

HEALTH DISPARITIES IN OBESITY: LIMITED ENGLISH PROFICIENCY
AND HEALTH, A FUNDAMENTAL CAUSES
APPROACH

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ABSTRACT

The present study contributes to the sociology of health and illness by applying Link and Phelan's theory of fundamental causes of disease to the study of language competence and health. The study answers the following research question: How does being limited in English proficiency (LEP) influence the effects of being obese on the prospects of having been diagnosed with heart disease for California residents? The project examines interaction effects between English competence and obesity to determine the partial effects of obesity and English competence on heart disease using secondary data from the 2011-2012 California Health Interview Survey.

Contrary to expectations, findings indicate that individuals who are limited in English proficiency and are not obese (or overweight) have the lowest odds of being diagnosed with heart disease. Furthermore, findings indicate, consistent with expectations, that individuals who lack English competence have higher chances of experiencing the effects of obesity and overweight on heart disease compared with English proficient counterparts. Findings suggest that LEP and English proficient individuals deal differently with mechanisms linked with disease.

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I would like to thank my family for their love and support.

CHAPTER 1

INTRODUCTION

Contemporary epidemiology disproportionately focuses on risk factors to explain the poor health of individuals, and it has effectively alerted the public about the potential harms of risk factors (Link and Phelan 1995). The general public, for instance, widely accepts that smoking causes cancer. If people do not smoke, then they would not develop lung cancer. This logic interprets people's engagement in smoking (risky behavior) as the main explanation for the health condition of smokers with lung cancer. Similarly, people think of eating fast food as an unhealthy habit. People who frequently eat at fast food places are more likely to become obese and more likely to develop chronic illnesses, such as heart disease or type II diabetes. Eating at fast food places is considered a risk factor because it puts people at risk of disease, and for many, it is the primary explanation for why people experience heart disease and type II diabetes.

A disadvantage to risk factor epidemiology is the disproportionate attention given to risk factors because it reduces scope of relevant factors to risk factors, often referred to as life-style factors and biological factors. This framework may lead researchers to undermine the social factors shaping disease, and the overall social context through which social and individually-based factors operate (Link and Phelan 1995). Risk factor epidemiology would readily dismiss language competence as just a proxy for the more "meaningful" factors.

The present project's contribution is the addition of English competency as a factor that impacts health. The project presents an approach modeled on the framework suggested by Link and Phelan (1995) that focuses on a specific social condition, language competence, and its role in health. This approach treats social conditions as the "fundamental causes" that cause people to have poor health (Link and Phelan 1995). Not unlike how life-style risk factors put people at risk of interacting with proximate factors, fundamental social factors put people at risk of engaging with life-style risk factors and other mechanisms. Link and Phelan argue that lack of resources, such as individual social economic status, are persistent fundamental causes of disease. Throughout centuries, researchers have linked an array of life-style and biological factors with disease, but addressing specific risk factors has not eliminated the fundamental relationship between socioeconomic status and disease (Link and Phelan 1995). Addressing health inequalities inevitably requires addressing fundamental social conditions.

The present study is situated within the context of fundamental social causes, and it investigates English competence as an additional, previously unidentified fundamental cause of disease. This analysis specifically focuses on individuals' interactions with known mechanisms that lead to chronic illness, such as obesity and heart disease. A guiding research question is how do social conditions contribute to disease progression for individuals with little English proficiency? The study focuses on English proficiency and being obese and their effects on heart disease. I conducted a secondary data analysis of the adult portion of the 2011-2012 California Health Interview Survey (CHIS).

The study explores the following research question: how does being limited in English proficiency (LEP) influence the effects of being obese on the prospects of having

been diagnosed with heart disease for California residents? I use logistic regression analysis to examine the independent effects of LEP and obesity, along with control variables for years lived in the United States, education, and annual family income, on heart disease. I examined interaction effects between LEP and obesity to determine the partial effects of obesity for LEP and English proficient individuals on the odds of being diagnosed with heart disease.

The present study builds upon the existing knowledge on the subject of English proficiency and health. The study accomplishes this by identifying the limitations of previous studies, and, through the use of contemporary data, applying the fundamental causes approach to the empirical case of language proficiency/competence and its relationship to health. Additionally, the efforts made to contextualize findings allow for further research opportunities to investigate language competence and health. The efforts made to contextualize disease mechanisms also highlight the importance of fundamental social structures that create health inequalities, which aids the development of effective public health policy in California.

CHAPTER 2

LITERATURE REVIEW

Risk factor epidemiology comprehends risk factors as the fundamental factors shaping health inequalities. This paradigm in turn produces a disproportionate attention to life-style and biological factors in health research and often disregards social conditions (Link and Phelan 1995). Under this paradigm, social conditions are proxies for proximate causes. Life-style and biological factors are considered independent of social conditions. This paradigm understands, for instance, that a person who frequently eats at fast food places is very likely to develop poor health regardless of social status or other social factors.

In contrast, the fundamental causes approach comprehends social conditions as root causes of health inequalities (Link and Phelan 1995). Under this paradigm, it is the social conditions that are independent of risk factors, and these social conditions fundamentally shape health inequalities. Social conditions expose individuals to agents that make them sick. Life-style and biological factors are considered mere mechanisms linking social conditions and disease. For example, many people with low socioeconomic status (SES) lack the means to avoid living in places overwhelmed with fast food restaurants. As a result, they are more likely to engage in risky behavior (eating foods that are high in sugars, fats, and salts). This approach therefore focuses more on social conditions than risk factors.

Critics of the risk factor paradigm argue that it pushes forward a rhetoric of risk (see Lupton 1993 for an analysis on risk discourse). Once we identify that eating fast food leads to heart disease (we may call eating fast food a risk factor), it becomes a moral obligation (Lupton 1993) not to eat it. Thus, we may look down upon those who eat fast food because we all know that eating fast food is bad for our health. The undertone of this logic is that those who eat fast food have only themselves to blame if they develop heart disease.

As Lupton (1993) argues, risk discourse is ideologically and politically charged, and it often blames the victim for their poor health. Researchers using a paradigm that solely focuses on disease risk factors (factors that reside within the individual) may innocently engender risk discourse while neglecting social factors (like the deprivation of resources at the societal level). This is not to say that research on mechanisms and disease is unimportant, but rather that the findings must ultimately be linked to social conditions to be meaningful (Link and Phelan 1995; Phelan, Link, and Diez-Roux 2004; Link, Phelan, Miech, and Westing 2008; Phelan, Link, and Tehranifar 2010).

