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**ACCULTURATION AND DISABILITY
IN MEXICAN AMERICAN OLDER ADULTS**

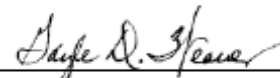
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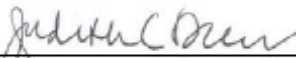
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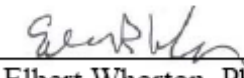
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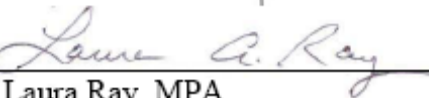
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**Acculturation and Disability
In Mexican American Older Adults**

by

Mary Ellen Kuhlmann, B.S., M.S., Ph.D.

Dissertation

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Dedication

This work is dedicated to my husband and to my family.

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Acculturation and Disability in Mexican American Older Adults

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Abstract: The purpose of this study is to examine acculturation and disability in Mexican American older adults living independently in the southwestern United States. **Design:** A prospective cohort study (1993-2005). **Setting:** Texas, New Mexico, Colorado, Arizona, and California. **Participants:** Participants in the Hispanic Established Population for Epidemiologic Studies of the Elderly (H-EPESE), a population-based sample of 3050 non-institutionalized Mexican-American men and women aged 65 and over. **Measures:** Variables included three measures of acculturation (*English proficiency, English usage, and Mainstream contact*), risk factors (age, gender, education, marital status, and BMI), disablement process factors (chronic pathology, cognitive status, and physical performance), and activities of daily living disability (ADLs), and instrumental activities of daily living disability (IADLs). Chi-Square, Chi-Square test for trends, ordinary least squares regression and discrete hazard analyses were used to identify associations of measures of acculturation with incidence of ADL and IADL disability. **Results:** There was a significant association between one measure of acculturation (*English proficiency*) and incidence of IADL disability, which remained after adding risk factors and Disablement process variables to the model. **Conclusion:** The findings support the importance of acculturation when examining ADL and IADL disability. Interventions that consider acculturation may be useful in reducing ADL and IADL disability in Mexican American older adults.

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Chapter 1: Introduction

The Disablement Process Model provides a useful framework for studying the multiple components of disability {Verbrugge, 1994 458 /id}. The main pathway to disability in this model is characterized by four stages: pathology (i.e., physiological abnormalities that are diagnosed as disease), impairments (i.e., structural abnormalities and dysfunctions in specific body systems), functional limitations (i.e., restrictions in physical and cognitive functions required in daily life), and disability (i.e., difficulty in performing activities in one's daily life). According to this model, factors outside the main pathway are grounded in a social context. Social context factors outside the main pathway include intra-individual factors, such as acculturation. The Disablement Process Model proposes that key intra-individual factors, such as acculturation, influence the main pathway as “buffers” through their ability to impede, accelerate or reverse the disablement process.

Although the Disablement Process Model has been used to study the relationships between disability and a variety of factors in non-Hispanic whites, its use in examining factors that contribute to disability in Mexican American older adults is just emerging. To date, evidence suggests that higher levels of disability are found in Mexican American older adults in comparison to non-Hispanic older white adults (Markides & Eschbach, 2005a) and this has prompted greater attention to investigating the relationships between disability and physical factors such as chronic pathology. A critical examination of the literature provides evidence that prior research has largely ignored the possible contribution of acculturation, a key intra-individual factor, to disability outcomes in this population.

This study, therefore, explores relationships between three measures of acculturation (*English proficiency, English usage, and Mainstream contact*) and limitations in activities of daily living (ADL) and instrumental activities of daily living (IADL) in Mexican American older adults who participated in the Hispanic Established Populations for the Epidemiological Studies of the Elderly (H-EPESE) from 1993 through 2005. This study's use of the Disablement Process Model permits the conceptualization of acculturation as an intra-individual factor that has a direct association with disability. It has been demonstrated that Hispanic American older adults have more difficulty with independent living skills than their non-Hispanic white counterparts (Burr & Mutchler, 2003e; Shetterly et al., 1998f; Wilmoth, 2001a). It is possible to infer from such findings that acculturation, particularly English proficiency, confers critical skills needed to perform everyday tasks that are required for community independence, such as balancing a checkbook, in a cultural milieu that may be quite different from the one of origin.

To examine ways in which acculturation is associated with disability in the study population, this study examined data from Waves 1, 2, 3, 4, and 5 of the H-EPESE. Data from the H-EPESE, which sampled Mexican American older adults from five Southwestern states, were accessed to test the following hypothesis: Mexican American older adults who are less acculturated will have greater incidence of disability in activities of daily living (ADL) and instrumental activities of daily living (IADL) over time.

OVERVIEW

The evidence for the study is based on data from the H-EPESE (Markides et al., 1999). The study was initiated in 1993 and comprises prospective data over a span of fourteen years. Probability sampling procedures were used to select study participants

from five southwestern states (Texas, California, Arizona, Colorado, and New Mexico), and represent 85% of the older Mexican American population in the United States.

The Discrete hazard method will be used to analyze differences in the development of ADL and IADL disability over time as a function of acculturation.

These results extend previous research conducted on disability-related factors in the Hispanic EPESE sample by including information on acculturation.

SPECIFIC AIMS

The proposed specific aims are:

Aim 1. To examine the relationships between three measures of acculturation (*English Proficiency, English Usage, and Mainstream contact*) and incidence of ADL disability among Mexican American older adults over a 12-year period (1993-2005).
Hypothesis 1a: Mexican American older adults with low acculturation (English Proficiency, English Usage, and Mainstream contact) will have greater incidence of ADL disability over a 12-year period (1993-2005).

Hypothesis 1b: The relationship between low acculturation (English Proficiency, English Usage, and Mainstream contact) and increased ADL disability will remain constant after accounting for demographic variables, including age, gender, marital status, education, and BMI, and disablement process variables, including chronic pathology, and cognitive (MMSE) and physical performance (POMA) measures.

Aim 2. To examine the relationships between three measures of acculturation (*English Proficiency, English Usage, and Mainstream contact*) and incidence of IADL disability among Mexican American older adults over a 12-year period (1993-2005).

Hypothesis 2a: Mexican American older adults with low acculturation (English Proficiency, English Usage, and Mainstream contact) will have greater incidence of IADL disability over a 12-year period (1993-2005).

Hypothesis 2b: The relationship between low acculturation (English Proficiency, English Usage, and Mainstream contact) and increased IADL disability will remain constant after accounting for demographic variables, including age, gender, marital status, education, and BMI, and disablement process variables, including chronic pathology, and cognitive (MMSE) and physical performance (POMA) measures.

Chapter 2: Background and Significance

BACKGROUND

Disability in Older Adults

In the United States, the number of older adults is rapidly increasing and so too are concerns about their health outcomes. Increases in average life expectancy, decreases in mortality rates, and the aging of the baby boom generation are paving the way for an unprecedented demographic shift, a trend which is expected to continue well into (the 21st) century. For example, between 1950 and 1986 mortality rates for persons aged 65 to 74 years old decreased by 31% and, on average, persons aged 70 to 75 years old could expect to live an additional 14.2 years (Rejeski & Brawley, 2006b).

In 2003, the U.S. Centers for Disease Control (2003a) reported that nearly 13% of the U.S. population was 65 years of age or older and further projected that this population sector would increase to 19.5% by 2030. In true numbers, these projections suggest that by the year 2030, one in four people living in the U.S. will be 60 years of age and one out in five will be 65 and older (Tanner, 2008b). It is well known that disability often accompanies aging, and disability is characterized by decreased participation in everyday roles and activities. Despite the fact that many of us will experience some level of disability as we age, the process of aging is not synonymous with the process of becoming disabled (Kennedy & Minkler, 1998). “The new gerontology” views successful aging as the absence of disability and disengagement from life (Dunn et al., 2004). This view posits that there is tremendous variability in the aging process, as well as when and what kind of disability individuals will experience as they age (Stahl & Feller, 1990). Yet, while some older adults report themselves as aging successfully despite their experience of disability (Montross et al., 2006) many others experience a

trajectory of disability marked by progressively compromised function and participation in everyday roles and life activities (Niemi et al., 1988).

Disability in older adults is a major concern of health care providers, insurance providers, public policy makers, and older adults themselves. In older adults, disability has been defined as the inability to independently accomplish tasks that were previously accomplished without the assistance of another person or device (Verbrugge & Jette, 1994e). While this definition was first published in disability literature in the 1990's, it remains an accepted working definition for purposes of research and clinical practice. It has been reported that 10% of individuals over 65 years old have at least one disability, and this number increases to 50% in those over 85 years of age (Braungart, 2006). It has also been reported that 84% of persons 65 years and older who have disability live in their communities (Rejeski & Brawley, 2006a). The transition from the ability to independently accomplish everyday tasks to disability in community-dwelling elders is often marked by increasing dependence and decreased social, emotional, and financial resources (Tanner, 2008a).

Disability, as defined above and viewed in the context of the large cohort of aging Baby Boomers, is also an issue of urgent fiscal concern. Currently, individuals over age 65 comprise just less than 13% of the total U.S. population, yet they account for over 35% of total health care expenditures (Fried et al., 2001), nearly five times greater health expenditures than the total population groups under age 65 (Centers for Disease Control, 2003b). Increases in both longevity and total numbers of this aging cohort are expected to increase nursing home utilization and total Medicaid expenditures (Spillman & Lubitz, 2000). Because disability drives both nursing home utilization and mortality (Bryant et al., 2002) better understanding of disability is urgently needed, with particular emphasis on populations whose greater prevalence of functionally-limiting disease render them especially vulnerable to disability.

A literature review was undertaken to better understand how acculturation, a key intra-individual factor, affects disability in vulnerable populations. This literature review is reported here in four sections. The first section discusses literature related to disease and disability in one population – Hispanic Americans – who are known to be vulnerable through their lower socioeconomic status and higher rates of diabetes and disability than non-Hispanic whites. The first section also discusses literature related to disease and disability in an important subsector of the Hispanic American population – Mexican Americans – who, like their parent population, are known to have higher rates of disability than non-Hispanic whites. The second section examines the literature related to key determinants of disability in Mexican American older adults, an important subsector of the Mexican American population, with particular emphasis on the emergence of interest in intra-individual factors, such as acculturation. This second section specifically examines one key intra-individual factor, acculturation, in terms of its theory, measures, and scales, as well as its relationship with health outcomes and disability in Mexican American older adults. The third section discusses the Disablement Process as a conceptual model to examine the relationship between acculturation and disability in Mexican American older adults. Finally, the fourth section discusses the significance of the proposed study.

Disparities in Disease and Disability in Vulnerable Populations

Disease and Disability in Hispanic Americans

While there is some evidence that age-related disability is declining overall in the U.S. (Waidmann & Liu, 2000b), there are also reports of higher prevalence of functionally-limiting disease and disability in older Hispanic adults in general, and Mexican American older adults in particular (Zsembik et al., 2000b). Compared to the 1990 census, the 2000 US census reports that the U.S. Hispanic population increased by

53% and is currently the largest minority group in the United States (Guzman, 2001). It is also the fastest-growing minority group, yet less attention has been paid to understanding disability in Hispanic Americans than non-Hispanic white Americans (Vega & Amaro, 1994a).

Despite widespread availability of such health care funding options as Medicare and Medicaid for individuals over 65 and over, disparities in health care have merely been reduced and not eliminated (Angel et al., 2002c; Caesar, 2006). Although the majority of older adults have Medicare, it has been reported that older adults who do not supplement Medicare with private coverage are likely to have unmet health care needs (Cohen et al., 1997). In an examination of ethnic and racial differences in older adults' use of medical care was undertaken by Escarce and colleagues (2003c). Using data from the Household Component of the 1996-1998 Medical Expenditure Panel Survey, these investigators compared Medicare expenditures among Hispanic, black and non-Hispanic whites. They found that, despite substantially less favorable health profiles across a wide spectrum of categories including self-rated health, chronic conditions, and functional limitations, Hispanic older adults had lower Medicare expenditures than non-Hispanic whites. Escarce and colleagues attributed their findings to improvements in Medicare policies, but admitted that their study did not fully account for the complex relationships among ethnicity, socioeconomic status, and health.

The relationships among ethnicity, socioeconomic status and health have aroused the interest of some investigators, who claim that Hispanic Americans enjoy an epidemiologic paradox characterized by a mortality advantage (Elo et al., 2004), particularly at older ages (Markides & Eschbach, 2005b). Other investigators claim, however, that the effects of the "Hispanic paradox" are not uniform, and may be offset by increased prevalence of morbidity in Hispanic Americans compared to non-Hispanic whites. Using data from the San Antonio Heart Study, Hunt and colleagues compared the

relationship between ethnicity and mortality in Mexican Americans vs. non-Hispanic whites over a 14-1/2 year period (Hunt et al., 2003). These investigators found greater risk of all-cause, cardiovascular and coronary heart disease mortality in Mexican American diabetics not using insulin as compared to non-Hispanic whites. Other researchers have found increased prevalence of functionally-limiting disease in Hispanic Americans as compared to non-Hispanic whites. In a review of the health status of U.S. Hispanic populations that appeared over a decade ago, Vega and Amaro (1994b) used community-specific research studies in the U.S to compare diseases and conditions for Hispanic subgroups relative to non-Hispanic whites. In their results, these investigators reported that Hispanic Americans' lower or similar rates of cardiovascular disease were offset by higher rates of other conditions such as obesity, high blood pressure and diabetes. More recently, Crimmins and colleagues (2007) used the National Health and Nutrition Examination Surveys (1999-2002) to compare biological risk profiles (blood pressure, metabolic and inflammatory risk profiles) among non-Hispanic whites, Blacks, and U.S.-born and foreign-born Hispanics. After controlling for socioeconomic status, U.S.-born Mexican Americans reportedly had higher biological risk scores than non-Hispanic whites. Specifically, these investigators reported higher levels of metabolic risk for Mexican Americans, leading them to conclude that particular subgroups of Hispanic Americans are at high risk for the functionally-limiting morbidity that often accompanies diabetes.

Disease and Disability in Mexican Americans

Mexican Americans are the fastest-growing subgroup of the Hispanic population, and are rapidly adding to the explosion of Hispanic American older adults in the U.S. Among the 35 million Hispanics living in the United States, Mexican Americans

represent approximately 20.6 million people (Guzman, 2001). By the year 2050, it is anticipated that approximately six million Mexican Americans will be 65 years old or older and at high risk for disability (Angel & Angel, 1998).

Disparities in disease and disability are particularly apparent in Mexican Americans. Although the prevalence of cardiac risk factors in Mexican Americans has been reported as within the general population range, diabetes prevalence is reportedly higher in Mexican American older adults as compared to non-Hispanic whites (Morgenstern et al., 2001; Sundquist et al., 2001a). Unfortunately, like their parent population, Mexican American older adults are less likely to use preventive medical care or other health services than non-Hispanic whites (Solis et al., 1990b).

Unsurprisingly, disparities in disease prevalence and health care utilization are echoed in disability disparities in Mexican Americans compared to their non-Hispanic white counterparts (Ostchega et al., 2000e; Rudkin et al., 1997a; Zsembik & Fennell, 2005c). In an older report comparing two surveys of non-Hispanic white and African-American older adults and one of Mexican-American older adults, Rudkin and colleagues (1997b) found higher rates of functional disability in Mexican American than in non-Hispanic white older adults. More recently, Ostchega and colleagues (2000d) used data from the Third National Health and Nutrition Examination Survey (NHANES III) to compare disability in Hispanic versus non-Hispanic white older adults. These investigators found that Mexican-American men and women reported more disability than did non-Hispanic white men and women, and Mexican American women reported more disability than Mexican American men. They also found the overall prevalence of those reporting at least one IADL disability was 51.0% in Mexican Americans and 35.5% in non-Hispanic whites, and the gender-specific prevalence of IADL disability was 64.0% in Mexican American women and 37.9% in Mexican American men. In addition, they found higher prevalence of ADL disability in Mexican Americans (55.0%) vs. non-

Hispanic whites (35.7%) overall, and higher gender-specific prevalence of ADL disability in Mexican American women compared to Mexican American men (65% vs. 44%). Moreover, in the total NHANES III sample, these investigators found a marked relationship between prevalence of disability and increased age among all age groups (60-69; 70-79, and 80+) and for both genders, with women reporting more disability than men in each age group and the percentage difference by gender increasing with age.

Reports such as these have prompted examination of the determinants of the disparity in disability, such as the study conducted by Zsembik and colleagues (2005a). Using data from the Assets and Health Dynamics Among the Oldest Old study, Zsembik and colleagues also found greater disability in Mexican American compared to non-Hispanic white older adults. These investigators concluded that, while their models did not fully account for the excess disability in Mexican Americans as compared to non-Hispanic whites, their use of the Disablement Process model permitted more fine-grained examination of the relationships among medical conditions, and physical and cognitive limitations and disability in Mexican American older adults.

