foreach i of numlist 1/80{

            local j=`i'-0

            replace fnwgt`i'=rakedw`j'/2

}

foreach i of numlist 81/160{

            replace fnwgt`i'=rakedw0/2

}

save adult13 , replace

***CHIS 2014 Adult data****

use "folder location\CHIS 2014 data"

gen year=2014

gen fnwgt0=rakedw0/2

for new fnwgt1-fnwgt160: gen X=0

foreach i of numlist 1/80{

            replace fnwgt`i'=rakedw0/2
```



```
}

foreach i of numlist 81/160{

            local j=`i'-80

            replace fnwgt`i'=rakedw`j'/2

}

append using adult13 /*this step concatenates the
data files*/

save "folder location\combined.dta", replace
```

After creating the new weights in your pooled file, you need to call them in your analyses. The following code snippets describe design statements that must be used in your SAS/SUDAAN or Stata procedures to analyze the combined dataset. The Stata examples work with Stata Version 12-14. The Stata design statement (`svyset`) is needed before the analysis. It does not need to be repeated for each analysis in Stata, once applied.