Fundamental Causes of Disease

Link and Phelan (1995) published their work on fundamental social causes in the midst of the Clinton administration's attempt to reform healthcare. Link and Phelan argue that social conditions are the key factors that must be addressed for effective public health policy since they fundamentally affect the distribution of disease (Link and Phelan 1995). The authors' focus on social conditions departs from the current epidemiological discipline that emphasizes risk factors.

Socioeconomic status (SES) has been historically linked with negative health status. Scholars have observed this link for centuries (Syme and Berkman 1976), and the association between SES and health has persisted over time. So why is it that people with lower SES are more susceptible to disease than those with higher SES? Researchers have traditionally focused on the risky behaviors lower SES individuals typically engage with. This portrays the risk factor paradigm. For instance, working class individuals are more likely to live in poor housing conditions, be exposed to dire sanitation, and work in harsh working conditions (Link and Phelan 1995). As a result, they are more likely to develop disease. Disengagement in risky behaviors will result in better health even for lower SES individuals. This approach focuses mainly on mechanisms. The risk factor paradigm argues for addressing mechanisms in public health policy, and at times this has led to reductions in incidence of specific diseases (e.g. dysentery). However, Link and Phelan argue that addressing mechanisms does little to eliminate fundamental relationships. If the connection between social conditions and disease is fundamental (as Link and Phelan argue), social conditions will still create health inequalities even after eliminating specific disease mechanisms.

For example, despite drastic improvements made to housing, sanitation, and working conditions (the leading factors linked with disease during the 1960s), health inequalities remain to this day. Link and Phelan explain that the efforts made by reformers did not affect the fundamental relationship between SES and health status. The fundamental problem rests in the social conditions not the particular mechanisms that appear to be the basis for health inequalities. By the 1960s, poor working conditions, housing, and sanitation were no longer significant factors affecting the distribution of

disease. However, other formerly unknown factors, such as smoking, lack of exercise, and poor diet, progressively became leading factors affecting the distribution of disease (Link and Phelan 1995). In other words, although low SES individuals were no longer getting sick from poor working conditions, housing, and sanitation, they were getting sick for smoking, not exercising, and having a poor diet, novel varieties of risky behaviors.

According to Link and Phelan (1995), fundamentally, the poor working conditions, housing, and sanitation were not causing lower SES to have poorer health, but rather, it was the lack of resources. Socioeconomic status is a root of health inequalities itself. People with low SES do not have the adequate means to choose where to work or where to live. They also lack the means to reduce the detrimental health effects of poor housing and poor working conditions. People's status determines their well-being. With proper resources, people would avoid the mechanisms that are known to endanger their health, or alternatively, people would be better prepared to deal with them. People with lower SES individuals lack the resources to avoid or reduce the damaging health effects of smoking, lack of exercise, and poor diet. Central to the fundamental causes approach is recognizing the presence of social conditions even when mechanisms (risk factors) change throughout history.

Link and Phelan argue that fundamental causes are linked to disease through a "variety of mechanisms" (1995:81) or what Lutfey and Freese (2005:1328) call a "multiplicity of mechanisms" that propagate "fundamental relationships." Fundamental social causes will continue to create health inequalities through an assortment of mechanisms. In other words, social conditions are able to shape health inequalities in several different ways including some that may not be obvious in the present.

Interventions addressing specific mechanisms only diminish the importance of the mechanisms themselves, but they do not address unforeseen mechanisms that later arise. Therefore, to address on-going health inequalities, we must comprehend social conditions as fundamental causes that create disease. Individuals are situated in a social context that does not provide the means for all individuals to manage mechanisms leading to disease. Focus must therefore be placed on the “fundamental factors that put people at risk of risks” (Link and Phelan 1995:85).

Researchers employing the risk factor paradigm may innocently diminish the importance of social factors. Some even suggest that social factors have, at best, modest effects on disease while others more drastically disregard social factors as mere “proxies” for the “real” causes of disease (Link and Phelan 1995:84). However, even though social conditions do not create disease at the molecular level, they create disease at the distal or more distant level. Causal effects for fundamental social causes are situated outside the individual. Social conditions breed disease by leaving certain individuals without the means to avoid disease.

Risk factors cannot be separated from the social conditions without losing sight of its function in regards to the distribution of disease. Thus, research findings investigating mechanisms should always be interpreted within social context to highlight the importance of social factors. In other words, we need to “contextualize risk factors” (Link and Phelan 1995) by (1) using a framework that highlights the social factors that expose people to risk factors and (2) identifying social conditions that link certain risks factors to disease. This is what Link and Phelan (1995) mean by investigating the fundamental causes that put people at risk of risks. It is not enough to identify risk factors leading to

heart disease without the social context in which the mechanism operates linking social conditions and disease.

Link and Phelan (1995) identify four essential components of fundamental causes. The current research is situated within these components. (1) A fundamental cause affects multiple disease outcomes, so it affects overall health rather than one particular disease. (2) Fundamental relationships are connected through an array of prevalent and unforeseen mechanisms. (3) A fundamental cause essentially involves access to resources. In other words, those with more resources are able to enjoy better health because they are better equipped to avoid known mechanisms linked with disease or diminish their effects. (4) A fundamental cause will retain its association with health over time (through the replacement of mechanisms process).

How does the theory of fundamental causes apply to the study of language competence and health? Essential to the present research is the idea that language is a form of capital, a resource that can be used for social exchanges (Bourdieu 1977). In the next section I review the literature on English competence and health using the aforementioned components as guidance. Research on LEP and health presents ample evidence suggesting that LEP is a fundamental cause of disease. Much of the literature has focused on the following research areas: health care access, quality of care, and overall health status.

The present study will significantly contribute to the literature on LEP and health by addressing some of the limitations of previous studies. First, the present study deals with English proficiency in a direct manner by using a measure that directly measures participants' self-reported English competence. One study uses survey language as a

measure for participants' language, but it may not reflect participants' competence in English. Second, most previous studies do not control for recent immigrant effects. This is addressed in this study. The effects of being a recent immigrant are separated from limited English competence. Third, the present study includes measures of SES, such as education and income, and controls for their effects since some studies could not include them in their analyses.

English Competence

Bourdieu (1977:651) posits that “linguistic competence” results in “linguistic capital” given its relationship with the conditions of a certain linguistic market. In market conditions in which English speakers control key institutions, English competence acts as a form of capital because it allows individuals to navigate through institutions. English capital then is a resource individuals can use to avoid or lessen the effects of mechanisms that could negatively impact their health. The literature suggests that people with low levels of English competence may suffer discrimination, or have trouble communicating with health care personnel, among many other disadvantages.