The foregoing suggests the existence of disparities in health care utilization, disease and disability in Mexican Americans compared to non-Hispanic whites. This is perhaps unsurprising in light of the well-established connection between certain diseases, such as diabetes, and disability in the general population (Mayfield et al., 1999), as well as the higher rates of diabetes and diabetic complications in the Mexican American population (Al Snih et al., 2005d). Yet, in the face of these apparent disparities, Mexican Americans and non-Hispanic whites share many similarities in links between disease and disability. In an examination of the relationship of chronic disease and disability using H-EPESE data, Markides and colleagues (1996) compared Mexican American older adults and their non-Hispanic white counterparts and found similar links between chronic conditions, such as stroke, arthritis, heart attack, hip fracture, and disability. Moreover,

these investigators also found greater stroke and hip fracture-related disability in their sample as compared to the Framingham Disability survey. Similarly and more recently, another investigator using data from the H-EPESE found associations between arthritis and incidence of disability (Al Snih et al., 2001), as well as associations between diabetic complications and incidence of lower body disability in Mexican American older adults (Al Snih et al., 2005e).

Acculturation and Disability in Mexican Americans

The foregoing suggests that links between disease and disability in Mexican American older adults, similar to their non-Hispanic white counterparts, are well established. Extant literature, however, rarely considers the influence of intra-individual factors, such as acculturation, on disability in Mexican American older adults.

Evidence is emerging, however, that key intra-individual factors may contribute to the understanding of disability in Mexican American older adults (Angel et al., 2003a; Berges et al., 2007b; Ostir et al., 2000a). Using data from the H-EPESE, Angel and colleagues (Angel et al., 2003b) found an association between one intra-individual factor, financial strain, and disability. Specifically, these investigators found that those who reported financial strain were more likely to report difficulty with performance-based tests of mobility and IADL disability.

Additional evidence of the relationship between intra-individual factors and disability was found by Ostir and colleagues (2000b), who reported a relationship between another intra-individual factor, positive affect, and incidence of functional status limitations. These investigators found decreased incidence of ADL disability in Mexican American older adults with high vs. low positive affect, even after controlling for functional status, sociodemographic variables, major chronic conditions, body mass and body mass index (BMI), smoking status, drinking status, and negative body mass index

(BMI), smoking and drinking status, and negative affect at baseline. More recent evidence of an association between intra-individual factors and disability was reported by Berges and colleagues (2007c), who examined the impact of attendance at religious services and incidence of disability in Mexican American older adults with stroke. These investigators found that church attendance pre-stroke is associated with better physical function post-stroke in Mexican American older adults. They also found that frequent attendees of religious services had significantly less incidence of disability than infrequent attendees, even after controlling for demographics, medical conditions, health behaviors, and physical mobility. Findings such as these add to an emerging body of evidence documenting the impact of intra-individual factors on disability in Mexican American older adults. Finding such as these prompt consideration of how other intra-individual factors, such as acculturation, uniquely predispose Mexican American older adults to disability.

Acculturation

In the proposed study, acculturation is conceptually defined as the process by which individuals whose primary experience has been in one culture assume characteristic ways of living (attitudes, values, and behavior) of another culture (Hazuda et al., 1988e). Acculturation has long been a focus of interest in explaining how characteristics particular to cultural groups (e.g., dietary habits, patterns of physical activity) are related to health outcomes.

In public health research, acculturation research has largely relied on self-reported surveys that are based on either unidirectional or bidirectional conceptual models. The unidirectional model assumes that the acculturation occurs along a continuum from complete identification with the minority culture to complete identification with the dominant culture. In the unidirectional acculturation model, the individual abandons his

or her original cultural paradigms and adopts those of the host culture (Cabassa, 2003b). The endpoint of the acculturation process in the unidirectional models is complete assimilation into the dominant culture, whereby the individual assumes full membership in the dominant group.

In his seminal work, *Assimilation in American Life*, Milton Gordon (1964) conceptualized acculturation as unidirectional, and the first of seven stages of the process of assimilation. According to Gordon, assimilation is the multidimensional, multistage process by which the groups of people who differ in previous national background, religion or culture become incorporated into the host society. Gordon described the process of acculturation as a subset of a larger process of assimilation, and one in which both acculturation and assimilation are unidirectional. To become assimilated into the host society, the minority group must accommodate and replace its cultural identity with that of the dominant group, including its language, dress, music, sports, dietary patterns, etc. The endpoint of the assimilation process was intermarriage, at which point the incorporation of the dominant group's cultural identity would be complete and fully replace the former identity of the minority group. At that point it was supposed that the dominant group would embrace the minority group into its social cliques, clubs and inner-circle institutions, completing the process of assimilation.

Gordon's model proposed three hypotheses concerning the relationship of acculturation with assimilation: 1. acculturation will be the first dimension of assimilation to occur in dominant-minority group contact; 2. acculturation may take place without other dimensions of assimilation, and the process of "acculturation only" may continue indefinitely; and 3. acculturation does not necessarily lead to assimilation, but assimilation inevitably involves acculturation.

Since then researchers have disagreed with Gordon's hierarchy and other aspects of his theory, arguing that acculturation does not proceed unidirectionally along a

continuum. Consideration of directionality of influence has since been a major focus of contention in acculturation research (Teske & Nelson, 1974), giving rise to bidirectional models of acculturation. The proponents of bidirectional models of acculturation argue that the individual may acquire the experiences and values of the dominant culture while continuing to value and identify with the original culture (Cabassa, 2003c). Bidirectional models emphasize biculturalism, described as feeling comfortable in both cultures (Chiriboga, 2004).

In addition, many bidirectional models describe different typological patterns and different domains of acculturation. Mendoza (1989), for example, described a typology comprising four patterns of acculturation: cultural resistance — resistance against the acquisition of dominant culture while maintaining minority culture; cultural shift — substitution of the dominant culture for the minority culture; cultural incorporation — adaptation of customs from both minority and dominant cultures; and cultural transmutation — alternation between minority and dominant cultures to create a new cultural identity.

Other theories of acculturation describe similar comparisons of cultures resulting in changes in identity, values, and behavior (Berry, 1989). Berry's typology is similar to Mendoza's and comprises: separation — rejection of the dominant culture and maintenance of the minority culture; assimilation — exchange of the minority culture for the dominant culture; integration — adaptation of values from both cultures resulting in a bicultural identity; and marginalization — rejection of or by both cultures.

John Berry's conceptualization of acculturation differs from Mendoza's in that he considered acculturation as comprising two broad domains: the population level, consisting of comparison of similarities and differences across broad ranges of cultures, and the individual level, consisting of the psychological adaptations individuals make when they move between cultures (Berry, 1989). At the population level, Berry's model

of acculturation arises from elements of intercultural contact, and results in changes in social structure, economic base, and political organization. Overall, while acculturation theorists differ in their emphasis on directionality and relative importance of different domains, most theorists concur that acculturation is a dynamic phenomenon with considerable breadth of individual variation (Berry, 1989; Cabassa, 2003a).

Acculturation Measures and Scales

In Mexican Americans, individual variation in acculturation has been measured using both unidimensional and multidimensional acculturation scales. Unidimensional or proxy measures, including nativity, age at immigration, or generational status, are often used to describe and measure acculturation in public health research. Critics have pointed out problems with proxy measures, arguing that their use relies on the erroneous assumption that acculturation can be estimated by measures of exposure to the dominant culture (Cabassa, 2003d; Negy & Woods, 1992).

Acculturation is, however, considered by many to be multidimensional, that is, occurring on different levels and at different rates in different individuals (Berry, 1989; Gordon, 1964; Hazuda et al., 1988d). As a result, the measurement of acculturation has progressed from the use of proxy measures to the development and use of multidimensional acculturation scales including several characteristics such as language, attitudes, behavior, and the like. However, the measurement of acculturation has been plagued by the complexity of these phenomena, each of which encompasses multiple constructs and factors. For this reason, a wide variety of multidimensional acculturation scales have been used in public health, many of which differ regarding the dimensions of interest, the number and type of items, the populations sampled, and psychometric quality (Cuellar et al., 1995; Deyo et al., 1985; Hazuda et al., 1988c; Marin et al., 1987; Mendoza, 1989; Solis et al., 1990e).

Most, if not all, acculturation scales are similar in regarding language as a critical subconstruct; however, the nearly universal focus on language has both supporters and detractors. Supporters claim that language accounts for substantial variance in acculturation measurement, while detractors claim that it is difficult to account for the complexity of language use, especially among bicultural individuals who may become bilingual rather than abandon their language of origin (Lara et al., 2005).

In summary, although researchers disagree on the details of directionality and dimensionality, it is generally agreed that the process of acculturation, albeit at different rates and along distinct dimensions, may be differentially related to a variety of outcomes in individuals and groups who immigrate to the United States.

Acculturation and Health Outcomes in Mexican Americans

Acculturation and its relationship to health outcomes in Mexican Americans is complex (Lara et al., 2005; Sundquist & Winkleby, 1999c). On one hand, evidence exists that acculturation is a risk factor in Mexican Americans. Specifically, evidence demonstrates an association with obesity in U.S.-born Mexican Americans (Sundquist & Winkleby, 2000). In a cross-sectional examination of the NHANES III, Sundquist and Winkleby (2000) found, after adjustment for age, education, leisure-time physical activity and smoking, waist circumference was significantly larger in U.S.-born Mexican Americans than those who were born in Mexico. However, these investigators also found that U.S.-born women who spoke Spanish were more likely than those who spoke English to have abdominal obesity. They found, in addition, that U.S.-born Spanish-speaking women with abdominal obesity had increased prevalence of hypertension and non-insulin dependent diabetes. In another study by the same investigators, however, links were reported between acculturation and positive health behaviors in Mexican Americans. In another examination of the NHANES III, Sundquist and Winkleby found

that English-speaking Mexican Americans had lower body mass and were less likely to smoke than Spanish-speaking Mexican Americans (Sundquist & Winkleby, 1999b).

Acculturation's association with positive health outcomes in Mexican Americans has been more consistently demonstrated in health behaviors such as health screening utilization (Jurkowski & Johnson, 2005) and participation in leisure time physical activity (Crespo et al., 2001a). In a cross-sectional analysis of the modified Behavioral Risk Factor Surveillance System (BRFSS) administered to Mexican American adults in four Chicago neighborhoods, Jurkowski and Johnson (2005) found that Mexican Americans who were acculturated were more likely to have had blood cholesterol screening, blood pressure screening, and a routine check-up in the preceding two years when compared to unacculturated Mexican Americans after controlling for age, healthcare coverage, education, and marital status. Paralleling these findings, Crespo and colleagues (2001b), in a cross-sectional analysis of the Third National Health and Nutrition Examination Survey, found that more acculturated Mexican Americans had a higher prevalence of leisure time physical inactivity than less acculturated Mexican Americans. Evenson and colleagues (2004), in an analysis of the Women's Cardiovascular Health Network multisite survey, also reported an association between acculturation and increased physical activity. Similarly, in a cross-sectional comparison of four national surveys including the National Health and Nutrition Examination Survey, 1999-2002; the Behavioral Risk Factor Surveillance System, 2003; the National Household Travel Survey, 2001; and the National Health Interview Survey Cancer Supplement, 2000, Ham and colleagues (2007b) found that the prevalence of leisure-time physical activity increased, albeit nonsignificantly, with acculturation in Mexican Americans.

Acculturation and Health Outcomes in Mexican American Older Adults

Acculturation and its relationship to health outcomes in Mexican American older adults is, unfortunately, as complex as it is in the overall Mexican American population. It is, on one hand, associated with unhealthy dietary practices (Gregory-Mercado et al., 2006) and other negative health behaviors such as alcohol and tobacco use (Masel et al., 2006b), as well as negative health outcomes, such as hypertension (Espino & Maldonado, 1990a) and cancer (Schneider & Chiriboga, 2005). In an examination of the H-EPESE, Masel and colleagues (2006a) found that older Mexican Americans who were more acculturated were more likely to be former or current smokers than nonsmokers and former or current drinkers than those who were less acculturated. Not surprisingly, there are also reports of links between acculturation and negative health outcomes, such as hypertension and cancer. In an examination of the Hispanic Health and Nutrition Examination Survey (HHANES), Espino and colleagues (1990b) found that acculturation was a stronger predictor of hypertension than socioeconomic status in Mexican American older adults. More recently, in a cross-sectional examination of the associations among stress, depressive symptoms and cancer prevalence, Schneider and colleagues (2005) found that Mexican American older adults with higher levels of acculturation were more likely to have cancer.

On the other hand, acculturation is associated with positive health outcomes in Mexican American older adults, such as decreased depression (Cuellar et al., 2004a; Zamanian, 1993b), reduced cognitive impairment (Simpao et al., 2005a), as well as positive health behaviors, such as increased awareness of genetic testing (Vadaparampil et al., 2006) and leisure time physical activity (Dergance et al., 2005b). In a telephone survey investigating the relationship between acculturation and depression in older Mexican Americans, Zamanian and colleagues (1993a) found less depression in more-acculturated groups than the low-acculturation group, even after controlling for

socioeconomic status. Similarly, in a cross-sectional survey examining the relationship of acculturation and depression in Mexican American older adults, Cuellar and colleagues (2004b) showed that acculturation had a protective effect on subjective well-being. Paralleling these findings, Simpao and colleagues (2005b), using cross-sectional data from the San Antonio Longitudinal Study of Aging, found that less acculturated older Mexican Americans were almost twice as likely to have MMSE-assessed cognitive impairment, even after accounting for education, income, and other factors. Further evidence of acculturation's beneficial effect on Mexican American older adults was found by Dergance and colleagues who, in the San Antonio Longitudinal Study of Aging (SALSA), found that higher levels of acculturation were associated with increased adoption of health-seeking behaviors, such as leisure time physical activity (Dergance et al., 2005a).

Although evidence attests to acculturation's positive impact on health behaviors in Mexican American older adults, far less attention has been paid to its impact on disability (Dunn et al., 2004; Ontiveros et al., 1999). Nevertheless, it has been speculated that acculturation has a positive impact on the process of disability in Mexican American older adults (Hazuda & Espino, 1997). In addition, while many researchers studying acculturation have focused on younger individuals, it is thought by some that the process of acculturation unfolds over the life span with varying levels of impact (Krause & Goldenhar, 1992).

Acculturation and Disability in Mexican American Older Adults

Relationships among disease, health outcomes and disability have been amply demonstrated and, more recently, research examining the impact of intra-individual factors on disability in Mexican American older adults is receiving attention. It has long

been known that aging, health outcomes and disability are integrally related (Patel et al., 2006; Verbrugge & Jette, 1994d) and the research examining disability in Mexican American older adults has identified acculturation as a key intra-individual factor in this relationship (Dunn et al., 2004; Ontiveros et al., 1999). In a pilot study examining the relationships among psychosocial factors, disease, and disability in older Mexican American women, Dunn et al. (2004) identified acculturation as a key mediator linking chronic illness and function. In another study examining the physical and psychosocial antecedents and outcomes in older Mexican Americans with stroke, Ontiveros et al. (1999) reported that individuals who ever had a stroke were more likely to be disabled, and that those who had greater language acculturation were at greater risk for stroke. Although neither of these investigators directly tested the relationship between acculturation and disability, their results suggest that acculturation is a key, yet understudied, factor contributing to disability in aging Mexican Americans. The foregoing suggests that there are indirect links among acculturation, chronic disease and disability in Mexican American older adults. Yet while the indirect links among acculturation and disability are many and far from unambiguous, acculturation could conceivably also have a direct effect on disability. It has been shown, for example that Hispanic American older adults have more difficulty with independent living skills than their non-Hispanic white counterparts (Shetterly et al., 1998e). It is possible to infer from such findings that acculturation, particularly English proficiency, confers critical skills needed to perform tasks that are required for community independence, such as balancing a checkbook, in a cultural milieu that may be quite different from the one of origin.

The Disablement Process

Examination of the transition from community independence to dependence, particularly in individuals who are aging in a different culture, requires models capable of considering a broad range of factors. The Disablement Process model conceptualizes

disablement as a complex interplay among the medical and social aspects of disability. It is a socio-medical model that considers the transition from independence to disability as a process rather than a static state, with potential for transition back to a less disabled state (Peek et al., 2003c).

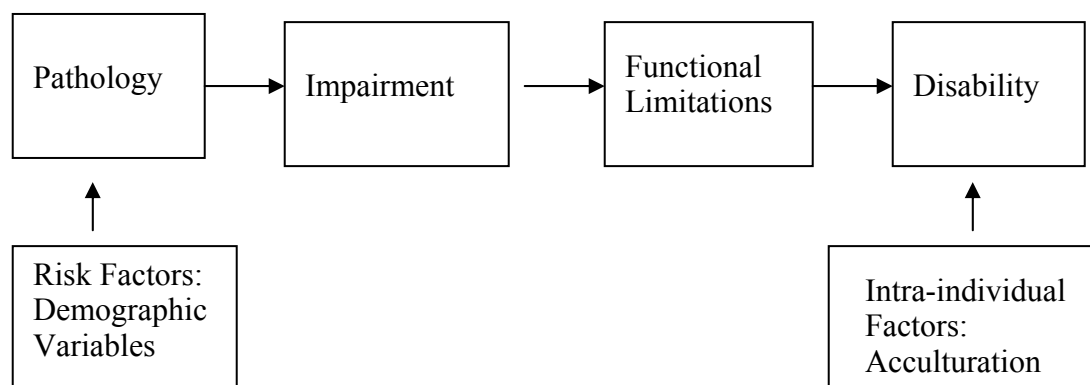
In the Disablement Process model (Figure 2.1), first proposed by Nagi (1965) and further developed by Verbrugge and Jette (1994), disability is defined as difficulty doing activities in any domain of life due to health or physical problems. In this model, disability comprises the culmination of the main disablement pathway in the individual's inability to negotiate the demands of the environment (Verbrugge & Jette, 1994c). The main pathway to disability in this model is characterized by four stages: pathology, impairments, functional limitations, and disability. The first stage, pathology, is characterized by abnormal physiological function. In the second stage, the effect of pathology on specific body systems results in impairment, characterized by decreased mental or physical function. In the third stage, impairment results in functional limitation, characterized by inability to complete routine tasks. Functional limitations may impact the individual's ability to respond adaptively to environmental demands or engage in expected roles, resulting in disability.

According to the Disablement Process model many, if not all, factors leading to disability are grounded in a social context. These social context factors encompass social, psychological, and environmental factors that influence the main disablement pathway. They comprise extra-individual factors, that operate at the external level, including medical care, medication, and the physical and social environment, and intra-individual factors that operate at the internal level, including lifestyle and behavior changes, psychosocial attributes, such as acculturation.

By incorporating the social, medical, and psychological aspects of disability in a clear and testable framework, the Disablement Process is an improvement over prior

disability models. Moreover, it expands prior explanatory models by permitting examination of how intra-individual factors, such as acculturation, influence the trajectory of disability. The Disablement Process model is therefore ideally suited to examine how acculturation acts as a buffer to facilitate, impede or reverse the Disablement Process.

Figure 2.1. The Disablement Process Model [adapted from Verbrugge and Jette, 1994]



The Disablement Process in Mexican American Older Adults

Although researchers have used the Disablement Process Model to examine the process of becoming disabled in non-Hispanic whites, it has only just begun to be used to examine the transition from health to disability among older ethnic groups. It has been amply demonstrated that Mexican American older adults have higher levels of disability than their non-Hispanic white counterparts (Ostchega et al., 2000c; Rudkin et al., 1997c; Zsembik & Fennell, 2005b), and this has prompted interest in examining how health related disparities render Mexican Americans particularly vulnerable to disability as they age.

The Disablement Process has previously been examined among non-Hispanic white older adults. Less research, however, has examined the Disablement Process in Mexican American older adults (Hazuda & Espino, 1997; Peek et al., 2003d). In one study, Peek and colleagues (2003a) examined the role of key factors outside the main disablement pathway in a sample of Mexican American older adults. In their results a proxy for acculturation, taking the interview in Spanish, was a factor that was shown to be significantly associated with pathology and impairment. And although other intra-individual factors outside the main pathway failed to demonstrate a direct effect on

disability, important questions regarding the influence of intra-individual factors on disability in older Mexican Americans remained. Indirect evidence of the impact of intra-individual factors was also found by Hazuda and Espino (1997). They showed that individuals who reported higher levels of acculturation also reported lower levels of chronic disease, functional limitation, and disability. These investigators recommended increased use of the Disablement Process Model to shed light on how intra-individual factors, such as acculturation, may help prevent, reduce or reverse disability in this population.

The above findings permit inferences regarding the overall importance of intra-individual factors, such as acculturation, in the development of disability in Mexican American older adults. Emerging evidence suggests that acculturation, particularly English proficiency, may have a direct effect on disability and community independence (Burr & Mutchler, 2003f; Shetterly et al., 1998d). It is known, for example, that Hispanic Americans have higher levels of disability than non-Hispanic white older adults, and that disability is linked with decreased community independence. It is also known that Hispanic American older adults are less likely to live independently than their non-Hispanic white counterparts (Wilmoth, 2001b).

Independent living in Hispanic American older adults has been linked to acculturation, particularly English proficiency (Burr & Mutchler, 2003b). Using data from the 1990 U.S. Census of Population, Burr and colleagues found that English proficiency was associated with increased likelihood of living independently in Mexican American older adults. Acculturation has also been linked with disability in Hispanic American older adults (shetterly). Using the San Luis Valley Health and Aging Study, Shetterly and colleagues (Shetterly et al., 1998c) reported that community-dwelling Hispanic American older adults, particularly those with lower levels of English proficiency, were more likely to report IADL disability. It is possible to infer from the

above findings that acculturation, particularly English proficiency, confers skills needed to perform everyday tasks, maintain community independence, and delay disability in Mexican American older adults.

SIGNIFICANCE

The means by which acculturation influences disability in Mexican American older adults have yet to be fully elucidated. The foregoing suggests that important gaps remain in understanding the influence of intra-individual factors, such as acculturation, on disability in this population. Specifically, more finely grained examination of the ways in which acculturation, a key intra-individual factor, slows down, speeds up or reverses the disablement process is needed. Addressing this gap is necessary to understand the positive and negative factors leading to disability in Mexican American older adults in order to craft effective interventions.

Moreover, examining the impact of acculturation on the development of disability in Mexican American older adults is consistent with past and present federal funding objectives. In its 2005 and 2006 initiatives, the National Institute of Aging (NIA) called for additional research regarding the ways in which impairments, functional limitations and disabilities develop in different minority groups, and acknowledged that strategies to prolong active life expectancy in Mexican Americans have yet to be fully explored (from: http://www.ncmhd.nih.gov/strategicmock/our_programs/strategic/pubs/NIA-Rev.pdf). Moreover, in its recent executive summary of minority aging research, the NIA identified understanding health differences associated with race, ethnicity, gender, environment, socioeconomic status, geography, and culture as a key objective (from: <http://www.nia.nih.gov/AboutNIA/MinorityAgingResearch.htm#appendix>). Finally, elucidation of the links between aspects of acculturation and disability in older Mexican

Americans is consistent with Healthy People 2010 goals of eliminating health disparities and increasing quality of life in underserved populations.

Prior research has presaged the profound impact Mexican American elders will have on the health care system. This has prompted interest in examining how health related disparities render Mexican Americans particularly vulnerable to disability as they age. The rapid growth of this population presents a clear opportunity and a pressing need to integrate concepts of disability and successful aging in Mexican Americans. Health disparities is, deservedly, a topic of national interest and the impetus for research that promises new perspectives and improved health in underserved populations (NIA, 2001).

The proposed research intends to address current gaps by investigating the ways in which acculturation influences disability in Mexican American older adults. Such an investigation would add to the body of knowledge regarding how disability develops in a population that experiences relatively low mortality despite low socioeconomic status. More importantly, the results of such an investigation will improve the lives of older Mexican Americans by paving the way for future research leading to effective interventions at the individual and community levels.

Chapter 3: Methods

The primary aim of this study was to explore relationships between various dimensions of acculturation and disability in Mexican American older adults.

Guided by the literature review, two specific aims and hypotheses to be tested are presented below. This is followed by 1) a description of the data source and sample; 2) a description of the variables; and 3) an outline of the analyses.

SPECIFIC AIMS:

Aim 1. To examine the relationships between three measures of acculturation (*English Proficiency, English Usage, and Mainstream contact*) and incidence of ADL disability among Mexican American older adults over a 12-year period (1993-2005).

Hypothesis 1a: Mexican American older adults with low acculturation (English Proficiency, English Usage, and Mainstream contact) will have greater incidence of ADL disability over a 12-year period (1993-2005).

Hypothesis 1b: The relationship between low acculturation (English Proficiency, English Usage, and Mainstream contact) and increased ADL disability will remain constant after accounting for demographic variables, including age, gender, marital status, education, and BMI, and disablement process variables, including chronic pathology, and cognitive (MMSE) and physical performance (POMA) measures.

Aim 2. To examine the relationships between three measures of acculturation (*English Proficiency, English Usage, and Mainstream contact*) and incidence of IADL disability among Mexican American older adults over a 12-year period (1993-2005).

Hypothesis 2a: Mexican American older adults with low acculturation (English Proficiency, English Usage, and Mainstream contact) will have greater incidence of IADL disability over a 12-year period (1993-2005).

Hypothesis 2b: The relationship between low acculturation (English Proficiency, English Usage, and Mainstream contact) and increased IADL disability will remain constant after accounting for demographic variables, including age, gender, marital status, education, and BMI, and disablement process variables, including chronic pathology, and cognitive (MMSE) and physical performance (POMA) measures.

DATA SOURCE

This research used data from Waves 1, 2, 3, 4 and 5 of the H-EPESE (Hispanic Established Population for the Epidemiological Study of the Elderly) survey (Markides et al., 1999). The H-EPESE is a longitudinal survey that includes detailed questions regarding functional capacity and aspects of acculturation, as well as medical history and mental status. The H-EPESE used area probability sampling to identify subjects, and counties, and households from within defined census tracts. In Stage 1, counties were selected if at least 6.6 percent of the county population consisted of Mexican-American older adults (using 1990 U.S. Census figures). In Stage 2, 300 randomly selected census tracts were chosen, and in Stage 3, blocks were randomly selected. One to two additional blocks were added in Stage 3 to obtain at least 400 households within each sampling unit. In Stage 4, interviews were conducted with up to four members of the Mexican American household aged 65 and over. The five states in the H-EPESE sampling frame contain 85% of the 65 and older Mexican American population living in the United States (Hazuda & Espino, 1997).

Interviewers

H-EPESE survey interviewers were from Harris Interactive, Inc. (formerly Louis Harris and Associates) and received five days of training. Harris Interactive, Inc. subsequently trained interviewers at 10 sites for a five-day training period. The Project Team members were present at all sessions conducted by Harris Interactive. The Project Team training responsibilities included 1) special techniques for interviewing elderly Mexican Americans; 2) simple medical and functional assessments; and 3) all the instruments/questions used in the study. All interviewers were bilingual for English and Spanish.

Both Spanish and English versions of the questionnaires were available. Two-thirds of the interviews were conducted in Spanish. Fifteen percent of each interviewer's work was validated by phone. Questions were answered by: 1) respondent only, 2) proxy with respondent, and 3) proxy only.

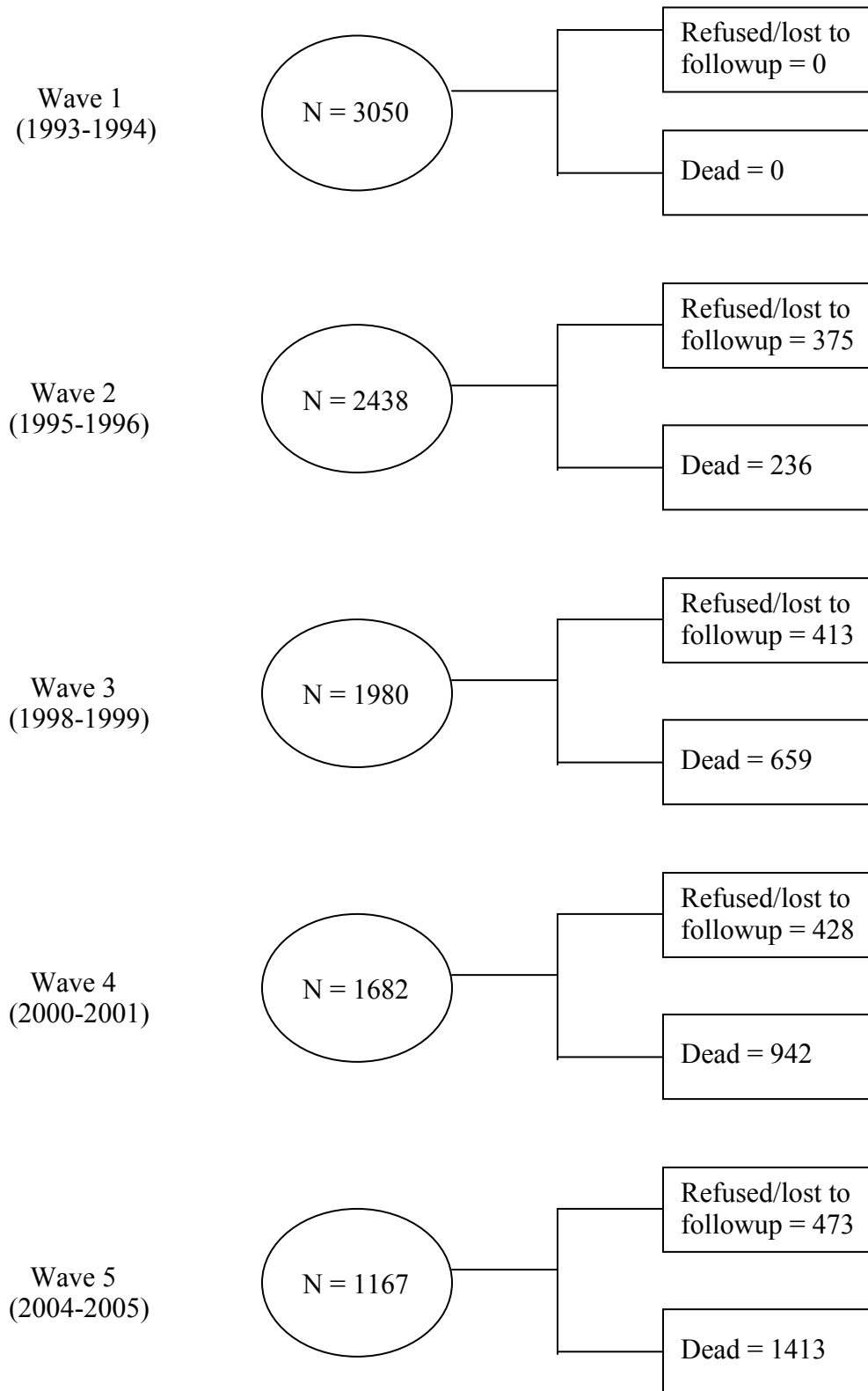
Instrumentation

Data were not collected by this investigator but were accessed through the H-EPESE data base in 2008.

Study population

Goals of the H-EPESE researchers were to interview the original 3,050 subjects at approximately two-year intervals (Figure 3.1). The number of subjects completing interviews by year was: 3,050 (1993-4); 2,438 (1995-6); 1,980 (1998-9); 1,682 (2000-1);

Figure 3.1. Missing and Deceased H-EPESE Subjects by Wave



and 1167 (2004-5). Attrition ranged from 15 to 61.7% from Wave 1 to Wave 5, and total death-related attrition increased from 7.8% at Wave 1 in 1993-94 to 46.3% at Wave 5 in 2004-5.

VARIABLES

The dependent variable is disability, as reflected in limitations in basic activities of daily living (ADL) and instrumental activities of daily living (IADL).

ADL and IADL

For ADL, H-EPESE respondents were asked whether they needed help performing seven tasks, based on a modification of the *Katz Activities of Daily Living scale* (Katz et al., 1963). Tasks on the modified scale include bathing, toileting, grooming, dressing, eating, transferring from bed to chair, and walking across a small room. If respondents were unable or needed assistance performing a task, they were scored as having an ADL disability. ADL items were scored both as a sum of all 7 items (range 0-7) and as a dichotomy (none = 0; unable to do one or more = 1).

For IADL, respondents were asked if they could perform 10 tasks, based on the *OARS Instrumental Activities of Daily Living Scale* and the *Rosow-Breslau Scale* (Rosow & Breslau, 1966). The ten tasks include driving, shopping, using a telephone, preparing meals, performing light housework, performing heavy housework, handling money, taking medications, walking up and down stairs, and walking half a mile. If respondents were unable to perform any of these tasks, they were coded as having an IADL disability. IADL items were scored both as a sum of all 10 items (range 0-10) and as a dichotomy (none = 0; unable to do one or more = 1). Although the reliability of standardized measures of ADL, such as the Katz ADL scale, and the validity of standardized measures of IADL, such as the OARS and Rosow and Breslau scales, is well known, reliability information on the modified version of the IADL scale used in the H-EPESE is lacking.

Independent variables (predictor variables) included dimensions of acculturation, gender, age, education, marital status, BMI, chronic pathology (arthritis, heart attack, stroke, hip fracture or diabetes), cognitive impairment (MMSE), and physical performance (POMA). The measurement of these particular variables is described below.

Dimensions of Acculturation

Dimensions of acculturation were measured with three acculturation subscales. These acculturation subscales were specifically developed as part of the San Antonio Heart Study, a large population-based sample of Hispanics and non-Hispanic whites, in order to measure key dimensions of acculturation in Mexican Americans (Hazuda et al., 1988b). The *Adult Proficiency in English* subscale was designed to measure self-reported proficiency in English language skills and is scored from 3 to 12, with 3 signifying no proficiency in English and 12 signifying maximal proficiency in English. The *Adult Proficiency in English* subscale was stratified into quartiles (scores 3-5 = 1; 6-8 = 2; 9-11 = 3; 12 points = 4). In this investigation, the *Adult Proficiency in English* scale is, for brevity, called the *English proficiency* subscale.

The *Adult Pattern of English vs. Spanish Language Usage* subscale was designed to measure self-reported frequency of English versus Spanish language use and is scored from 10-50, with 10 signifying exclusive use of Spanish and 50 an exclusive use of English. The *Adult Pattern of English vs. Spanish Language Usage* subscale was stratified into quartiles (scores 10-19 = 1; 20-29 = 2; 30-39 = 3; 40-50 = 4). In this investigation, the *Adult Pattern of English vs. Spanish Language Usage* subscale is, for brevity, called the *English usage* subscale.