Such conditions are inherently tied to power relations over the control of the instruments of “production and reproduction of producers and consumers” (Bourdieu 1977:651). Control over the instruments means having control over the value of linguistic competence and therefore control over linguistic capital. Those who control of the instruments of “production and reproduction” such as the education system set the conditions of the value of linguistic competence, in this case English competence. English is the “dominant language” that is imposed by holders of the instruments through “agencies of linguistic coercion” (Bourdieu 1977:651-652). An in-depth review of

linguistic power struggles in California is not included in the present study. Nevertheless, it is very apparent the ways English is imposed on people in California through the education system (most notably) but also through health care. This how language is “coerced” upon individuals: they either accept the dominant language or suffer the consequences. Access and adequate use of health care are possible mechanisms linking LEP and health among many others.

Multiple Health Outcomes

Substantial research suggests that LEP influences health status. Researchers have found associations between LEP and overall poorer health status (Alizadeh-Khoei, Mathews, Hossain 2011; Eamranond, Legedza, Diez-Roux, Kandula, Palmas, Siscovick, and Mukamal 2009; Kandula, Dauderdale, and Baker 2007; Mui, Kang, Kang, and Domansky 2007; Nguyen and Reardon 2013; Ponce, Hays, and Cunningham 2006; Stentell and Braun 2012). For example, using data from the 2001 California Health Interview Survey (CHIS) Kandula, Dauderdale, and Baker (2007) find that among all ethnicities, respondents with limited English proficiency had worse self-reported health compared with English-proficient respondents after controlling for SES. This finding suggests, apart from linking LEP to disease, that the effects of LEP on health outcomes cut across racial and class lines. Furthermore, Ponce et al. (2006) using the 2001 CHIS find that LEP adults experience significantly worse health compared with adults that only speak English. Similarly, Sentell and Braun’s (2012) analysis of the 2007 CHIS suggests that LEP is significantly associated with poorer health status compared to both, those that are not LEP and those who have low health literacy, among Latinos, Vietnamese, Whites, and other race/ethnicity. These findings highlight a consistent association between the

lack of access to English and its associated capital and overall health status. To be sure, these findings suggest that access to English capital is associated with health status regardless of race or class.

In contrast to the substantial research on overall health, the amount of research examining the effects of LEP on multiple disease outcomes is limited. Associations with multiple health outcomes is a core component in Link and Phelan's theory. Nevertheless, Mui et al. (2007) find that among Chinese and Korean elders, lack of English capital is associated with poorer health outcomes for six of their eight health measures. The associations are significant for physical functioning, physical limitations, general health, vitality, social functioning, and mental health, and not significant for bodily pain and emotional limitations (Mui et al. 2007). Eamranond et al. (2009) find associations with speaking Spanish at home and higher systolic blood pressure, fasting LDL cholesterol, and fasting blood glucose among Hispanic adults with hypertension, hypercholesterolemia, or diabetes. These findings suggest that access to English capital is associated with multiple physical health outcomes in some respects.

Access to Resources

There is strong evidence suggesting that LEP is associated with limited access to resources. Studies find that LEP individuals are less likely to access health care services (Alizadeh-Khoei, Mathews, Hossain 2011; Andrulis and Brach 2007; Kim, Loi, Chiriboga, Jang, Parmelee, Allen 2010; Ponce, Hays, and Cunningham 2006; Stentell, Shumway, and Snowden 2007; Stentell, Braun Davis, and Davis 2013), have low levels of health literacy (Andrulis and Brach 2007; Lee and Choi 2012; Levya, Sharif, and Ozuah 2005; Masland, Kang, and Ma 2011; Stentell and Braun 2012), face

discrimination in health care facilities (Lauderdale et al. 2006; Schenker et al. 2010), and have communication problems with physicians (Lopez-Quntero et al. 2009; Schenker et al. 2010).

Overwhelmingly the literature shows that LEP individuals are less likely to use health care services. Andrulis and Brach (2007) suggest that LEP individuals may avoid health care facilities to avoid embarrassment and discrimination. The literature suggests that English competence is an important resource necessary to accurately interpret health prescriptions and communicate well with health care workers. For instance, Stchenker et al. (2010) report that LEP patients (in addition to have lower trust in clinicians) have suboptimal communication with their physician, which includes physicians' lack of explaining things in a way they could understand, physicians not involving them in decisions about their health, and physicians not understanding the kinds of problems they have in carrying out recommended treatment. Not having English competence seems to be a resource that negatively affects the doctor patient relationship. The authors do note one exception however. Patients with LEP are less likely to report physicians not listening to them compared with English-speakers (Stchenker et al. 2010). The last finding suggests that there could be some positive effects (though this one seems small in comparison) along with negative ones (which I further elaborate on the next section).

Risk Factors

There is little research on LEP and risk factors. DuBard and Gizlice (2008) find that rates of chronic disease, obesity, smoking, and binge drinking are significantly lower among Spanish-speaking Hispanics (those who chose to complete the survey in Spanish) compared with English-speaking Hispanics (those who chose to complete the survey in

English). The DuBard and Gizlice (2008) reason that low acculturation has protected LEP individuals from adopting unhealthy American lifestyles. The authors report low prevalence of arthritis, asthma, high blood pressure, and obesity, and they further clarify that these differences were not explained by age, gender, and educational attainment differences (DuBard and Gizlice 2008). Furthermore, the researchers reason that the lower rates in chronic illness could be explained by the “healthy immigrant” effect since the regions in which rates of chronic disease are lower are in those that have the most recent U.S. immigrants (DuBard and Gizlice 2008:6). However, the researchers do not actually control for the moderating effects of being a recent immigrant. The current project includes a variable indicating years of stay in the U.S. to control for recent immigrant effects.

Positive Health Outcomes: Countervailing Mechanisms

Research suggest that some protective effects are associated with limited in English competence as suggested by DuBard and Gizlice (2008). These protective effects are what Lutfey and Freese call “countervailing mechanisms” which work in the opposite direction in the context of fundamental causes (2005:41). At first glance, countervailing mechanisms seem to undermine the theory of fundamental causes since they produce positive health outcomes. However, countervailing mechanisms’ positive health effects are smaller than the overall set of mechanisms that produce negative health outcomes (Lutfey and Freese 2005). Spanish-speaking Hispanics in DuBard and Gizlice’s (2008) study are associated with lower engagement with risk factors such as smoking and binge drinking (countervailing mechanisms) compared to English speaking-Hispanics; nevertheless, the study also finds associations between Spanish-speaking Hispanics and

poorer overall health status. The “net” effects on Spanish-speaking Hispanics’ health are negative overall.