The *Adult Interaction with Members of Mainstream Society* subscale measures contact with Anglo-Americans and comprises questions regarding the ethnic composition

of the respondent's social contacts. The subscale ranges from 0 to 4, with 0 signifying almost no contact with Anglo-Americans and 4 signifying contact with predominantly Anglo-Americans. The *Adult Interaction with Members of Mainstream Society* subscale was stratified into quartiles (scores 3 = 1; 4-5 = 2; 6-7 = 3; 8-9 = 4). In this investigation, the *Adult Interaction with Members of Mainstream Society* is, for brevity, called the *Mainstream contact* subscale.

Quartiles for each measure of acculturation were established by Hazuda et al. (1988), using cut points determined from the San Antonio Heart Study. Location in the lower numbered levels on each acculturation subscale signified less acculturation toward non-Hispanic White culture. For example, study subjects in the lowest quartile for *English proficiency* were least proficient in understanding, speaking, and writing English. Those in the lowest level for *English usage* spoke mainly Spanish when interacting with family, friends, neighbors, and coworkers, and were also exposed to mainly Spanish-based media. For those in the lowest quartile of *Mainstream contact*, the majority of close friends, neighbors, and co-workers were Hispanics.

Validation of the acculturation subscales was also established using data from the San Antonio Heart Study (Hazuda et al., 1988a). In that study, analysis of the original subscales showed that the three scales formed a single cluster across samples. It was felt that this reflected a higher-order construct, termed "*Adult Functional Integration with Mainstream Society*," which measured the degree to which Mexican Americans had acquired and used English language skills to function effectively within mainstream society. The *Adult Functional Integration with Mainstream Society* scale was tested against theoretically-derived hypotheses predicting that measures of structural assimilation would be more strongly associated than measures of acculturation with identificational and marital assimilation, as well as indicators of socioeconomic status (Gordon, 1964). When tested against these assimilation constructs in Gordon's model

(identificational and marital assimilation), the correlation coefficients of the *Adult Functional Integration with Mainstream Society* scale ranged from .23 to .44. When tested against SES indicators, the correlation coefficients of the scale ranged from .48 to .73 (Hazuda et al., 1988f).

The Cronbach's alpha for the *Adult Functional Integration with Mainstream Society* scale was .75 for the overall scale. Individual Cronbach's alphas were also reported: *Adult Proficiency in English* scale as 0.95; the *Adult pattern of English vs. Spanish Language Usage* as 0.95; and the *Adult Interaction with Members of Mainstream Society* as 0.78 (Hazuda et al., 1988f).

Sociodemographic Characteristics

Sociodemographic factors included age, gender, education, marital status, and body mass index (BMI). Age was measured by asking participants to give their age and birth date. Gender was measured by interviewer observation. Education was measured by asking participants what the highest grade or year of regular school that they had completed. Marital status was measured by asking participants whether they were married, separated, divorced, widowed, or never married. BMI was calculated by dividing weight in kilograms by height in meters squared. Height was measured using a tape placed against a wall, and weight was measured with a Metro 9800 scale. BMI may be used either as a continuous or categorical variable, with BMI of greater or equal to 30 classified as obese. In this study, BMI was stratified using CDC criteria as underweight-normal (BMI < 25), overweight (BMI 25-30), and obese (BMI >30).

Chronic Pathology

H-EPESE respondents were asked to respond 'yes' or 'no' if they ever had a physician diagnosis of arthritis, heart attack, stroke, hip fracture or diabetes.

Physical Performance

The impact of functional limitations on disability, as measured by physical performance, is well-known (Guralnik et al., 1994b; Ostir et al., 1998b; Peek et al., 2003b). Moreover, Guralnik and colleagues (1994a) have emphasized the importance of using objective measures to assess physical performance in older persons who report little or no disability. Physical performance, a measure of functional limitations, was assessed with a modified version of the *Performance Oriented Mobility Assessment* (POMA) developed by Tinetti (1986). The reliability for the modified POMA is considered excellent (Ostir et al., 1998a) and includes three measures: stands (side-by-side standing, semi-tandem standing, tandem and full tandem standing), chair stands and walking at a normal pace. The POMA was scored both as a total summary score and categorized summary score (categorized stands, categorized chair stands, and categorized walking at normal pace). The total summary score ranged from 0-12, with 0 indicating inability to perform and 12 indicating best performance. Categorized summary scores ranged from 0-4, with 0 indicating inability to perform and 4 indicating best performance.

Cognitive Function

The 30-item the *Mini Mental State Examination* (MMSE) was used to assess cognitive function. The relationship between cognitive function and disability is well known (Greiner et al., 1996; Raji et al., 2002) and MMSE is frequently used to assess cognitive function (Folstein et al., 1975). The English and Spanish versions of the MMSE were developed from the *Diagnostic Interview Scale* and have been used in other surveys of Hispanic Americans (Bird et al., 1987). The MMSE asks questions such as “What is the date?,” “What county are we in?,” and “What floor of the building are we on?”

DESCRIPTION OF THE STUDY PARTICIPANTS

This section reports the description of the study participants with respect to the independent and the dependent variables. Percentages of the dependent variables are summarized in Table 3.1. Percentages, means, standard deviations and ranges of the independent variables are summarized in Table 3.2 and Table 3.3.

Table 3.1. Descriptive statistics of the outcome variables in Mexican American older adults in the Hispanic Established Populations for Epidemiologic Studies of the Elderly at each wave

Disability variables	Wave 1 (1993-94) (N = 3050)	Wave 2 (1995-96) (N = 2438)	Wave 3 (1998-99) (N = 1980)	Wave 4 (2000-01) (N = 1682)	Wave 5 (2004-05) (N = 1167)
Any ADL limitation	421 (13.8)	383 (15.8)	459 (23.3)	420 (25.2)	429 (36.8)
Any IADL limitation	1621 (53.2)	1262 (51.8)	1011 (51.3)	860 (51.4)	885 (75.8)

The Dependent Variables

Disability variables included ADL (bathing, toileting, grooming, dressing, eating, transferring from bed to chair, and walking across a small room) and IADL (driving, shopping, using a telephone, preparing meals, performing light housework, performing heavy housework, handling money, taking medications, walking up and down stairs, and walking half a mile).

The Independent Variables

The independent variables included covariates and predictors. The covariates (Table 3.2) included age, gender, education, marital status, BMI, chronic pathology (arthritis, heart attack, stroke, diabetes, and hip fracture), and functional limitations

(MMSE and POMA). The predictor variables (Table 3.3) include three measures of acculturation: *English proficiency*, *English usage*, and *Mainstream contact*.

COVARIABLES

At baseline, there were 3050 study participants, comprising 1292 men (42.4% of the sample) and 1758 women (57.6% of the sample) whose average age was 73.6 years. The average education level (*education* variable) at baseline was 4.9 years. The value of the variable signifies the highest grade of school completed. Values for the *married* variable are binary and signify the percentage of study participants who were married at baseline (55%). The values of the *BMI* variable signify the percentage of subjects who were underweight to normal weight (30.5%), overweight (39.6%), and obese (27.2). The values of the *number of chronic diseases* variable report the percentages of study subjects with either no chronic diseases (38.8%), 1 (39.5%), 2 (16.3%), 3 (4.8%), 4 (0.5%), or 5 (0.1%) chronic diseases, and further identify occurrence percentages by type, such as arthritis (40%), heart attack (11%), stroke (6.7%), diabetes (28.5%), and hip fracture (3.5%). In terms of the Disablement process model, impairment was measured using the MMSE. The average score in the MMSE at baseline was 24.7 with a standard deviation of 4.7 and a range of 0 to 30. Also in terms of this model, functional limitations were measured using a modified version of the POMA. The average POMA score was 6.5 with a standard deviation of 3.5 and a range of 0 to 12 in H-EPESE participants.

Table 3.2. Descriptive statistics of the predictor and covariate variables in Mexican American older adults in the Hispanic Established Populations for Epidemiologic Studies of the Elderly at baseline (1993-94)

Explanatory Variables	Frequency (%)	Mean (SD)	Range	N
<i>Demographic variables:</i>				
Age		73.6 (6.8)	65-108	3050
Gender				
Male	1292 (42.4)			
Female	1758 (57.6)			
Education		4.9 (3.9)	0-20	3002
Married	1693 (55.5)			
BMI				
underweight-normal (< 25)	844 (30.5)			
overweight (25-30)	1097 (39.6)			
obese (>= 30)	828 (27.2)			
<i>Chronic pathology:</i>				
No. chronic diseases				
0	1182 (38.8)			
1	1205 (39.5)			
2	497 (16.3)			
3	147 (4.8)			
4	16 (0.5)			
5	3 (0.1)			
Arthritis	1208 (40.0)			
Heart attack	333 (11.0)			
Stroke	204 (6.7)			
Diabetes	867 (28.5)			
Hip fractures	107 (3.5)			
<i>Functional limitation:</i>				
MMSE		24.7 (4.7)	0-30	2852
POMA (total)		6.48 (3.5)	0-12	2922

INDEPENDENT PREDICTOR VARIABLES

The independent predictor variables included *English proficiency*, *English usage*, and *Mainstream contact* (Table 3.3). At baseline, the majority of study participants were in the bottom quartile of acculturation in every measure of acculturation.

Table 3.3. Descriptive statistics of the acculturation variables in Mexican American older adults in the Hispanic Established Populations for Epidemiologic Studies of the Elderly at baseline

Acculturation variables	N (%)
Acculturation (quartiles):	
<i>English proficiency</i>	
1st quartile = 1	1191 (39.5)
2nd quartile = 2	759 (25.2)
3rd quartile = 3	438 (14.5)
4th quartile = 4	625 (20.7)
<i>English usage</i>	
1st quartile = 1	1606 (54.3)
2nd quartile = 2	711 (24.0)
3rd quartile = 3	536 (18.1)
4th quartile = 4	106 (3.6)
<i>Mainstream contact</i>	
1st quartile = 1	2081 (68.6)
2nd quartile = 2	550 (18.1)
3rd quartile = 3	350 (11.5)
4th quartile = 4	53 (1.8)
Acculturation (low/high):	
<i>English proficiency</i>	
Low (1st quartile)	1191 (39.0)
High (quartiles 2-4)	1822 (61.0)
<i>English usage</i>	
Low (1st quartile)	1606 (54.3)
High (quartiles 2-4)	1353 (45.7)
<i>Mainstream contact</i>	
Low (1st quartile)	2081 (68.6)
High (quartiles 2-4)	953 (31.4)

With respect to the measure of *English proficiency*, 39.5% of study participants were in the bottom quartile, 25.2% were in the 2nd quartile, 14.5% were in the 3rd quartile, and 20.7% were in the top quartile.

With respect to the measure of *English usage*, 54.3% of study participants were in the bottom quartile, 24% were in the 2nd quartile, 18.1% were in the 3rd quartile, and 3.6% were in the top quartile.

With respect to the measure of *Mainstream contact*, 68.6% of study participants were in the bottom quartile, 18.1% were in the 2nd quartile, 11.5% were in the 3rd quartile, and 1.8% were in the top quartile.

Among the study participants, the proportion of those with one or more problems performing ADL at baseline (1993-94) was 13.8% (Table 3.3). The proportion of those with one or more ADL limitations increased steadily throughout all five waves, from 15.8% in Wave 2 (1994-96) to 23.3% in Wave 3 (1998-99), to 25.2% in Wave 4 (2000-01), and then jumping sharply to 36.8% in Wave 5.

The proportion of those with one or more problems performing IADL at baseline (1993-94) was 53.2% (Table 3.3). This proportion decreased slightly over the next two waves to 51.8% in Wave 2 (1994-96) and 51.3% in Wave 3 (1998-99). Those with IADL limitations then increased slightly in Wave 4 (2000-01) to 51.4% before jumping sharply to 75.8% in Wave 5.

DATA ANALYSIS

Specific Aim 1. To examine the relationship between acculturation (*English proficiency, English usage, and Mainstream contact*) and incidence of ADL disability among Mexican American older adults over a 12-year period (1993-2005).

Hypothesis 1a: Mexican American older adults with low acculturation (*English proficiency, English usage, and Mainstream contact*) will have greater incidence of ADL disability over a 12-year period (1993-2005).

Hypothesis 1b: The relationship between low acculturation (*English proficiency, English usage, and Mainstream contact*) and increased ADL disability will remain constant after accounting for demographic variables (age, gender, marital status, education, and BMI) and disablement process variables (chronic pathology and measures of cognitive and physical performance).

For Specific Aim 1, the bivariate relationship between low acculturation and ADL disability at each of five waves was tested using the Chi-Square Test for Equal Proportions and the Chi-Square Test for Trends.

The Chi-square Test for Equal Proportions may be used to test the fit between a theoretical frequency distribution and a frequency distribution of observed data. In this dissertation, the Chi-square Test for Equal Proportions was used to test the fit between the expected and observed fit between those who had low acculturation and disability.

The Chi-Square Test for Trends may be used to test whether a series of proportions vary linearly as a function of an ordinal variable. In this dissertation, the Chi-Square Test for Trends was used to test the trend toward having ADL disability as a function of each gain in acculturation level.

To test the multivariate relationship between low acculturation and ADL disability adjusted for relevant demographic and disablement process factors, Ordinary Least Squares regression and Discrete Hazard analyses were used.

Ordinary Least Squares regression may be used to examine the degree of change in one variable as a function of the change in another. In this dissertation, Ordinary Least Squares regression analyses were used to examine the relationship between change in ADL disability at Wave 5 as a function of change in level of acculturation at Wave 1.

Models were adjusted for relevant factors, including demographic (age, gender, marital status, education, and BMI), and disablement process. (chronic disease, impairment, performance) factors.

Finally, the Discrete Hazard regression method was used to estimate the incidence of any ADL limitation over a 2-, 5-, 7-, and 12-year intervals among non-disabled subjects at baseline as a function of acculturation adjusted for relevant disablement process variables. The Discrete Hazard regression method is appropriate for examination of longitudinal data, particularly data containing time-varying and non-time-varying variables, as well data in which the time to the event of interest is unknown. Moreover, this method allows respondents to transition in and out of disability over time. Since, trajectory of disability is dynamic rather than static in context of the Disablement Process, the Discrete Hazard method seemed especially well-suited to understanding how acculturation affects the transition in and out of disability in Mexican American older adults.

The development of any ADL disability was measured in discrete rather than continuous time because disability was only measured at 2 to 3-year intervals. The discrete hazard model is therefore appropriate to model the probability of developing any ADL disability by the next interview based on disability-free status at the current interview. The results of the discrete hazard analyses, adjusted for relevant demographic and disablement process variables, will be reported last. All results were obtained using SAS for Windows, version 9.1 (SAS Institute, Cary, N.C.).

To test the first hypothesis of specific aim 1, one model was used for each acculturation subscale (*English proficiency, English Usage, and Mainstream contact*) to assess the unadjusted effect of acculturation on incidence of ADL disability.

To test the second hypothesis of specific aim 1, two additional models were added to the first model for each acculturation subscale. Model 2 included each acculturation

subscale and demographic variables (age, gender, education, marital status, and BMI). Model 3 included each acculturation subscale, demographic variables (age, gender, education, marital status, and BMI), and disablement process variables, including chronic pathology (diabetes, stroke, hip fracture, heart attack, and arthritis), and measures of cognitive (MMSE) and physical (POMA) performance.

Specific Aim 2. To examine the relationship between acculturation (*English proficiency, English usage, and Mainstream contact*) and incidence of IADL disability among Mexican American older adults over a 12-year period (1993-2005).

Hypothesis 2a: Mexican American older adults with low acculturation (*English proficiency, English usage, and Mainstream contact*) will have greater incidence of IADL disability over a 12-year period (1993-2005).

Hypothesis 2b: The relationship between low acculturation (*English proficiency, English usage, and Mainstream contact*) and increased IADL disability will remain constant after accounting for demographic variables (age, gender, marital status, education, and BMI) and disablement process variables (chronic pathology and measures of cognitive and physical performance).

To test specific aim 2, the Chi-Square Test for Equal Proportions was used to test the unadjusted relationship between low acculturation and IADL disability at each of five waves. The Chi-Square Test for Trends was used to test the trend toward having IADL disability as a function of each gain in acculturation level. Ordinary Least Squares regression analyses were used to examine the relationship between acculturation at baseline and IADL disability at wave 5, adjusted for relevant disablement process variables. Finally, the discrete hazard regression method was used to estimate the incidence of any IADL limitation over a 2-, 5-, 7-, and 12-year intervals among non-disabled subjects at baseline as a function of acculturation adjusted for relevant disablement process variables.

To assess the unadjusted effect of acculturation on incidence of IADL disability, the first hypothesis of specific aim 2, one model was used for each acculturation subscale (*English proficiency, English usage, and Mainstream contact*). To test the second hypothesis of specific aim 2, two additional models were added to the first model for each acculturation subscale. Model 2 included each acculturation subscale and demographic variables (age, gender, education, marital status, and BMI). Model 3 included each acculturation subscale, demographic variables (age, gender, education, marital status, and BMI), and disablement process variables, including chronic pathology (diabetes, stroke, hip fracture, heart attack, and arthritis), and measures of cognitive (MMSE) and physical (POMA) performance.

The results of the analyses described for both specific aims will be reported in the next chapter.

Chapter 4: Acculturation and Incidence of ADL Disability

Aim 1. To examine the relationships between three measures of acculturation (*English Proficiency, English Usage, and Mainstream contact*) and incidence of ADL disability among Mexican American older adults over a 12-year period (1993-2005).

Hypothesis 1a: Mexican American older adults with low acculturation (English Proficiency, English Usage, and Mainstream contact) will have greater incidence of ADL disability over a 12-year period (1993-2005).

Hypothesis 1b: The relationship between low acculturation (English Proficiency, English Usage, and Mainstream contact) and increased ADL disability will remain constant after accounting for demographic variables, including age, gender, marital status, education, and BMI, and disablement process variables, including chronic pathology, and cognitive (MMSE) and physical performance (POMA) measures.

This chapter reports results of the bivariate and multivariate analyses of the relationship between acculturation and disability throughout five waves of the H-EPESE. The beginning of this chapter will focus on the bivariate association between acculturation and ADL disability. The Chi-Square Test for Equal Proportions was used to test the unadjusted relationship between low acculturation and any ADL disability at the beginning of each of the waves, and these results will be reported first. The results of the Chi-Square Test for Trends, which was used to test the trend toward having any ADL disability as a function of each gain in acculturation level at the beginning of each of five waves, will follow.

The next section in the chapter focuses on the multivariate relationship between acculturation and ADL disability. The results of ordinary least squares analyses, which were used to examine the relationship between acculturation at baseline and total ADL

disability at Wave 5, adjusted for total ADL disability at baseline, as well as relevant demographic and disablement process variables, is reported. Finally, the discrete hazard method was used to analyze differences in the development of any ADL disability over time as a function of acculturation.

THE RELATIONSHIP BETWEEN LOW ACCULTURATION AND ANY ADL DISABILITY AT THE BEGINNING OF EACH WAVE OF THE H-EPESE

The Chi-Square Test for Equal Proportions was used to examine differences between those scoring low (first quartile) and high (2nd, 3rd, and 4th quartiles) on three measures of acculturation and any ADL disability. Quartiles for each measure of acculturation were established by Hazuda et al. (1988); and location in the first quartile on each dimension of acculturation signified the lowest level of acculturation toward non-Hispanic White culture. The unadjusted association of low acculturation and any ADL limitation at the beginning of each wave in the H-EPESE is shown in Table 4.1.

The Chi-Square Test for Equal Proportions indicated that there were significant differences in any ADL disability between the least acculturated and more acculturated subjects in two acculturation measures (*English proficiency* and *English usage*) at the beginning of each wave. However, the association between the least acculturated and more acculturated subjects in the third measure of acculturation (*Mainstream contact*) and any ADL disability was weaker and reached statistical significance only in the third ($p < .05$) and the fifth waves ($p < .01$).

Table 4.1. Results of Chi-square Test of Equal Proportions of low acculturation versus any ADL disability in Mexican American older adults in the Hispanic Established Populations for Epidemiologic Studies of the Elderly at each Wave.

	Wave 1 (1993-94) (N = 3050)	Wave 2 (1995-96) (N = 2438)	Wave 3 (1998-99) (N = 1980)	Wave 4 (2000-01) (N = 1682)	Wave 5 (2004-05) (N = 1167)
<i>Low English Proficiency</i>					
Chi-Square	17.40	17.39	11.43	12.82	16.70
Probability Level	$p < .001$	$p < .001$	$p < .01$	$p < .01$	$p < .001$
Odds Ratio	1.50	1.56	1.31	1.42	1.38
(Confidence interval)	(1.21-1.84)	(1.25-1.94)	(1.06-1.62)	(1.14-1.78)	(1.08-1.76)
<i>Low English Usage</i>					
Chi-Square	17.50	11.72	10.03	8.37	9.46
Probability Level	$p < .001$	$p < .001$	$p < .05$	$p < .05$	$p < .05$
Odds Ratio	1.56	1.48	1.38	1.37	1.41
(Confidence interval)	(1.25-1.95)	(1.17-1.86)	(1.11-1.71)	(1.09-1.72)	(1.11-1.80)
<i>Low Mainstream Contact</i>					
Chi-Square	3.90	5.10	8.24	1.86	12.99
Probability Level	0.27	0.16	$p < .05$	0.60	$p < .01$
Odds Ratio	1.21	1.30	1.37	1.15	1.59
(Confidence interval)	(0.96-1.52)	(1.02-1.65)	(1.08-1.72)	(0.90-1.46)	(1.22- 2.08)

THE RELATIONSHIP OF ACCULTURATION AND ANY ADL DISABILITY BY ACCULTURATION LEVEL AT THE BEGINNING OF EACH WAVE OF THE H-EPESE

The Chi-Square Test for Trends, which was used to test the trend of having any ADL disability as a function of each gain in acculturation level at the beginning of each of five waves of the H-EPESE, showed a similar pattern. For the measures of *English proficiency* and *English usage* only, the prevalence of any ADL disability increased with each successively higher level of acculturation (Table 4.2). For the measure of *Mainstream contact*, however, the prevalence of any ADL disability did not increase consistently with each successively higher level of acculturation, and was statistically

significant at the beginning of the second ($p < .05$), third ($p < .01$) and fifth ($p < .01$) waves only.

THE RELATIONSHIP BETWEEN ACCULTURATION AND TOTAL ADL DISABILITY ADJUSTED FOR DEMOGRAPHIC AND DISABLEMENT PROCESS FACTORS AT THE BEGINNING OF EACH WAVE OF THE H-EPESE

Ordinary least squares regression analyses were used to determine if the relationship between low levels of acculturation and ADL disability remained significant ($p < .05$) after adjusting for demographic and disablement process factors (Tables 4.3, 4.4, and 4.5). The relationship between measures of acculturation at baseline and total ADL disability at Wave 5 was tested with 3 models adjusted for total ADL disability at baseline, as well as demographic and disablement process factors. Model 1 included acculturation and was adjusted for total ADL at Wave 1. Model 2 included acculturation and was adjusted for total ADL and demographic factors (age, gender, marital status, education, and BMI) at Wave 1. Model 3 included acculturation and was adjusted for total ADL, demographic factors and disablement process factors at Wave 1. The disablement process factors included chronic pathology (diabetes, stroke, hip fracture, heart attack, arthritis), impairment (cognitive status) and functional limitation (physical performance). Models adjusted for total ADL disability at baseline were consistent with the bivariate analyses in demonstrating a significant ($p < .01$) relationship between higher levels of acculturation and total ADL disability at Wave 5. However, after adjusting for demographic and disablement process factors at baseline, two of the three measures of acculturation (*English proficiency* and *English usage*) demonstrated an insignificant ($p > .05$) relationship with total ADL disability at Wave 5.

Table 4.2. Results of Chi-Square Test for Trends for acculturation versus any ADL disability in the Hispanic Established Populations for Epidemiologic Studies of the Elderly at each Wave

		Percent of Subjects with any ADL Disability									
		Wave 1 N = 3050	OR (CI)	Wave 2 N = 2439	OR (CI)	Wave 3 N = 1980	OR (CI)	Wave 4 N = 1692	OR (CI)	Wave 5 N = 1167	OR (CI)
50	<i>English proficiency</i>		1.80		1.82		1.58		1.71		1.98
	1 st quartile	16.67	(1.34-2.50)	19.27	(1.32-2.49)	26.18	(1.18-2.12)	29.49	(1.25-2.33)	41.48	(1.41-2.78)
	2 nd quartile	13.32	(0.99-1.95)	13.72	(0.85-1.73)	24.49	(1.05-1.99)	25.37	(0.99-1.96)	37.07	(1.14-2.39)
	3 rd quartile	11.95	(0.83-1.82)	15.00	(0.90-2.01)	20.00	(0.76-1.64)	22.71	(0.80-1.80)	40.13	(1.22-2.89)
	4 th quartile	9.95	*1.0 (N/A)	11.62	*1.0 (N/A)	18.33	*1.0 (N/A)	19.66	*1.0 (N/A)	26.32	*1.0 (N/A)
	Total %	13.80		15.70		23.20		25.40		36.90	
	Trend significance	p < .001		p < .001		p < .001		p < .001		p < .001	
	<i>English usage</i>		1.29		2.08		2.12		1.42		2.03
	1 st quartile	15.23	(0.71-2.33)	17.24	(0.95-4.59)	25.39	(1.03-4.34)	27.57	(0.72-2.81)	40.32	(0.94-4.38)
	2 nd quartile	9.17	(0.38-1.36)	12.82	(0.65-3.32)	20.78	(0.78-3.41)	23.04	(0.55-2.26)	34.39	(0.71-3.47)
	3 rd quartile	11.42	(0.49-1.74)	12.29	(0.61-3.21)	19.60	(0.72-3.22)	20.00	(0.45-1.92)	30.77	(0.59-3.00)
	4 th quartile	12.26	*1.0 (N/A)	9.09	*1.0 (N/A)	13.85	*1.0 (N/A)	21.15	*1.0 (N/A)	25.00	*1.0 (N/A)
	Total %	12.98		15.01		22.79		24.82		36.66	
	Trend significance	p < .01		p < .01		p < .01		p < .01		p < .01	
	<i>Mainstream contact</i>		1.63		1.18		2.27		0.87		2.82
1 st quartile	14.55	(0.65-4.13)	16.83	(0.49-2.83)	25.17	(0.79-6.54)	26.13	(0.39-1.90)	39.90	(0.94-8.46)	
2 nd quartile	11.68	(0.49-3.30)	14.32	(0.39-2.41)	20.97	(0.61-5.27)	23.53	(0.33-1.71)	31.40	(0.63-6.01)	
3 rd quartile	13.75	(0.58-4.03)	12.00	(0.31-2.04)	18.64	(0.51-4.66)	22.63	(0.31-1.67)	27.87	(0.52-5.23)	
4 th quartile	9.43	*1.0 (N/A)	14.63	*1.0 (N/A)	12.90	*1.0 (N/A)	29.03	*1.0 (N/A)	19.05	*1.0 (N/A)	
Total %	13.85		15.77		23.44		25.30		36.75		
Trend significance	N.S.		p < .05		p < .01		N.S.		p < .001		

The Relationship of Mainstream Contact and Total ADL Disability at Wave 5 of the H-EPESE, Adjusted for Demographic and Disablement Process Factors

Only one measure of acculturation, *Mainstream contact* (Table 4.3), demonstrated a significant ($p < .05$) relationship with total ADL disability at Wave 5 after adjusting for demographic and disablement process factors at baseline. The model itself demonstrated significance at the $p < .001$ level, and several factors in the model were shown to be significant ($p < .05$) in the relationship between *Mainstream contact* and total ADL disability at Wave 5. Of these, age and diabetes ($p < .001$), and BMI and stroke ($p < .05$) were shown to account for a significant portion of the variance in Model 3.

The Relationship of English Proficiency and Total ADL Disability at Wave 5 of the H-EPESE, Adjusted for Demographic and Disablement Process Factors

English proficiency had an insignificant relationship ($p > .05$) with total ADL disability when demographic and disablement process factors were considered (Table 4.4). Similar to *Mainstream contact*, however, the relationship between low *English proficiency* and total ADL disability was strongly affected by age and diabetes ($p < .001$).

The Relationship of English Usage and Total ADL Disability at Wave 5 of the H-EPESE, Adjusted for Demographic and Disablement Process Factors

Low *English usage* was not shown to be associated ($p > .05$) with total ADL disability (Table 4.5). This relationship, when adjusted for demographic and disablement process factors, was also shown to be affected by age and diabetes ($p < .001$), as well as BMI ($p < .05$). Unlike the other measures of acculturation, however, the relationship between *English usage* and total ADL disability at Wave 5 was shown to be affected ($p < .001$) by the POMA.

Table 4.3. Results of multiple regression analyses of the relationship of *Mainstream contact* at Wave 1 (N = 3050) and ADL disability at Wave 5 (N = 1167) in the Hispanic Established Populations for Epidemiologic Studies of the Elderly

Explanatory variables	Model 1	(SE)	Model 2	(SE)	Model 3	(SE)
Intercept	1.81***	0.14	-4.38***	1.04	-2.02	1.24
<i>Mainstream contact</i>	-0.32**	0.09	-0.26**	0.09	-0.22*	0.09
Total ADL at baseline	0.50***	0.08	0.39**	0.11	0.13	0.12
<i>Demographics:</i>						
Age			0.09***	0.01	0.08***	0.01
Female			0.02	0.15	-0.05	0.15
Marital status			-0.11	0.15	-0.11	0.15
Education			-0.03	0.02	-0.01	0.02
BMI:						
overweight			-0.35*	0.17	-0.41*	0.17
obese			-0.12	0.18	-0.32	0.18
<i>Chronic pathology:</i>						
diabetes					0.67***	0.16
stroke					0.86*	0.37
hip fracture					-0.02	0.47
heart attack					-0.18	0.25
arthritis					0.09	0.14
<i>Impairment:</i>						
MMSE					-0.03	0.02
<i>Physical performance:</i>						
POMA					-0.46	0.09
R-Square	0.05		0.08		-0.13	

Notes: *p<.05; **p<.01; ***p<.001

Table 4.4. Results of multiple regression analyses of the relationship of *English proficiency* at Wave 1 (N = 3050) and ADL disability at Wave 5 (N = 1167) in the Hispanic Established Populations for Epidemiologic Studies of the Elderly

Explanatory variables	Model 1	(SE)	Model 2	(SE)	Model 3	(SE)
Intercept	1.77***	0.14	-4.80	1.03	-2.47	1.23
<i>English proficiency</i>	-0.20**	0.06	-0.14	0.07	-0.14	0.07
Total ADL at baseline	0.55***	0.08	0.47***	0.12	0.16	0.13
<i>Demographics:</i>						
Age			0.09***	0.01	0.08***	0.01
Female			0.05	0.15	-0.02	0.15
Marital status			-0.03	0.15	-0.05	0.15
Education			-0.02	0.02	0.00	0.02
BMI:						
overweight			-0.33	0.17	-0.40	0.17
obese			-0.15	0.18	-0.35	0.18
<i>Chronic pathology:</i>						
diabetes					0.70***	0.16
stroke					0.82	0.37
hip fracture					0.00	0.48
heart attack					-0.18	0.25
arthritis					0.07	0.14
<i>Impairment:</i>						
MMSE					-0.02	0.02
<i>Physical performance:</i>						
POMA					-0.49	0.09
R-Square	0.01		0.08		0.13	

Notes: *p<.05; **p<.01; ***p<.001

Table 4.5. Results of multiple regression analyses of the relationship of *English usage* at Wave 1 (N = 3050) and ADL disability at Wave 5 (N = 1167) in the Hispanic Established Populations for Epidemiologic Studies of the Elderly

Explanatory variables	Model 1	(SE)	Model 2	(SE)	Model 3	(SE)
Intercept	1.81***	0.15	-4.69***	1.04	-2.16	1.24
<i>English usage</i>	-0.27*	0.08	-0.16	0.09	-0.18	0.09
Total ADL at baseline	0.48***	0.08	0.39***	0.11	0.13	0.12
<i>Demographics:</i>						
Age			0.09***	0.01	0.08***	0.01
Female			0.02	0.15	-0.05	0.15
Marital status			-0.10	0.15	-0.10	0.15
Education			-0.03	0.02	0.00	0.02
BMI:						
overweight			-0.32	0.17	-0.38*	0.17
obese			-0.09	0.18	-0.29	0.18
<i>Chronic pathology:</i>						
diabetes					0.66***	0.16
stroke					0.85*	0.38
hip fracture					-0.08	0.47
heart attack					-0.21	0.25
arthritis					0.05	0.14
<i>Impairment:</i>						
MMSE					-0.03	0.02
<i>Physical performance:</i>						
POMA					-0.48***	0.09
R-Square	0.04		0.08		0.13	

Notes: *p<.05; **p<.01; ***p<.001

THE IMPACT OF ACCULTURATION ON THE 12-YEAR INCIDENCE OF ANY ADL DISABILITY

The discrete hazard method was used to model the probability of developing any ADL disability by the next interview based on disability-free status at the current interview. Tables 4.6 through 4.8 show the discrete hazard models estimating acculturation effects on any ADL disability throughout Waves 1 through 5 of the H-EPESE.

The Impact of *English Proficiency* on the 12-year Incidence of Any ADL Disability

Table 4.6 shows that at baseline and before accounting for demographic and disablement process factors, respondents with lower *English proficiency* had greater incidence of any ADL disability. Once demographic factors were entered in the second model, however, the effect of English proficiency on incidence of any ADL disability was no longer significant at the $p < .05$ level; however demographic factors including age ($p < .01$) and BMI ($p < .05$) were.

The third model in Table 4.6 indicates that disablement process factors also have an impact on the development of any ADL disability. Chronic disease was shown to have a large impact, particularly diabetes ($p < .0001$) and, to a lesser extent, stroke and arthritis ($p < .05$). Cognitive function (MMSE) and physical performance (POMA) were also shown to have a large impact ($p < .0001$) on the incidence of any ADL disability over five waves in the H-EPESE.