Additional studies find similar countervailing mechanisms in action. Collins, Jimenes, and Grineski’s (2012) study of a community impacted by a flood disaster find associations with English-deficiency and positive outcomes in physical and mental health. These findings seem counterintuitive because being limited in English proficiency would seem to make it difficult for individuals to access information and resources (Collins, Jimenes, and Grineski 2012). Douglas, Delpachitra, Paul, McGain, and Pilcher (2014) also find a relationship between non-English speaking status and increased survival after admission to intensive care unit, which also suggests that some positive health effects are associated with LEP. However, Douglas et al. (2014) note that the study is limited because it only focuses on one particular hospital and it does not control for socioeconomic status. Therefore, their findings should be interpreted with caution.

The present study investigates individuals’ relationship with a particular risk factor leading to heart disease: being obese. The study is situated within the fundamental causes framework which suggests that those who lack English competence will have fewer resources available to avoid or diminish the harmful health effects of being obese compared with those with English competence. The study deliberately controls for the effects of education and income (which are other forms of resources) which could diminish the effects of linguistic competence. Here I conceptualize English competence as an additional component of SES. The inherent assumption in this study is that differences between LEP individuals and non-LEP individuals are due to the fewer

available resources (e.g. linguistic capital) LEP individuals have. I test the following hypotheses:

H₁: Those who are limited in English proficiency will have a higher probability of having heart disease than those who are English proficient.

H₂: Being obese will have different effects of being diagnosed with heart disease based on whether or not the respondent is limited in English proficiency. The effects of being obese will be higher for those with LEP.

CHAPTER 3

DATA AND METHOD

The project uses secondary survey data to test the hypotheses. It analyzes the data using bivariate comparisons and logistic regression. The bivariate comparison provides descriptive statistics for respondents who are limited in English proficiency (LEP) and those who are English proficient (EP). The logistic regression model predicts heart disease. This model helps to test the first hypothesis because it allows me to examine the independent effects of limited English proficiency and obesity. The logistic regression model also includes an interaction between LEP and obesity that allows me to test the second hypothesis and determine whether obesity has different effects for the LEP and EP populations.

The logistic regression model presents the effects of variables as logits. However, it is difficult to interpret logits substantively. Therefore, I calculated predicted probability to make findings easier to interpret.

Data for this study come from the adult portion of the 2011-2012 California Health Interview Survey (CHIS) conducted by the UCLA Center for Health Policy Research in collaboration with the California Department of Public Health and the Department of Health Care Services (UCLA Center for Health Policy Research, 2012). The cross-sectional survey focuses on providing comprehensive data on the health of Californian citizens. The telephone survey is representative of California's

noninstitutionalized adult population. The researchers use traditional landline random-digit-dial (RDD) and cell-phone RDD sampling frames. The combined (landline and cell phone) response rate is 35.1%. The CHIS is conducted in English, Spanish, Chinese (Cantonese and Mandarin dialects), Korean, Tagalog and Vietnamese to ensure that diverse ethnic groups are represented. The analytical sample size is 42,935. The large representative sample of California's population assists generalizability. More information on the survey's methodology is available at the CHIS website (UCLA Center for Health Policy Research, 2012).

Operationalization of Variables

I created a dummy variable operationalizing the key independent variable, whether the respondent is limited English proficient (response =1) or English proficient (0), from the combination of language spoken at home and an additional question asking what language the respondents spoke at home. The survey also asks respondents who spoke any language at home besides English, "Since you speak a language other than English at home, we are interested in your own opinion of how well you speak English. We are interested in your own opinion of how well you speak English. Would you say you speak English very well, well, not well, or not at all?" Respondents who answered "not well" and "not at all" are included in the LEP category. Those who answer "very well" and "well" and those who do not speak a language at home besides English are included in the English proficiency category.

I created two dummy variables operationalizing the respondents' weight status based on Body Mass Index (BMI) criteria. BMI is used as specified by National Institute of Health (NIH) to determine "risk for certain diseases such as heart disease, high blood

pressure, type 2 diabetes, gallstones, breathing problems, and certain cancers.” The NIH suggests that a higher BMI carries a higher risk for developing disease. The NIH defines obesity as a BMI score of 30.0 and above, and overweight as 25.0 to 29.9. I created two dummy variables—obese (yes = 1) and overweight (yes = 1). The individual is not obese or overweight is the reference category.

I created a dummy variable operationalizing the key dependent variable, whether the respondent has been diagnosed with heart disease (response = 1) or not (0), from the following question, “Has a doctor ever told you that you have any kind of heart disease?”

The logistic regression model also includes a series of control variables. Demographic variables are included to control for effects of age, gender, education, and income. The age variable is interval and it ranges from 18 to 85 years of age. The gender variable is a dummy variable for female (female = 1, male = 0). Education is a categorical variable. I created dummy variables for less than high school, high school, and some college to include them in the logistic regression model. Having at least a college degree is the reference category. Income is measured as annual household income, and it ranges from 0 to \$300,000.

Furthermore, the model also includes a variable for years of stay in the U.S. It consists of four categories: nine years or less, ten to fourteen years, fifteen or more, and born in the U.S. (the reference category). I added this variable to control for recent immigrant effects. Similarly, the model controls for risk factors that may account for the effects of LEP on heart disease. The risk factor variables are smoking, eating fast food, and walking for leisure. Smoking is a categorical variable that indicates whether the respondent smokes, quit smoking, or has never smoked regularly (the reference

category). The fast food variable is a continuous variable that measures the number of times the respondent ate fast food over the last seven days. The answers range from 0 to 30 times a week. Finally, the walking for leisure variable measures the number of times the respondent walked for leisure over the last seven days. Responses range from 0 to 99 times a week.

Statistical Methods

The present study analyzes the 2011-2012 CHIS data using IBM SPSS Statistics 21. In all analyses, weights are used to compensate for complex sample design in order to obtain unbiased population estimates. I first used bivariate comparisons, or cross-tabulations, to provide descriptive statistics respondents who are limited English proficient and English proficient separately. I then used a logistic regression model predicting heart disease to assess the independent effects of limited English proficiency and obesity. I used the Bayesian Information Criterion, commonly referred to as BIC, to assess the preferred model. I also used an analysis of variance test to analyze obesity by years of stay in the U.S.

As previously mentioned, the logistic regression model shows the effects as logits. Even though logits can be converted into odds, both are difficult to interpret in a substantive manner. Predicted probability is, therefore, calculated using the following formula: predicted probability = $\frac{e^{\text{logits}}}{1+e^{\text{logits}}}$, where e is Euler's number (approximately 2.718281). Also, since the logistic regression model includes interactions, the effects of LEP are affected by both, the partial effects of LEP by overweight and the partial effects of LEP by obese. In order to calculate substantively the effects of LEP, I assigned values for each variable in the model to calculate overall predicted probability. For practical

purposes, I selected values that resemble a typical person with heart disease. The typical case is a 66 year old (median age for those diagnosed with heart disease) man (mode), with at least a college degree (mode), a family income of \$40,000 (median), who was born in the U.S. (mode), never smoked regularly (mode), eats fast food once a week (median), and walks for leisure once a week (median). Keeping this set of variables constant, I compared predicted probability of individuals who are English proficient (which I call Case EP) and individuals who are limited in English proficiency (Case LEP) to assess the effects of English competence. I also compared predicted probability for individuals who are obese and English proficient (Case EP O) and individuals who are obese and limited in English proficiency (Case LEP O) to assess the combined effects of obesity and limited English competence. Also included are predicted probabilities for individuals who are overweight and English proficient (Case EP OW) and individuals who are overweight and limited in English proficiency (Case LEP OW).

CHAPTER 4

RESULTS

Bivariate Analyses

Descriptive statistics for the sample by English proficiency are shown in Table 1. Limited English proficient respondents are more likely to be obese. About 32.2% of LEP respondents are obese compared with 23.4% of English proficient respondents, a difference of 8.8 percentage points. The chi-square test reports a p-value of less than .000 which indicates that there is a statistically significant relationship between obesity and English proficiency. In addition, 44.6% of LEP respondents report poor health compared with 14.7% of English proficient respondents. There is an almost 30 percentage point difference between the two groups with more LEP respondents reporting poor health ($p < .000$). These findings seem to support the first hypothesis which predicts a greater likelihood of disease outcomes for LEP respondents.

About 6.34% of English proficient individuals have been diagnosed with heart disease. This is very similar to the 6.33% of limited English proficient individuals that have been diagnosed with heart disease. Fisher's test shows a p-value of less than .000 suggesting that the relationship is statistically significant at the 99.9% confidence level. This difference is minor however. More precise percentages for EP (6.338544%) and LEP (6.278937%) show a difference of 0.059607 percentage points. With a large sample size, very small group differences are often identified as significant. Still, the percentage

of individuals diagnosed with heart disease in California appears to be marginally larger for EP.

The median age for LEP respondents is 45, and for EP, the median age is 44. A slightly higher percentage of LEP are female (52.7%) compared with EP (51.0%). The distribution of educational attainment seems to be positively skewed for LEP. About 63% of LEP respondents have less than a high school degree, and only 8.3% have at least a college degree. Compared to LEP, the educational attainment is more evenly distributed at the higher levels for English proficient respondents. There is a negative skew in the distribution. Only 7.3% of English proficient have less than a high school education, 25.0% have a high school degree, 28.0% have done some college, and 39.7% have at least a college degree. A similar pattern is observed in the income distribution. The median income figure for limited English proficient respondents is \$22,000 compared to \$60,000 for English proficient respondents'. The low levels of education and income (variables that are frequently used to measure socioeconomic status) do suggest that individuals lacking English proficiency live in more difficult life circumstances with limited resources.

Furthermore, as predicted, a larger proportion of LEP respondents are recent immigrants (19.4%) compared with English proficient respondents (3.1%). About 2.5% of LEP respondents were born in the U.S. This suggests that "healthy immigrant" effects do not apply to at least some LEP individuals. Still, limited English proficiency may be indicative of people living in immigrant communities. About 16.2% of LEP individuals have been in the U.S. for ten to fourteen years compared to 2.8% of EP counterparts. The largest percentage of LEP individuals have been in the U.S. for 15 years or more

(61.8%). Sixteen percent of EP counterparts are immigrants who have been in the U.S. for 15 years or more. About 81.4% of LEP residents are Hispanic and 17.4% are of Asian descent.

Table 1. Descriptive statistics for limited in English proficiency and English proficient populations in the 2012 California Health Interview Survey
(unweighted N=42,935; weighted N=27,796,484)

	LEP	English Proficient
	Unweighted N=5,256	Unweighted N=37,679
	Weighted N=4,340,878	Weighted N=23,455,606
	Weighted sample (%)	Weighted sample (%)
Health variables		
Obese	32.2%	23.4%
Heart disease	6.3%	6.3%
Self-reported poor health	44.6%	14.7%
Demographics variables		
Age group	45 (median)	44 (median)
Female	52.7%	51.0%
Education		
Less than high school	62.9%	7.3%
High school degree	20.5%	25.0%
Some college	8.4%	28.0%
College degree or more	8.3%	39.7%
Household income	\$22,000 (median)	\$60,000 (median)
Years in the U.S.		
Years 9 or less	19.4%	3.1%
Years 10 to 14	16.2%	2.8%
Years 15+	61.8%	16.0%
Born in U.S.	2.5%	78.1%
Race		
Asian	17.4%	13.2%
Hispanic	81.4%	25.5%
Other	1.2%	61.3%

Multivariate Analyses

The logistic regression model is shown in Table 2. The outcome variable is having been diagnosed with heart disease. The model includes a series of demographic

and other control variables. Everything in the model being equal, the model shows that being limited in English proficiency reduces the odds of having been diagnosed with heart disease by 20.9%. The effect is statistically significant ($P < .001$). However, this estimate does not account for the interactions between LEP and overweight and obesity. The interaction LEP by overweight significantly increases the odds partially by 60.0% ($p < .001$) and the interaction LEP by obese significantly increases the odds partially by 27.8% ($p < .001$). Interestingly, being overweight significantly reduces the odds by 10.3% ($p < .001$), but being obese significantly increases the odds by 28.9% ($p < .001$). In order to assess the full effects of these factors, all the partial effects need to be taken into account.

There are six possible scenarios. The first case is a person who is English proficient and is not obese or overweight (Case EP). In this case, the interaction does not affect the prediction for having heart disease. Relatively, the odds are 20.9% higher than the limited in English proficient counterpart. The second case is a person who is English proficient and overweight (Case EP OW). In this case, the EP has 20.9% higher odds than LEP plus the interaction effects with overweight. The interaction partial effects are 60.0% lower odds than LEP. The third case is a person who is English proficient and is obese (Case EP O). Similarly, the odds are a combination of the partial effects of English proficiency (20.9% higher odds than LEP) and the partial effects of the interaction with obesity (27.8% lower odds than LEP). The next three cases are for limited English proficiency. The fourth case is a person who is limited in English proficiency and is not obese or overweight (Case LEP). The fifth case is a person who is limited in English proficiency and is overweight (Case LEP OW). The final and sixth case is a person who is limited in English proficiency and is obese (Case LEP O). Since the odds of English

proficient are relatively to limited English proficient, the odds for cases of limited English proficient persons is the reverse of English proficient cases, but as we can see, it is difficult to interpret what the odds signify in a substantive manner.