Table 4.6. Discrete Hazard analysis of the association of *English proficiency* and incidence of ADL disability over 5 Waves in the Hispanic Established Populations for Epidemiologic Studies of the Elderly

Explanatory variables	Model 1 OR (CI)	Model 2 OR (CI)	Model 3 OR (CI)
<i>English proficiency</i>	0.86 (0.80, 0.93)**	0.91 (0.82, 1.01)	0.93 (0.84, 1.04)
<i>Demographics:</i>			
Age		1.10 (1.09, 1.12)	1.09 (1.07, 1.10)***
Female		1.28 (1.04, 1.57)*	1.16 (0.93, 1.45)
Marital status		0.86 (0.70, 1.05)	0.88 (0.71, 1.09)
Education		0.99 (0.97, 1.03)	1.02 (0.99, 1.06)
BMI:			
overweight		0.94 (0.75, 1.19)	0.99 (0.77, 1.26)
obese		1.39 (1.10, 1.75)**	1.26 (0.99, 1.63)
<i>Chronic pathology:</i>			
diabetes			1.92 (1.56, 2.36)***
stroke			1.65 (1.13, 2.41)*
hip fracture			1.84 (0.98, 3.45)
heart attack			1.37 (0.99, 1.88)
arthritis			1.29 (1.06, 1.57)*
<i>Impairment:</i>			
MMSE			0.95 (0.93, 0.975)***
<i>Physical performance:</i>			
POMA			0.84 (0.82, 0.87)***

Notes: *p<.05; **p<.01; ***p<.001

The Impact of *English Usage* on the 12-year Incidence of Any ADL Disability

English usage (Table 4.7) was significantly associated with any ADL disability ($p < .01$) at baseline, but this relationship decreases to nonsignificance ($p > .05$) after accounting for demographic and disablement process factors. The demographic factors that were shown to play the largest roles were age ($p < .001$) and BMI ($p < .01$). However, unique to the measure of *English usage*, sex was shown in Model 2 to have an impact ($p < .05$) on the 5-wave incidence of any ADL disability in the H-EPESE.

With respect to the measure of *English usage*, disablement process factors were also shown to have an impact on the development of any ADL disability (Table 4.7). In the third model measuring the impact of *English usage* on incidence of any ADL disability adjusted for disablement process factors, diabetes again figured prominently ($p < .001$), with stroke ($p < .05$) and arthritis also significant. Unique to the measure of *English usage*, however, heart attack demonstrated a significant impact ($p < .05$). The measure of *English usage* also demonstrated the considerable impact of cognitive function (MMSE) and physical performance (POMA) ($p < .0001$) on the incidence of any ADL disability over five waves in the H-EPESE.

Table 4.7. Discrete Hazard analysis of the association of *English usage* and incidence of ADL disability over 5 Waves in the Hispanic Established Populations for Epidemiologic Studies of the Elderly

Explanatory variables	Model 1 OR (CI)	Model 2 OR (CI)	Model 3 OR (CI)
Intercept			
<i>English usage</i>	0.87 (0.78, 0.96)**	0.96 (0.85, 1.10)	0.97 (0.84, 1.11)
<i>Demographics:</i>			
Age		1.10 (1.09, 1.12)***	1.08 (1.07, 1.10)***
Female		1.27 (1.03, 1.57)*	1.14 (0.91, 1.43)
Marital status		0.85 (0.69, 1.04)	0.87 (0.71, 1.09)
Education		0.98 (0.96, 1.01)	1.01 (0.98, 1.05)
BMI:			
overweight		0.92 (0.73, 1.17)	0.96 (0.75, 1.22)
obese		1.37 (1.09, 1.73)**	1.26 (0.98, 1.62)
<i>Chronic pathology:</i>			
diabetes			1.89 (1.54, 2.33)***
stroke			1.57 (1.07, 2.30)*
hip fracture			1.64 (0.88, 3.06)
heart attack			1.45 (1.06, 1.99)*
arthritis			1.31 (1.08, 1.61)**
<i>Impairment:</i>			
MMSE			0.95 (0.93, 0.97)***
<i>Physical performance:</i>			
POMA			0.85 (0.82, 0.89)***

Notes: *p<.05; **p<.01; ***p<.001

The Impact of *Mainstream Contact* on the 12-year Incidence of Any ADL Disability

Similar to both measures of *English proficiency* and *English usage*, *Mainstream contact* was not significantly associated ($p > .05$) with incidence of any ADL disability (Table 4.8). Age was the demographic factor that was shown to play the largest role ($p < .0001$), and sex and BMI were significant ($p < .05$) in Model 2 only.

With respect to *Mainstream contact*, the disablement process factors that were shown to have the greatest impact on the development of any ADL disability were: diabetes ($p < .0001$), and stroke, heart attack and arthritis ($p < .05$). In addition, the measure of *Mainstream contact* paralleled both measures of *English proficiency* and *English usage* in demonstrating the large impact of cognitive function (MMSE) and physical performance (POMA) ($p < .0001$) on the 12-year incidence of any ADL disability.

SPECIFIC AIM 1 SUMMARY

In summary, the goal of Specific Aim 1 was to determine whether low acculturation had an impact on the incidence of ADL disability, before and after accounting for relevant demographic and disablement process factors. In some but not all analyses, partial support for Specific Aim 1 was demonstrated by significant associations between measures of acculturation (*English proficiency*, *English usage*, and *Mainstream contact*) and ADL disability throughout five waves of the H-EPESE.

Table 4.8. Discrete Hazard analysis of the association of *Mainstream contact* and incidence of ADL disability over 5 Waves in the Hispanic Established Populations for Epidemiologic Studies of the Elderly

Explanatory variables	Model 1 OR (CI)	Model 2 OR (CI)	Model 3 OR (CI)
<i>Mainstream contact</i>	0.91 (0.81, 1.03)	0.97 (0.85, 1.10)	0.97 (0.84, 1.10)
<i>Demographics:</i>			
Age		1.10 (1.09, 1.12)***	1.09 (1.07, 1.10)***
Female		1.30 (1.05, 1.59)**	1.16 (0.93, 1.45)
Marital status		0.86 (0.70, 1.05)	0.88 (0.71, 1.09)
Education		0.98 (0.96, 1.01)	1.01 (0.98, 1.04)
BMI:			
overweight		0.95 (0.76, 1.21)	1.00 (0.79, 1.28)
obese		1.39 (1.10, 1.75)**	1.28 (1.00, 1.65)
<i>Chronic pathology:</i>			
diabetes			1.87 (1.52, 2.30)***
stroke			1.63 (1.11, 2.38)*
hip fracture			1.63 (0.87, 3.05)
heart attack			1.41 (1.03, 1.93)*
arthritis			1.29 (1.06, 1.57)*
<i>Impairment:</i>			
MMSE			0.95 (0.93, 0.97)***
<i>Physical performance:</i>			
POMA			0.85 (0.83, 0.88)***

Notes: *p<.05; **p<.01; ***p<.001

Specific Aim 1 was initially supported at the bivariate level by both the Chi-Square Tests of Equal Proportion and the Chi-Square Tests for Trends, which indicated that there were significant differences ($p < .05$) in any ADL disability between the least acculturated and more acculturated subjects with respect to measures of *English proficiency* and *English usage*, but not *Mainstream contact*.

Specific Aim 1 was also partly supported at the multivariate level by multiple regression, but not by the discrete hazard, analyses. Multiple regression models, when adjusted for total ADL disability alone (Model 1), were consistent with the bivariate analyses in demonstrating a significant relationship ($p < .01$) between low levels of *English proficiency* and *English usage*, but not *Mainstream contact*, and total ADL disability at Wave 5. However, once disablement process factors were entered into the multiple regression models (Model 3), only the measure of *Mainstream contact* was shown to have a significant relationship ($p < .05$) with total ADL disability at Wave 5.

Finally, the results of the discrete hazard analyses also demonstrated lack of support for Specific Aim I. Low levels of *English proficiency* and *English usage*, but not *Mainstream contact*, were shown to be significant ($p < .05$) when adjusted for total ADL disability alone (Model 1). However, once demographic (Model 2) and disablement process factors (Model 3) were entered into the discrete hazard models, the relationships between all three measures of acculturation (*English proficiency*, *English usage*, and *Mainstream contact*) and the incidence of any ADL disability were reduced to nonsignificance ($p > .05$).

Chapter 5: Acculturation and Incidence of IADL Disability

Aim 2. To examine the relationships between three measures of acculturation (*English Proficiency, English Usage, and Mainstream contact*) and incidence of IADL disability among Mexican American older adults over a 12-year period (1993-2005).

Hypothesis 2a: Mexican American older adults with low acculturation (English Proficiency, English Usage, and Mainstream contact) will have greater incidence of IADL disability over a 12-year period (1993-2005).

Hypothesis 2b: The relationship between low acculturation (English Proficiency, English Usage, and Mainstream contact) and increased IADL disability will remain constant after accounting for demographic variables, including age, gender, marital status, education, and BMI, and disablement process variables, including chronic pathology, and cognitive (MMSE) and physical performance (POMA) measures.

This chapter reports results of the bivariate and multivariate analyses of the relationship between low acculturation and IADL disability throughout five waves of the H-EPESE. The beginning of this chapter will focus on the bivariate association between low acculturation and IADL disability. The Chi-Square Test for Equal Proportions was used to test the unadjusted relationship between low acculturation and any IADL disability at the beginning of each of the waves, and these results will be reported first. The results of the Chi-Square Test for Trends, which was used to test the trend toward having any IADL disability as a function of each gain in acculturation level at the beginning of each of five waves, will follow.

The next section in the chapter focuses on the multivariate relationship between low acculturation and IADL disability. The results of ordinary least squares analyses, which were used to examine the relationship between low acculturation at baseline and

total IADL disability at Wave 5 adjusted for total IADL disability at baseline and relevant demographic and disablement process variables, are reported. Finally, the discrete hazard method was used to analyze differences in the development of any IADL disability over time as a function of acculturation. The development of any IADL disability was measured in discrete rather than continuous time because IADL disability was only measured at 2 to 3-year intervals. The discrete hazard model is therefore appropriate to model the probability of developing any IADL disability by the next interview based on disability-free status at the current interview. The results of the discrete hazard analyses, adjusted for relevant demographic and disablement process variables, will be reported last. Results were obtained using SAS for Windows, version 9.1 (SAS Institute, Cary, N.C.).

THE RELATIONSHIP BETWEEN LOW ACCULTURATION AND ANY IADL DISABILITY AT THE BEGINNING OF EACH WAVE OF THE H-EPESE

The Chi-Square Test for Equal Proportions was used to examine differences between those scoring low (first quartile) and high (2nd, 3rd, and 4th quartiles) on three measures of acculturation and any IADL disability. Quartiles for each measure of acculturation were established by Hazuda et al. (1988), and location in the first quartile on each dimension of acculturation signified the lowest level of acculturation toward non-Hispanic White culture. The unadjusted association of low acculturation and any IADL limitation at the beginning of each wave in the H-EPESE is shown in Table 5.1.

The Chi-Square Tests for Equal Proportions indicated that there were significant differences in any IADL disability between the least acculturated and more acculturated subjects in two acculturation measures (*English proficiency* and *English usage*) at the beginning of each wave. However, the association between the least acculturated and more acculturated subjects in the third measure of acculturation (*Mainstream contact*)

and any IADL disability was weaker and reached statistical significance only in the second, third, fourth, and fifth waves ($p < .05$).

Table 5.1. Results of Chi-Square Tests for Equal Proportions of low acculturation versus any IADL disability in Mexican American older adults in the Hispanic Established Populations for Epidemiologic Studies of the Elderly at each Wave.

	Wave 1 (1993-94) (N = 3050)	Wave 2 (1995-96) (N = 2438)	Wave 3 (1998-99) (N = 1980)	Wave 4 (2000-01) (N = 1682)	Wave 5 (2004-05) (N = 1167)
<i>Low English Proficiency</i>					
Chi-Square	90.00	72.00	43.67	22.24	37.00
Probability Level	$p < .001$	$p < .001$	$p < .001$	$p < .001$	$p < .001$
Odds Ratio	1.91	1.82	1.68	1.54	2.27
(Confidence interval)	(1.65, 2.22)	(1.54, 2.15)	(1.40, 2.02)	(1.26, 1.88)	(1.68, 3.06)
<i>Low English Usage</i>					
Chi-Square	46.95	37.22	23.84	15.76	24.36
Probability Level	$p < .001$	$p < .001$	$p < .001$	$p < .01$	$p < .001$
Odds Ratio	1.65	1.60	1.53	1.41	1.93
(Confidence interval)	(1.42, 1.90)	(1.36, 1.88)	(1.28, 1.83)	(1.16, 1.71)	(1.47, 2.54)
<i>Low Mainstream Contact</i>					
Chi-Square	3.67	13.79	12.34	10.12	20.06
Probability Level	0.30	$p < .01$	$p < .01$	$p < .05$	$p < .001$
Odds Ratio	1.16	1.37	1.39	1.39	1.88
(Confidence interval)	(0.99, 1.35)	(1.15, 1.62)	(1.15, 1.68)	(1.13, 1.71)	(1.42, 2.50)

THE RELATIONSHIP OF ACCULTURATION AND ANY IADL DISABILITY BY ACCULTURATION LEVEL AT THE BEGINNING OF EACH WAVE OF THE H-EPESE

The Chi-Square Test for Trends, which was used to test the trend of having any IADL disability as a function of each gain in acculturation level at the beginning of each of five waves of the H-EPESE, showed a similar pattern. For the measures of *English proficiency* and *English usage* only, the prevalence of any IADL disability increased

Table 5.2. Results of Chi-square test for trends for acculturation versus any IADL disability in the Hispanic Established Populations for Epidemiologic Studies of the Elderly at each Wave

	Percent of Subjects with any IADL Disability									
	Wave 1 N = 3050	OR (CI)	Wave 2 N = 2439	OR (CI)	Wave 3 N = 1980	OR (CI)	Wave 4 N = 1692	OR (CI)	Wave 5 N = 1167	OR (CI)
<i>English proficiency</i>		2.50		2.55		2.12		1.83		2.97
1 st quartile	62.66	(2.05, 3.05)	60.69	(2.04, 3.19)	59.16	(1.67, 2.70)	57.98	(1.41, 2.38)	84.28	(2.07, 4.26)
2 nd quartile	50.72	1.53 (1.24, 1.90)	51.4	1.75 (1.38, 2.23)	52.24	1.60 (1.23, 2.09)	49.4	1.30 (0.97, 1.72)	74.15	1.59 (1.10, 2.30)
3 rd quartile	49.2	1.44 (1.13, 1.84)	48.09	1.53 (1.16, 2.03)	44.36	1.17 (0.86, 1.59)	50	1.33 (0.95, 1.85)	72.37	1.45 (0.93, 2.25)
4 th quartile	40.16	*1.0 (N/A)	37.68	*1.0 (N/A)	40.5	*1.0 (N/A)	42.98	*1.0 (N/A)	64.3	*1.0 (N/A)
Total %	53.03		51.77		51.33		51.48		75.85	
Trend significance	p < .001	p < .0001	p < .0001		p < .0001		p < .0001		p < .0001	
<i>English usage</i>		2.11		1.92		1.78		2.30		1.91
1 st quartile	58.04	(1.41, 3.15)	56.51	(1.21, 3.08)	55.88	(1.07, 2.96)	54.88	(1.28, 4.13)	81.28	(0.91, 3.99)
2 nd quartile	46.05	1.30 (0.86, 1.97)	47.83	1.36 (0.84, 2.21)	47.53	1.28 (0.76, 2.15)	48.66	1.79 (0.98, 3.27)	71.23	1.09 (0.51, 2.31)
3 rd quartile	46.27	1.31 (0.86, 2.01)	41.37	1.05 (0.64, 1.72)	42.77	1.05 (0.62, 1.80)	45.25	1.56 (0.85, 2.89)	66.35	0.87 (0.40, 1.87)
4 th quartile	39.62	*1.0 (N/A)	40.26	*1.0 (N/A)	41.54	*1.0 (N/A)	34.62	*1.0 (N/A)	69.44	*1.0 (N/A)
Total %	52.37		51.16		50.93		50.88		75.74	
Trend significance	p < .0001		p < .0001		p < .0001		p < .0001		p < .0001	
<i>Mainstream contact</i>		1.15		1.86		1.87		1.26		1.95
1 st quartile	54.36	(0.67, 1.98)	54.33	(0.99, 3.51)	54.08	(0.90, 3.87)	54.06	(0.62, 2.56)	79.56	(0.77, 4.90)
2 nd quartile	50.09	0.97 (0.55, 1.70)	47.47	1.41 (0.73, 2.72)	45.43	1.32 (0.62, 2.79)	45.16	0.88 (0.42, 1.84)	68.6	1.09 (0.42, 2.84)
3 rd quartile	51.71	1.03 (0.58, 1.84)	46.18	1.34 (0.69, 2.62)	47.73	1.45 (0.67, 3.12)	46.32	0.92 (0.43, 1.97)	65.57	0.95 (0.36, 2.54)
4 th quartile	50.94	*1.0 (N/A)	39.02	*1.0 (N/A)	38.71	*1.0 (N/A)	48.39	*1.0 (N/A)	66.67	*1.0 (N/A)
Total %	53.22		51.48		51.5		51.41		75.9	
Trend significance	NS		p < .001		p < .01		p < .01		p < .001	

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consistently with each successively higher level of acculturation. It was not significant ($p > .05$) in the first wave, yet was statistically significant at the beginning of the second, third, fourth, and fifth ($p < .05$) waves.