Table 2. Logistic regression model predicting heart disease

Regressor	B	Std. Error	Exp(B)	Sig.
Constant	-6.192	0.005	0.002	0.000
Demographics variables				
Age group	0.067	0.000	1.069	0.000
Female	-0.344	0.002	0.709	0.000
Education ^a				
Less than high school	0.099	0.003	1.105	0.000
High school degree	-0.066	0.002	0.937	0.000
Some college	-0.041	0.002	0.960	0.000
Household income (\$10,000)	-0.012	0.000	0.988	0.000
Years in the U.S. ^b				
Years 9 or less	-0.588	0.007	0.556	0.000
Years 10 to 14	0.055	0.006	1.056	0.000
Years 15 or more	-0.036	0.002	0.965	0.000
Risk factors				
Current smoker ^c	0.291	0.003	1.338	0.000
Quit smoking (used to smoke) ^c	0.265	0.002	1.303	0.000
Fast food	0.009	0.000	1.009	0.000
Walking for leisure	-0.014	0.000	0.986	0.000
Overweight	-0.108	0.002	0.897	0.000
Obese	0.254	0.002	1.289	0.000
Limited English proficiency ^d	-0.234	0.005	0.791	0.000
Interactions				
LEP by overweight	0.470	0.006	1.600	0.000
LEP by obese	0.245	0.006	1.278	0.000

^a reference: at least college degree

^b reference: born in the U.S.

^c reference: never smoked

^d reference: English proficient

Predicted probability is easier to interpret. I calculated overall predicted probability for each case using a predetermined set of values for the other variables in the logistic regression model to closely observe language and BMI. To be sure, the values are the following: The typical case is a 66 year old (median age for those diagnosed with heart disease) man (mode), with at least a college degree (mode), a family income of \$40,000 (median), who was born in the U.S. (mode), never smoked regularly (mode), eats fast food once a week (median), and walks for leisure once a week (median). Keeping this set of variables constant, I compared predicted probability of individuals who are English proficient (which I call Case EP) and individuals who are limited in English proficiency (Case LEP) to assess the effects of English competence. I also compared predicted probability for individuals who are obese and English proficient (Case EP O) and individuals who are obese and limited in English proficiency (Case LEP O) to assess the combined effects of obesity and limited English competence. Also included are predicted probabilities for individuals who are overweight and English proficient (Case EP OW) and individuals who are overweight and limited in English proficiency (Case LEP OW). The results are presented in Table 3.

Table 3. Predicted probability for typical case for English proficient and limited English proficient by overweight and obesity

	Case EP	Case EP OW	Case EP O	Case LEP	Case LEP OW	Case LEP O
Predicted Probability	0.1387	0.1262	0.1718	0.1130	0.1546	0.1733
Percentage	13.87%	12.62%	17.18%	11.30%	15.46%	17.33%

Table 3 shows the predicted probability for the six cases I am comparing. It should be noted that predicted probability, just like any regression output, are estimates of the true probabilities that requires a confidence interval. Calculating this in SPSS is beyond the scope of the current project, so instead I focus on the significance of the original variables and the substantive effects of LEP via predicted probabilities. By altering the characteristics of interest, we can see substantively the impact of the variable in the increase or decrease in predicted probability.

The predicted probability of having been diagnosed with heart disease for a typical case individual who is English proficient (Case EP) is about .1387. If the variable is changed to limited in English proficient (Case LEP), the predicted probability decreases to a .1130 chance of having been diagnosed heart disease. The predicted probability is lower for individuals who are limited in English proficiency. If the English proficient is overweight (Case EP OW), the predicted probability is a .1262 chance of heart disease. The limited in English proficient counterpart (Case LEP OW) has a predicted probability of .1546. For English proficient individuals, the predicted probability of having heart disease lowers by being overweight (assessed by BMI). In contrast, limited English proficient individuals have a higher predicted probability of having been diagnosed with heart disease. If the English proficient individual is obese (Case EP O), the predicted probability increases to .1718. If that individual is obese and limited in English proficiency (Case LEP O), the predicted probability increases to .1733. There is a sharp increase in predicted probability for English proficient individuals from overweight to obesity. Obesity also increases predicted probability for individuals with

limited in English proficiency. For LEP individuals, the chances of heart disease increase if they are overweight and continue to increase if they are obese.

Comparing Case EP and Case LEP, we see that being limited in English proficient brings the lowest probability of heart disease. LEP individuals, who are not overweight or obese, in the typical case I described, have the lowest probability of heart disease. The predicted probability for LEP is 2.57 percentage points lower than EP. However, this apparent advantage disappears for LEP individuals when their BMI levels reach overweight and obese. Case EP OW and Case LEP show 4.16 percentage point increase in predicted probability for limited English proficient individuals, but a 2.57 percentage point decrease in predicted probability for English proficient individuals. The effects of overweight seem to affect English proficient populations and limited in English proficiency populations differently. Case EP O and Case LEP O show a 3.31 percentage point increase for English proficient individuals who are obese (compared to those that are not obese or overweight) and a 6.03 percentage point increase for limited in English proficiency individuals who are obese (compared to those that are not obese or overweight). This also shows that obesity affects both populations differently.

The results have a few implications. The evidence shows that overweight and obese affect the limited English proficient populations and English proficient populations differently. The effects seem to be worse for those who are limited in English proficiency. This also suggests that risk factors may affect both populations differently. The evidence supports the second hypothesis: “Being obese will have different effects of being diagnosed with heart disease based on whether or not the respondent is limited in English proficiency. The effects of being obese will be higher for those with LEP.” The

effect of obesity on English proficient individuals (in the typical case) is a 3.31 percentage point increase in predicted probability compared to the 6.03 percentage point increase on LEP individuals. Moreover, the evidence shows that limited in English proficiency brings the lowest predicted probability of heart disease if the individual is not obese or overweight. Therefore, the evidence does not support the first hypothesis, “those who are limited in English proficiency will have a higher probability of having heart disease than those who are English proficient.” In the typical case, LEP individuals have the lowest predicted probability. We expect 11.30% of that LEP population segment to have heart disease and 13.87% of that EP population segment to have heart disease. The countervailing mechanisms approach suggests that healthy (non-overweight and non-obese) individuals may have some protective health effects by being limited in English proficiency. However, this is effect is no longer there when the LEP individual is overweight or obese.

The logistic regression model in Table 2 also shows the effects of control and demographic variables. Note that the effects of overweight and obesity discussed previously were calculated holding everything else constant. The effects of overweight and obesity in the typical case I described are for a person who was born in the U.S. The logistic regression model shows that the odds for recent immigrants (those who have been in the U.S. for nine years or less) are 41.2% lower than U.S. born individuals. This effect is statistically significant ($p < .001$). This result does suggest that recent immigrants are healthier than U.S. born individuals. Table 4 shows the means for obesity by years in the U.S. The U.S. born category, which is used as the reference category, has a mean of .2522. For individuals who have been in the U.S for one year or less, the mean obesity

score is .0494. For 2-4 years in the U.S., the mean is .1240, and for 5-9 years, the mean is .1726. For the first nine years in the U.S., immigrants appear to have better health (less obesity in average population). However, U.S. immigrants start to have worse health after 10 years as the results suggest. For 10-14 years, the mean for obesity increases to 0.2654 (higher than the mean obesity for the U.S. born category). Lastly, the 15 or more category shows a mean of 0.2559 which closely resembles the 0.2522 figure for the U.S. born category. The results for overweight resemble the pattern for obesity (presented in Table 5). The ANOVA test shows a p-value of less than .001. The differences between the groups are statistically significant. The results suggest that the health of immigrants (in terms of obesity) worsens the longer they reside in the U.S. It resembles the health of U.S. born counterparts in about ten to fourteen years.

Table 4. Obese by years in the U.S.

Years in U.S.	Mean
1 Year or less	0.0494
2 to 4 Years	0.1240
5 to 9 Years	0.1726
10 to 14 Years	0.2654
15 Years or more	0.2559
U.S. Born	0.2522

Table 5. Overweight by years in the U.S.

Years in U.S.	Mean
1 Year or less	0.3157
2 to 4 Years	0.3031
5 to 9 Years	0.3642
10 to 14 Years	0.3084
15 Years or more	0.3824
U.S. Born	0.3437

CHAPTER 5

DISCUSSION

Descriptive statistics indicate that 44.6% of California residents who lack English competency report poor health. This statistic is particularly high and even more so considering that 14.7% of English proficient residents report poor health. Similarly, rates of obesity are higher for residents who lack English competence, 32.2% versus 23.4%. Multivariate analyses, however, show that being limited in English proficiency brings the lowest odds of having heart disease. Nevertheless, the advantage that LEP individuals have disappears after taking into account interaction effects between language and overweight and obesity. The typical cases shown indicate higher percentage point increases for LEP individuals. Furthermore, ANOVA results indicate that levels of obesity increase the longer individuals reside in the U.S. and begin to resemble U.S. born counterparts in about ten to fourteen years. About 80.5% of LEP California residents are either born in the U.S. or have been in the U.S. for more than ten years. This suggests that about 20% of LEP residents experience the advantages of being limited in English proficient in regards to heart disease. However, 80% of LEP individuals do not experience these protective effects but do experience the effects of overweight and obesity at higher rates than EP individuals. This might help explain why a higher percentage of LEP residents report poor health compared to EP counterparts.

The evidence does not support the first hypothesis. Being limited in English proficiency actually brings the lowest odds of having heart disease. Note that this applies only for individuals who are not obese or overweight. The data does support the second hypothesis. The effects of both overweight and obesity are different for the LEP and EP populations. The effects are larger for individuals who lack English competence.

The principal goal of this research was to investigate the role of English competence as a possible fundamental cause. The study of obesity on heart disease for individual who are English competent and those who are not is the empirical example used to explore lack of English competence as a possible fundamental cause. Findings suggest that as long as LEP individuals are not in a context in which they struggle with obesity they have lower chances of having heart disease. However, for LEP individuals who are obese and overweight, the chances of having heart disease are higher than their EP counterparts. Obese or overweight LEP individuals may not have the linguistic capital necessary for better education and employment that EP counterparts enjoy. They might lack the necessary resources like information and income to adequately manage their condition. Everything else being equal, the effects of obesity and overweight are higher for individuals who lack English competence, so the possibility exists that lack of English competence alone may affect health.

Individuals with English competence and those without it may deal differently with mechanisms. According to Link and Phelan (1995), individuals with more resources are better equipped to avoid known mechanisms linked with disease or diminish their effects. Even though being obese increases the odds of disease for both groups, the effects are larger of LEP individuals. A potential explanation may lie in the disparities in

resources needed to deal with detrimental health effects concerning relative weight. In other words, healthy individuals who are not obese do not have to allocate their resources to deal with obesity. In contrast, those who are obese need to use their resources to deal with obesity if they do not want to experience the damaging health consequences.

Therefore, because there is an apparent difference in available resources between those who have English competency and those who do not, the effects of mechanisms (such as overweight and obesity) are augmented and disparities in health stand out. This logic follows that individuals with English competence are able to use their linguistic resources more effectively to avoid or lessen the effects of mechanisms. Individuals with little English competence have a diminished social network because of the language barriers that hinder communication with English speakers. English speakers are also likely to hold connections to formal institutions such as education and health care. In contrast, LEP individuals may lack such connections. If having social connections is interpreted as resource having a positive net effect on health, then hypothetically, LEP individuals have less of this resource.

Furthermore, being limited in English proficiency does seem to have a protective effect on a segment of the LEP population. The present study controls for being a recent immigrant, education, and income. Therefore, the disparities in health are not due to the “healthy immigrant” effect as DuBard and Gizlice (2008) suggest. Evidence presented here suggests that the healthy immigrant effect diminishes after the individual has resided in the U.S. for ten to fourteen years or more, which is close to 80% of the LEP population. Still, protective effects for individuals who have limited English competence remain after accounting for education and income which indirectly supports Douglas et

al. (2014) and Collins, Jimenes, and Grineski's (2012) findings. Particularly for those who are not overweight or obese, heart disease seems to be a "countervailing mechanism" (Lutfey and Freese 2005:41) for overall health status among the LEP population. Yet, a larger proportion of LEP respondents report poor health than English proficient respondents. This is supported by a large body of research linking poor health and LEP (Kandula, Dauderdale, and Baker 2007; Mui, Kang, Kang, and Domansky 2007). Kandula, et al. (2007), Ponce et al. (2006) and Sentell and Braun (2012) find similar findings studying earlier CHIS surveys. Since health and SES, in this case, English competence are theoretically linked and maintained through an array of mechanisms, the assertion that English competence is a fundamental cause is not weakened by this particular finding.

Latino Health

Close to 80 percent of the sample identifies as Hispanic or Latino/a, so limited English proficiency could very well be a proxy for Latino immigrant health. Researchers have recognized that despite their low levels of socioeconomic status and disproportionate representation among the poor, Latinos have shown higher life expectancy and lower all-cause mortality contrary to conventional expectations (Dubowitz, Bates, and Acevedo-Garcia 2010). Researchers have named this occurrence the Latino immigrant health paradox—despite their lower socioeconomic standing, foreign Latinos have overall better health outcomes, contrary to what we would expect (Dubowitz, Bates, and Acevedo-Garcia 2010).