The Relationship between Acculturation and Total IADL Disability Adjusted for Demographic and Disablement Process Factors at the beginning of Each Wave of the H-EPESE

Ordinary least squares regression analyses were used to determine if the relationship between low acculturation and IADL disability remained significant ($p < .05$) after adjusting for demographic and disablement process factors (Tables 5.3, 5.4, and 5.5). The relationship between measures of acculturation at baseline and total IADL disability at Wave 5 was tested with three models adjusted for total IADL disability at baseline, as well as demographic and disablement process factors. Model 1 included acculturation and was adjusted for total IADL at Wave 1. Model 2 included acculturation and was adjusted for total IADL and demographic factors (age, gender, marital status, education, and BMI) at Wave 1. Model 3 included acculturation and was adjusted for total IADL, demographic factors and disablement process factors at Wave 1. The disablement process factors included chronic pathology (diabetes, stroke, hip fracture, heart attack, arthritis), impairment (cognitive status) and functional limitation (physical performance).

Models adjusted for total IADL disability at baseline alone were consistent with the bivariate analyses in demonstrating a significant ($p < .01$) relationship between lower levels of acculturation and total IADL disability at Wave 5. After adjusting for demographic and disablement process factors at baseline, however, only one of the three

measures of acculturation (*English proficiency*) was shown to have a consistently significant ($p < .05$) relationship with total IADL disability at Wave 5.

The Relationship of Mainstream Contact and Total IADL Disability at Wave 5 of the H-EPESE, Adjusted for Demographic and Disablement Process Factors

Mainstream contact (Table 5.3) demonstrated a consistent relationship with total IADL disability at Wave 5. After adjusting for demographic and disablement factors at baseline, the association between lower levels of *Mainstream contact* and total IADL disability at Wave 5 remained highly significant ($p < .01$) in the final model (Model 3). Several demographic and disablement process factors were also shown to be significant ($p < .05$) in the relationship between *Mainstream contact* and total IADL disability at Wave 5. Of these, age was significant ($p < .001$) in all three models. Age's significance was paralleled by education, which was significant in Model 2 ($p < .001$) and in Model 3 ($p < .01$). In the third model, the POMA was also significant ($p < .01$) as were gender, BMI, diabetes and the MMSE ($p < .05$).

The Relationship of English Proficiency and Total IADL Disability at Wave 5 of the H-EPESE, Adjusted for Demographic and Disablement Process Factors

The measure of *English proficiency* (Table 5.4) also demonstrated a consistent relationship with total IADL disability at Wave 5. After adjusting for demographic and disablement factors at baseline, the association between lower levels of *English proficiency* and total IADL disability at Wave 5 remained significant ($p < .05$) in the final model (Model 3).

Table 5.3. Results of multiple regression analyses of the relationship of *Mainstream contact* at Wave 1 (N = 3050) and IADL disability at Wave 5 (N = 1167) in the Hispanic Established Populations for Epidemiologic Studies of the Elderly

Explanatory variables	Model 1	(SE)	Model 2	(SE)	Model 3	(SE)
Intercept	4.25***	0.22	-8.18***	1.51	-5.17**	1.75
<i>Mainstream contact</i>	-0.65***	0.13	-0.39**	0.13	-0.36**	0.13
Total IADL at baseline	0.60***	0.05	0.43***	0.05	0.29***	0.06
<i>Demographics:</i>						
Age			0.18***	0.02	0.17***	0.02
Female			0.50*	0.22	0.44*	0.22
Marital status			-0.07	0.21	-0.14	0.21
Education			-0.12***	0.03	-0.09**	0.03
BMI:						
overweight			-0.51*	0.24	-0.58*	0.24
obese			-0.26	0.26	-0.51*	0.26
<i>Chronic pathology:</i>						
diabetes					1.20*	0.23
stroke					0.94	0.53
hip fracture					0.27	0.68
heart attack					0.33	0.35
arthritis					0.20	0.20
<i>Impairment:</i>						
MMSE					-0.07*	0.03
<i>Physical performance:</i>						
POMA					-0.49**	0.14
R-Square	0.13		0.21		0.25	

Notes: *p<.05; **p<.01; ***p<.001

Table 5.4. Results of multiple regression analyses of the relationship of *English proficiency* at Wave 1 (N = 3050) and IADL disability at Wave 5 (N = 1167) in the Hispanic Established Populations for Epidemiologic Studies of the Elderly

Explanatory variables	Model 1	(SE)	Model 2	(SE)	Model 3	(SE)
Intercept	4.39***	0.22	-8.34***	1.50	-5.64**	1.75
<i>English proficiency</i>	-0.49***	0.08	-0.23*	0.11	-0.24*	0.11
Total IADL at baseline	0.59***	0.05	0.43***	0.05	0.29***	0.06
<i>Demographics:</i>						
Age			0.18***	0.02	0.17	0.02
Female			0.55*	0.22	0.47	0.22
Marital status			0.02	0.22	-0.08	0.21
Education			-0.11**	0.03	-0.08*	0.03
BMI:						
overweight			-0.48	0.24	-0.58*	0.24
obese			-0.24	0.26	-0.51*	0.26
<i>Chronic pathology:</i>						
diabetes					1.28***	0.23
stroke					0.94	0.53
hip fracture					0.32	0.69
heart attack					0.23	0.36
arthritis					0.16	0.20
<i>Impairment:</i>						
MMSE					-0.05	0.03
<i>Physical performance:</i>						
POMA					-0.54***	0.14
R-Square	0.14		0.21		0.26	

Notes: *p<.05; **p<.01; ***p<.001

In the measure of *English proficiency*, several demographic and disablement process factors were shown to be significant ($p < .05$). The most significant ($p < .001$) of these were age in Model 2, and diabetes and the POMA in Model 3. Education was also significant in both Model 1 ($p < .01$) and Model 2 ($p < .05$) and gender was significant in Model 2 ($p < .05$) and BMI in Model 3 ($p < .05$) only.

The Relationship of English Usage and Total IADL Disability at Wave 5 of the H-EPESE, Adjusted for Demographic and Disablement Process Factors

The relationship between *English usage* and total IADL disability (Table 5.5), when adjusted for demographic and disablement process factors, was not significant ($p > .05$). Similar to the other measures of acculturation, however, several demographic and disablement process factors were shown to be significant ($p < .05$). Age was consistently significant ($p < .001$), and education was significant in Model 2 ($p < .001$) and in Model 3 ($p < .05$). Gender was also significant ($p < .05$) in both Models 2 and 3. In the third model, the POMA was significant ($p < .01$), as were BMI, diabetes, and the MMSE ($p < .05$).

Table 5.5. Results of multiple regression analyses of the relationship of *English usage* at Wave 1 (N = 3050) and IADL disability at Wave 5 (N = 1167) in the Hispanic Established Populations for Epidemiologic Studies of the Elderly

Explanatory variables	Model 1	(SE)	Model 2	(SE)	Model 3	(SE)
Intercept	4.33***	0.23	-8.47***	1.50	-5.38**	1.75
<i>English usage</i>	-0.60***	0.11	-0.21	0.13	-0.23	0.13
Total IADL at baseline	0.60***	0.05	0.43***	0.05	0.30***	0.06
<i>Demographics:</i>						
Age			0.18***	0.02	0.18***	0.02
Female			0.50*	0.22	0.44*	0.22
Marital status			-0.07	0.22	-0.14	0.21
Education			-0.12***	0.03	-0.08*	0.03
<i>BMI:</i>						
overweight			-0.47	0.25	-0.53*	0.25
obese			-0.24	0.26	-0.49	0.26
<i>Chronic pathology:</i>						
diabetes					1.20*	0.23
stroke					0.81	0.54
hip fracture					0.21	0.68
heart attack					0.30	0.36
arthritis					0.15	0.20
<i>Impairment:</i>						
MMSE					-0.07*	0.03
<i>Physical performance:</i>						
POMA					-0.52**	0.14
R-Square	0.13		0.21		0.25	

Notes: *p<.05; **p<.01; ***p<.001

The Impact of Acculturation on the 12-year Incidence of Any IADL Disability

The discrete hazard method was used to model the probability of developing any IADL disability by the next interview based on disability-free status at the current interview. Tables 5.6 through 5.8 show the discrete hazard models estimating acculturation effects on any IADL disability throughout Waves 1 through 5 of the H-EPESE.

The Impact of English Proficiency on the 12-year Incidence of Any IADL Disability

Table 5.6 shows that at baseline, and before and after accounting for demographic and disablement process factors, respondents with lower *English proficiency* had less incidence of any IADL disability. The measure of *English proficiency* was significant in Model 1 ($p < .001$), and in Models 2 and 3 ($p < .05$).

However, the impact of the measure of *English proficiency* on incidence of any IADL disability was markedly diminished by demographic and disablement factors. The demographic factors that had the largest impact in Models 2 and 3 were age and gender, which were highly significant at the $p < .001$ level. Education had less of an impact, and was significant at the $p < .05$ level in Model 2 only. Disablement process factors also strongly affected the relationship between the measure of *English proficiency* and development of any IADL disability. Chronic disease was shown to have a large impact, particularly diabetes ($p < .001$) and, to a lesser extent, stroke ($p < .01$), heart attack and arthritis ($p < .05$). The POMA was also significant ($p < .001$) as was the MMSE ($p < .01$).

Table 5.6. Discrete Hazard analysis of the association of *English proficiency* and incidence of IADL disability over 5 Waves in the Hispanic Established Populations for Epidemiologic Studies of the Elderly

Explanatory variables	Model 1 OR (CI)	Model 2 OR (CI)	Model 3 OR (CI)
Intercept			
<i>English proficiency</i>	0.83 (0.77, 0.89)***	0.89 (0.81, 0.98)*	0.90 (0.82, 0.99)*
<i>Demographics:</i>			
Age		1.07 (1.05, 1.09)***	1.07 (1.05, 1.09)***
Female		1.82 (1.51, 2.20)***	1.76 (1.44, 2.15)***
Marital status		0.93 (0.77, 1.12)	0.89 (0.73, 1.08)
Education		0.97 (0.95, 1.00)*	0.99 (0.96, 1.02)
BMI:			
overweight		0.85 (0.69, 1.05)	0.85 (0.68, 1.06)
obese		1.02 (0.82, 1.28)	0.90 (0.71, 1.14)
<i>Chronic pathology:</i>			
diabetes			1.71 (1.39, 2.10)***
stroke			1.98 (1.23, 3.17)**
hip fracture			2.20 (0.83, 5.84)
heart attack			1.54 (1.08, 2.18)*
arthritis			1.26 (1.04, 1.51)*
<i>Impairment:</i>			
MMSE			0.96 (0.94, 0.98)**
<i>Physical performance:</i>			
POMA			0.84 (0.80, 0.87)***

Notes: *p<.05; **p<.01; ***p<.001

The Impact of English Usage on the 12-year Incidence of Any IADL Disability

The effect of the measure of *English usage* on incidence of any IADL disability was also markedly diminished by the impact of demographic and disablement factors. Unlike the measure of *English proficiency*, however, the impact of *English usage* (Table 5.7) on incidence of any IADL disability was not significant ($p > .05$) in the final model.

Although the measure of *English usage* was significant ($p < .01$) in Model 1, its effect diminishes to nonsignificance ($p > .05$) after accounting for demographic and disablement process factors in Models 2 and 3. The demographic factors that were the most significant in the measure of *English usage* were age and gender ($p < .001$) in Models 2 and 3, followed by education ($p < .01$) in Model 2 only. Disablement process factors also strongly affected the relationship between the measure of *English usage* and development of any IADL disability. Chronic disease was again shown to have a large impact, particularly diabetes ($p < .001$) and stroke ($p < .01$). And, once again, the POMA and the MMSE were significant ($p < .001$).

Table 5.7. Discrete Hazard analysis of the association of *English usage* and incidence of IADL disability over 5 Waves in the Hispanic Established Populations for Epidemiologic Studies of the Elderly

Explanatory variables	Model 1 OR (CI)	Model 2 OR (CI)	Model 3 OR (CI)
Intercept			
<i>English usage</i>	0.83 (0.76, 0.92)**	0.95 (0.84, 1.07)	0.94 (0.83, 1.06)
<i>Demographics:</i>			
Age		1.08 (1.06, 1.09)***	1.07 (1.05, 1.09)***
Female		1.87 (1.55, 2.25)***	1.80 (1.48, 2.20)***
Marital status		0.94 (0.78, 1.13)	0.90 (0.74, 1.10)
Education		0.96 (0.93, 0.99)**	0.98 (0.95, 1.01)
BMI:			
overweight		0.87 (0.70, 1.07)	0.86 (0.69, 1.07)
obese		1.03 (0.82, 1.28)	0.91 (0.72, 1.15)
<i>Chronic pathology:</i>			
diabetes			1.68 (1.36, 2.06)***
stroke			1.98 (1.23, 3.17)**
hip fracture			2.21 (0.83, 5.88)
heart attack			1.57 (1.11, 2.22)
arthritis			1.26 (1.05, 1.52)
<i>Impairment:</i>			
MMSE			0.96 (0.94, 0.98)***
<i>Physical performance:</i>			
POMA			0.84 (0.81, 0.87)***

Notes: *p<.05; **p<.01; ***p<.001

The Impact of Mainstream Contact on the 12-year Incidence of Any IADL Disability

The measure of *Mainstream contact* did not demonstrate a significant impact ($p > .05$) on the incidence of any IADL disability (Table 5.8). Although the measure of *Mainstream contact* was significant ($p < .01$) in Model 1, its effect diminishes to nonsignificance ($p > .05$) after accounting for demographic and disablement process factors in Models 2 and 3. Similar to the two other measures of acculturation, the demographic factors that were the most significant were age and gender ($p < .001$) in Models 2 and 3, followed by education, which was significant in Model 2 ($p < .01$) and Model 3 ($p < .05$).

Disablement process factors also strongly affected the relationship between the measure of *Mainstream contact* and development of any IADL disability. Chronic disease was again shown to have a large impact, particularly diabetes ($p < .001$) and, to a lesser extent, stroke ($p < .01$), heart attack and arthritis ($p < .05$). And, again, as with both other measures of acculturation, the POMA and the MMSE were significant ($p < .001$).

Table 5.8. Discrete Hazard analysis of the association of *Mainstream contact* and incidence of IADL disability over 5 Waves in the Hispanic Established Populations for Epidemiologic Studies of the Elderly

Explanatory variables	Model 1 OR (CI)	Model 2 OR (CI)	Model 3 OR (CI)
Intercept			
<i>Mainstream contact</i>	0.84 (0.75, 0.93)**	0.91 (0.80, 1.02)	0.89 (0.79, 1.01)
<i>Demographics:</i>			
Age		1.07 (1.05, 1.09)***	1.07 (1.05, 1.09)***
Female		1.83 (1.52, 2.21)***	1.77 (1.45, 2.16)***
Marital status		0.92 (0.77, 1.12)	0.88 (0.73, 1.08)
Education		0.96 (0.94, 0.98)***	0.98 (0.95, 0.99)*
BMI:			
overweight		0.85 (0.69, 1.06)	0.86 (0.68, 1.07)
obese		1.01 (0.81, 1.26)	0.90 (0.71, 1.14)
<i>Chronic pathology:</i>			
diabetes			1.67 (1.36, 2.05)***
stroke			1.97 (1.22, 3.16)**
hip fracture			2.20 (0.83, 5.83)
heart attack			1.57 (1.11, 2.23)*
arthritis			1.27 (1.05, 1.52)*
<i>Impairment:</i>			
MMSE			0.95 (0.93, 0.98)***
<i>Physical performance:</i>			
POMA			0.84 (0.81, 0.87)***

Notes: *p<.05; **p<.01; ***p<.001

SPECIFIC AIM 2 SUMMARY

In summary, the goal of Specific Aim 2 was to determine whether low acculturation had an impact on the incidence of IADL disability before and after accounting for relevant demographic and disablement process factors. In some but not all analyses, support for Specific Aim 2 was demonstrated by significant associations between measures of acculturation (*English proficiency*, *English usage*, and *Mainstream contact*) and IADL disability throughout five waves of the H-EPESE.

Specific Aim 2 was initially supported at the bivariate level by both the Chi-Square Tests of Equal Proportion and the Chi-Square Tests for Trends, which consistently indicated that there were significant differences ($p < .05$) in any IADL disability between the least acculturated and more acculturated subjects with respect to measures of *English proficiency* and *English usage*, but not *Mainstream contact*.

At the multivariate level, Specific Aim 2 was also partly supported; however, the results of the multivariate analyses differed from the results of the bivariate analyses. Multiple regression models, when adjusted for total IADL disability at baseline alone (Model 1) and in combination with demographic variables (Model 2) and disablement process variables (Model 3), agreed with the bivariate analyses in demonstrating a significant ($p < .05$) relationship between the measure of *English proficiency* and total IADL disability. In addition, multivariate analyses demonstrated a significant relationship ($p < .01$) between measures of *Mainstream contact*, but not *English usage*, and total IADL disability at Wave 5.

The discrete hazard results, on the other hand, demonstrated lack of support ($p > .05$) for the relationship of the measure of *Mainstream contact* and incidence of any IADL disability. While the results of multivariate analyses were inconsistent regarding the relationships between *Mainstream contact* and IADL disability, both multiple

regression and discrete hazard analyses consistently demonstrated lack of support ($p > .05$) for the relationship between the measure of *English usage* and IADL disability. However, the discrete hazard results were consistent with those of both bivariate and multiple regression analyses in demonstrating support ($p < .05$) for the association of low levels of *English proficiency* and incidence of any IADL disability.