The current research posits that linguistic capital, in this case English capital, is a resource that shapes the distribution of disease in a given population. This closely

resembles Link and Phelan's (1995) notion that socioeconomic status fundamentally shapes the distribution of disease since linguistic capital is conceptualized as a form of SES. The Latino health paradox, however, seems to undermine this research's and Link and Phelan's argument. Latino immigrants seem to surpass health expectations albeit lacking English capital (and other forms of SES) even though the lack of resources supposedly hinders good health. The current research does seem to support this to some degree.

The current research does not provide evidence that explain the paradoxical patterns of Latino health. Nevertheless, the study does find that being limited in English proficiency has protective effects for individuals who are not overweight or obese. The study finds that being limited in English proficiency actually brings lower odds of having heart disease compared with being English proficient. Dubowitz et al. (2010) have identified possible explanations that could explain the Latino health paradox.

One explanation is the "cultural orientation" of Latinos and strong social networks (Dubowitz et al. 2010). This view suggests that Latino immigrants are situated in a context that presumably promotes healthy behaviors. DuBard and Gizlice's (2008) do find that Spanish-speaking Hispanics are less likely to engage in risky behaviors. Perhaps the strong supportive networks in these communities buffer from risk factors. Limited English proficiency may prevent or delay acculturation and the adoption of unhealthy American lifestyles.

Researchers also reason that the Latino health paradox could be the result of immigrant selection processes (Dubowitz et al. 2010). This view suggests that persons who immigrate are healthier than those who do not. A parallel to this view suggests that

unhealthy immigrants are also likely to return to their country. Therefore, the lower odds of heart disease linked with limited English proficiency may actually be due to immigrants with heart disease moving out of the U.S., so there is an overrepresentation of those who do not have heart disease.

A third explanation suggests that data artifacts such as the undercounting Latino deaths, inconsistent definitions of Latino identity, and underreporting of health problems may explain the patterns identified as a paradoxical (Dubowitz et al. 2010). Research has documented that those who lack English competence are less likely to access health care services (Alizadeh-Khoei, Mathews, Hossain 2011; Andrulis and Brach 2007; Kim, Loi, Chiriboga, Jang, Parmelee, Allen 2010; Ponce, Hays, and Cunningham 2006; Sentell, Shumway, and Snowden 2007; Stentell, Braun Davis, and Davis 2013). Therefore, the number of LEP individuals with heart disease may be higher than what the sample indicates.

Regardless of why the Latino paradox exists, the seeming advantage that immigrants have disappears if they are overweight or obese. The effects of overweight and obesity are greater for those who lack English competence. The evidence provided shows that rates of obesity and overweight for LEP populations increase and resemble that of U.S. born counterparts the longer they reside in the U.S. It appears that the protective effects that may have shield immigrants from risk factors are no longer there after residing in the U.S. for at least 10 to 14 years. Antecol and Bedard (2006) similarly find that immigrants' health declines the longer they live in the U.S. Female immigrants resemble American BMI levels within 10 years of arrival, and men resemble American BMI levels within 15 years (Antecol and Bedard 2006). Thus, it appears that overweight

and obesity moderate the Latino health paradox. Those who are obese or overweight are not shielded by the protective effects associated with Latino health, and without these, the detrimental health consequences of being obese or overweight are greater in likelihood for LEP individuals than their EP counterparts.

“Countervailing mechanisms” approach suggests that while there might be positive health advantages to being limited in English proficiency at some points, on the aggregate, being limited in English proficiency produces negative health outcomes. Research does show that the health of immigrants declines over time the longer they reside in the U.S. The current research shows that, everything else being equal, being overweight or obese and lacking English competence bring higher odds of having heart disease compared with English competent counterparts. The Latino health paradox, therefore, does not entirely undermine the conclusions of this project.

Further research should not focus more on the life-styles of LEP individuals than the social factors that cause overweight and obese individuals with LEP to be more susceptible to heart disease. For instance, Lopex-Quintero et al. (2009) and Schenker et al. (2010) suggest that LEP individuals have trouble communicating with their physicians. Perhaps this suboptimal experience with the health care system prevents LEP overweight people from making healthier food choices. However, effective communication in health care is but one dimension in the experiences of health for LEP individuals. Evidently, the social conditions leave LEP individuals with limited access to health care resources. Noteworthy dimensions are the deprivation of education and income for LEP individuals (shown in the bivariate analyses). Even though the study takes into account income and education, it must be noted that the experience of LEP and English proficient individuals

in California is not the same one. Those with high levels of income and education who are LEP can still face discrimination in the work place, the education system, and health care because they lack linguistic resources. Still, a large proportion of LEP individuals have less formal education and income compared to English proficient individuals. Further studies should investigate the ways in which LEP and English proficient individuals use income and education, as resources, to deal with disease mechanisms.

Limitations

Previous research suggests that LEP individuals are less likely to visit health care facilities. Since many do not access health care facilities, it is likely that LEP individuals who have heart disease are underrepresented in this sample. Also, the logic regression analysis does not control for race and ethnicity. This is was difficult to achieve because the race variable in data set used easily obscures the effects of limited English proficiency.

By controlling for the effects of income, education, race, age, years in the U.S, I tried to isolate the potential effects of linguistic capital. Flaskerud and DeLilly (2012) argue, however, that it is difficult to test the importance of resources because it would require a situation is in which high SES individuals cannot use their resources to minimize disease outcomes. This also applies to the study of language competence and health. Phelan, Link, Diez-Roux, Kawachi, and Levin (2004) did identify one situation in which high SES individuals are not able to use their resources. In situations in which there is little knowledge about the disease (because it is a newly discovered disease, or no cure has yet been found), high SES individuals do not have viable ways to allocate their resources in order to deal with the disease. Further studies should investigate the

distribution of disease for which no cure has been found. Another method is perhaps a qualitative approach to fundamental causes. Qualitative research's ability to generate rich, contextual, in-depth data is ideal to examine the importance of linguistic resources to deal with disease outcomes and mechanisms at the micro level.

CHAPTER 6

CONCLUSION

This study applies Link and Phelan's theory of fundamental causes of disease to the study of language competence and health. The project examines interaction effects between English competence and obesity to determine the partial effects of obesity and English competence on heart disease. Contrary to expectations, findings indicate that individuals who are limited in English proficiency and are not obese (or overweight) have the lowest odds of being diagnosed with heart disease. Furthermore, findings indicate, consistent with expectations, that individuals who lack English competence have higher chances of experiencing the effects of obesity and overweight on heart disease compared with English proficient counterparts. Findings suggest that LEP and English proficient individuals deal differently with mechanisms linked with disease.

This study emphasizes the importance of "contextualizing mechanisms" by focusing on the structural elements that cause individuals with limited English proficiency to have poor health. The study presents an overall argument for the focus in public health policy on the structural conditions that ultimately cause individuals to become ill.

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