Chapter 6: Discussion

DISABILITY IN OLDER ADULTS

The number of older adults in the United States is increasing rapidly and in tandem with concerns about their health outcomes. There is evidence that age-related disability is declining overall in the U.S. (Waidmann & Liu, 2000a). There is also evidence of higher prevalence of disability in older Hispanic adults in general, and Mexican American older adults in particular (Zsembik et al., 2000a). Higher prevalence of disability in these fast-growing populations is perhaps unsurprising in view of their higher prevalence of disability-inducing diseases, such as diabetes, and underutilization of preventive health care services (Solis et al., 1990a). Accordingly, research regarding factors that facilitate health care utilization is critical in developing interventions to control chronic disease and reducing the burden of disability in this population.

The importance of intra-individual factors in understanding disability in Mexican American older adults has been considered (Angel et al., 2003c; Berges et al., 2007a; Ostir et al., 2000b). Intra-individual factors, such as acculturation, act as buffers to disability through their ability to arrest, retard, or reverse the disablement process. English proficiency, a measure of acculturation, may buffer disability through its direct effect on skills needed to perform everyday tasks, maintain community independence, and delay disability in Mexican American older adults. English proficiency may also buffer disability indirectly by facilitating utilization of health care services to control disability-inducing conditions, such as diabetes, to which Mexican Americans are

disproportionately prone. By documenting the association of disability incidence with one dimension of acculturation, English proficiency, this dissertation provides evidence of the importance of acculturation as a buffer in the trajectory of disablement in Mexican American older adults.

Summary of Major Findings

The relationships between three measures of acculturation and disability were examined cross-sectionally and over a 12-year interval in a sample of Mexican American older adults. Each measure of acculturation was examined alone and in combination with other key disability factors; each was significant ($p < .05$) in some analyses.

Support for the relationship between low levels of acculturation and higher levels of ADL disability was demonstrated at the bivariate level by significant associations ($p < .05$) between measures of acculturation (*English proficiency*, *English usage*, and *Mainstream contact*) and ADL disability throughout five waves of the H-EPESE. Specifically, the relationship of any ADL disability with measures of *English proficiency* and *English usage* was supported throughout all five waves, and *Mainstream contact* was supported in waves 2 and 4 ($p < .05$).

Support for multivariate relationships between lower levels of acculturation and higher levels of ADL disability was not shown in multiple regression analyses, and was refuted in discrete hazard analyses. The results of multiple regression showed that the measure of *Mainstream contact* alone was significantly associated ($p < .05$) with total ADL disability at Wave 5. However, when the association between each measure of acculturation and incidence of any ADL disability was tested by the discrete hazard

method over a 12-year interval, none of the three measures of acculturation were significant ($p > .05$).

The IADL disability results echoed support for the relationship between lower levels of acculturation and higher levels of IADL disability in some analyses. There were significant ($p > .05$) bivariate associations between any IADL disability and measures of *English proficiency* and *English usage* throughout all five waves, and *Mainstream contact* was significant in waves 2-5 only.

Multivariate results did not support ($p > .05$) any relationship between the measure of *English Usage* and IADL disability. In addition, multivariate analyses showed mixed results regarding the measure of *Mainstream contact*, which was significant ($p < .05$) in multiple regression but insignificant ($p < .05$) in discrete hazard analyses. Contrary to the ADL disability results, however, both multiple regression and discrete hazard analyses supported the association between higher levels of *English proficiency* and lower levels of IADL disability ($p < .05$).

Interpretation of findings

Individuals in the United States, including minorities, are leading longer and healthier lives than ever before due to better control of chronic diseases. There is, however, increasing concern that the high prevalence of obesity in Hispanic Americans is leading to higher rates of diabetes and cardiovascular disease (Sundquist & Winkleby, 2000). Diabetes and cardiovascular disease have been linked to disability in Mexican American older adults (Al Snih et al., 2005c; Ontiveros et al., 1999). It is thought that prevention, detection and control of chronic diseases, such as diabetes, depend heavily on availability and affordability of health services (Angel et al., 2002b). Health care access

and utilization are particularly important for those over 65, who are known to have higher levels of morbidity and mortality than the general population (Caesar, 2006).

Despite overall advances in health, Hispanics living in the United States continue to be disadvantaged when compared to non-Hispanic whites. Among the key contributors to health disparities, barriers to health care access have historically been cited (Angel et al., 2002a; Kirby et al., 2006; Solis et al., 1990g). Hispanic Americans are disproportionately represented among the economically disadvantaged (Angel et al., 2002d), and are also less likely to have health care coverage than non-Hispanic whites (Caesar, 2006). Low levels of health insurance are, in turn, thought to lead to Hispanic Americans' low utilization of health services (Timmins, 2002c), particularly preventive and early detection services (Cheng et al., 2007c; Solis et al., 1990c). Delays in early detection services are thought to lead to later-stage diagnoses and limited intervention options, leaving Hispanic Americans at risk for poor health outcomes (Angel et al., 2002e).

Inadequate health care coverage is a serious concern for certain Hispanic subgroups, such as Mexican Americans, who are also economically disadvantaged compared to non-Hispanic whites (Caesar, 2006). Individuals with private health insurance tend to be more affluent and consume more health care services (Angel et al., 2002f), and Mexican American individuals are less likely to have private health insurance than their non-Hispanic white counterparts (Escarce & Kapur, 2003b). Inability to access health care services due to inadequate health insurance coverage, poverty, or both, renders Mexican Americans vulnerable to disability-inducing diseases, such as diabetes.

In the context of the Disablement Process model, the main pathway leading to the development of disability begins with chronic disease, such as diabetes (Verbrugge & Jette, 1994b). The main pathway to disability in this model is characterized by four stages: pathology (i.e., physiological abnormalities that are diagnosed as disease), impairments (i.e., structural abnormalities and dysfunctions in specific body systems), functional limitations (i.e., restrictions in physical and cognitive functions required in daily life), and disability (i.e., difficulty in performing activities in one's daily life due to health or physical problems). In this model, disability comprises the culmination of the main disablement pathway in the individual's inability to negotiate the demands of the environment.

According to the Disablement Process model, factors outside the main disablement pathway act as “buffers” that reverse, delay or accelerate the main disability pathway. These “buffers,” comprising intra- and extra-individual factors, are considered to be grounded in a social context. Intra-individual factors include, for example, acculturation; extra-individual factors include, for example, health care access. In the context of this model, factors that operate at the level of the individual, such as acculturation, are considered to be intra-individual, while access to health care may be thought to operate beyond the individual level and is thus considered to be extra-individual. Although the concepts of extra- vs. intra--individual are distinctly delineated in the Disablement Process model, they may in fact operate synergistically (Caesar, 2006) as buffers in the disablement process.

The crux of the synergy between extra-individual factors – such as health care access – and intra-individual factors – such as acculturation, appears to center on one

dimension of acculturation, English proficiency. Evidence of this synergy has been offered by those who report that English proficiency contributes to both access and utilization of health care (Bender & Harlan, 2005a; Burr & Mutchler, 2003c; Caesar, 2006; Ponce et al., 2006). This synergy is explained by those who propose that access to the U.S. health care system is biased toward English speakers (Timmins, 2002b) and that health care access influences utilization (Cheng et al., 2007b). Fundamentally, English proficiency operates at the extra-individual level through its influence on health service structural supports, such as the ability to mediate access to health information and insurance coverage (Solis et al., 1990d). It also operates at the intra-individual level through its ability to mediate competence in completing an insurance application, communicating with a health care provider, or contesting a medical bill (Bender & Harlan, 2005b; Perez-Stable, 2007). In reality, however, the links among English proficiency and intra- and extra-individual factors may operate in a mutually reinforcing manner.

Evidence of the link between intra- and extra-individual level health outcomes and English proficiency was reported by Timmons and colleagues (2002a), who conducted a systematic review examining language barriers in health care in Hispanic Americans. In their literature review, these investigators cited low English proficiency as a critical component, and linked it with underinsurance and underutilization of health care, poor compliance and poor satisfaction with health care. These findings support others that report links between low English proficiency and decreased recommendations for health screening in younger Hispanic Americans (Cheng et al., 2007a), as well as decreased access to Medicare and other types of insurance in older Hispanic Americans

(Escarce & Kapur, 2003a). These findings also support reports of decreased access to Medicare and other types of health insurance in older Mexican Americans (Caesar, 2006). Moreover, these findings concur with those found in the 2004 Household Component of the Medical Expenditure Panel (Brach, 2008), which reported that Hispanic adults with low English proficiency are less likely to have adequate insurance and less likely to use health services.

The impact of the synergy between low English proficiency and low health care access, however, may be particularly profound in Hispanic American women. Links among low English proficiency, insurance coverage and health care utilization are an even greater concern in Hispanic American women, who are known to have lower levels of English proficiency than Hispanic American men (Crespo et al., 2001c) as well as higher levels of chronic disease (Jurkowski & Johnson, 2005; Sundquist & Winkleby, 1999a) and disability (Zsembik et al., 2000c) than both Hispanic American men and non-Hispanic whites (Ostchega et al., 2000b). Higher levels of non-HDL cholesterol (Jurkowski & Johnson, 2005; Ostchega et al., 2000a), as well as greater prevalence of obesity (Sundquist & Winkleby, 2000) and diabetes (Sundquist et al., 2001c) in Spanish-speaking Hispanic vs. non-Hispanic white women have also been reported.

Unfortunately, Hispanic American women with low vs. high English proficiency are less likely to engage in behaviors to prevent diabetes or heart disease, such as physical activity (Crespo et al., 2001d; Ham et al., 2007a). They are reportedly also less likely to engage in behaviors to detect diabetes (Sundquist & Winkleby, 2000) or heart disease (Jurkowski & Johnson, 2005). They are, in addition, less likely to engage in behaviors to treat diabetic or heart disease, such as monitoring blood glucose or taking

anti-hypertensive medication (Sundquist & Winkleby, 2000). The pairing of higher prevalence of diabetes and lower monitoring of diabetes in Spanish-speaking Hispanic American women is of particular concern because diabetes is positively associated with cardiovascular complications (Sundquist et al., 2001b) and disability (Al Snih et al., 2005b). Unfortunately, Hispanic American women report longer lapses between contact with a health care provider than non-Hispanic white women (Salganicoff, 2007).

Because of their lower levels of English proficiency, the synergy between intra-individual factors, such as language proficiency, and extra-individual factors, such as health care access, is of particular concern in Hispanic American women. Like their Hispanic American male counterparts, Hispanic American women face significant barriers to health care access as a function of low English proficiency (Amaro & de la Torre A., 2002b). Accordingly, low utilization of medical services leading to less timely care has also been linked to language barriers in this population, particularly low English proficiency (Pippins et al., 2007). Hispanic American women are less likely than women in other racial or ethnic groups to have a regular source of health care (Solis et al., 1990f) or to have insurance coverage (Amaro & de la Torre A., 2002a). When they are able to access health services, Hispanic American women with low English proficiency report difficulty communicating with English speaking health care providers (Oomen et al., 1999; Weinick et al., 2004) and lower levels of satisfaction with their health care providers (Saha et al., 2003).

It is clear from the foregoing that there are links among English proficiency, and early detection and intervention for disability-inducing diseases, such as diabetes, in Hispanic American women and men. It is equally clear that earlier diagnosis of heart and

diabetic disease is key to arresting, retarding or reversing the progression from chronic disease to impairment to physical limitations and, ultimately, disability (Zsembik et al., 2000d). Overall, higher levels of IADL limitations have been reported in this population compared to their non-Hispanic white counterparts (Shetterly et al., 1998b), while low levels of English proficiency have been linked to low levels of community independence in Hispanic Americans (Burr & Mutchler, 2003a).

Links among low English proficiency, IADL limitations and compromised independence has perhaps even more profound implications for aging Hispanic Americans,. For this population, 86% of whom do not speak English at home, and 38% of whom don't speak English well or at all (Wallace et al., 1998), the synergy of low English proficiency and health care access is considerably more salient. Although Medicare has improved health care access for older adults of all ethnic groups, Hispanic American older adults with limited English proficiency are less likely to have private insurance and even more likely to have Medicare or Medicaid alone than their English-speaking counterparts (Caesar, 2006).

For these elders, it may be surmised that low levels of English proficiency, health insurance and health service utilization would, over a lifetime, culminate in poor health outcomes. It may also be surmised that a lifetime of economic disparities correspond directly with substantial health disparities in Hispanic vs. non-Hispanic white older adults. Economic disparities undergird health disparities by, for example, impeding affordability of out of pocket payment for health care not covered by Medicare. Inability to pay for health care could be expected to lead to inadequate health care and unfavorable health outcomes in Hispanic elders with disability-inducing conditions, such as diabetes.

The consequences of health care inadequacy over a lifetime could conceivably place Hispanic American older adults at significant risk for early entry into the main pathway of the disablement process. Poorer control of chronic diseases, such as diabetes (Angel et al., 2008) has been shown to be associated with poorer health outcomes (Ponce et al., 2006) and higher levels of disability (Al Snih et al., 2005a) in Hispanic vs. non-Hispanic white older adults. These effects are reportedly magnified in Hispanic Americans older adults, in whom low levels of English proficiency have been linked with lower levels of community independence (Burr & Mutchler, 2003d).

It is known that high levels of IADL dependence often manifest in lower levels of community independence, and higher levels of IADL dependence in Hispanic American older adults have been reported (Carrasquillo et al., 2000). Lower levels of community independence are of particular concern to Hispanic Americans, who are known to delay long term care placement of their elders (Shetterly et al., 1998a), and higher levels of informal care have been reported in this population compared to non-Hispanic whites (Weiss et al., 2005). Accordingly, factors that increase community independence by delaying, arresting or reversing disability have important implications for the caregivers, clinicians, researchers, policy makers, and, indeed, for Hispanic American elders themselves.

The foregoing findings, by emphasizing links among English proficiency, health care access, health service use and disability, suggest a synergy between intra- and extra-individual factors in the disablement process in this population. More importantly, they prompt reflection on the relationship between English proficiency and disability, and how

insights gleaned might be best deployed in altering the trajectory of disablement in Mexican American older adults.

This dissertation aimed to examine the association of acculturation on the development of disability in Mexican American older adults, a rapidly growing subsector of the Hispanic American population. It hypothesized a direct relationship between acculturation and the development of disability in Mexican American older adults. By demonstrating that one measure of acculturation, English proficiency, is directly associated with lower incidence of disability, this dissertation's results add to the body of knowledge about Mexican American older adults.

The results also parallel prior research in suggesting a synergy between English proficiency and health care access in the development of disability in this population. Although this dissertation did not aim to understand the synergy between intra- and extra-individual factors, its results dovetail with extant research in suggesting links among English proficiency, health care access, health outcomes, disability and community independence in Mexican American older adults.

Viewing the development of disability as a modifiable trajectory, the results can be meaningfully interpreted through the lens of the Disablement Process model (Verbrugge & Jette, 1994a). This model considers the transition from independence to disability as a modifiable, multifactorial process, comprising a main disablement pathway (chronic disease, impairments, functional limitations, disability). This main pathway is influenced by intra- and extra-individual factors, which act as buffers with the ability to slow down, speed up or reverse the development of disability.

Within the context of the Disablement Process model, this dissertation concurs with prior research in reporting that factors outside the main disablement pathway do, indeed, play a role in altering the trajectory of disability in Mexican American older adults. Specifically, its results demonstrate that English proficiency, a measure of acculturation, buffers incidence of IADL disability in this population. Although this dissertation did not find a direct relationship between any measure of acculturation and ADL disability, it does document a direct effect of one measure of acculturation, English proficiency, on IADL disability.

However, the absence or attenuation of the association between all three measures of acculturation and incidence of ADL and IADL disability after accounting for relevant demographic and disablement process factors indicates that acculturation may play a minor role in the development of disability in older Mexican Americans. Nevertheless, the associations observed in this study do lend support to acculturation as a protective intra-individual factor in the development of disability in Mexican American older adults.

Comparison with prior studies linking intra-individual factors and disability

The results of this dissertation also support other studies that document the contribution of intra-individual factors to the disablement process in Mexican American older adults. Paralleling these studies, this dissertation provides evidence that intra-individual factors, such as acculturation, do not act alone in their influence on disability in this population. For, while the bivariate results of this dissertation show a strong relationship between three measures of acculturation and disability, the effects are markedly attenuated or obviated entirely at the multivariate level in the presence of demographic and disablement process factors.

These findings parallel those of other studies that have failed to find direct relationships between intra-individual variables and disability (Dunn et al., 2004; Femia et al., 1997c). In one study examining the relationships among intra-individual factors, disease, and disability in older Mexican American women, Dunn and colleagues (2004) were unable to document a direct link between acculturation and functional limitations. Their descriptive-correlational pilot study used measures of functional status (ADL and IADL), physical factors (pain, disease symptoms), and mental health (depression, cognition) to examine quality of life in a convenience sample of 51 older Mexican American women living in the southwest United States. These investigators, while unable to report a direct effect of acculturation on disability, surmised that acculturation mediated increased functional capacity. Specifically, they concluded that chronic illness alone does not predict functional status; rather, they propose that key factors, such as cognition, depression and acculturation, act as key mediators linking chronic illness and function.

Findings such as these are conceptually consistent with the Disablement Process model's premise that intra-individual factors interact with key factors in the main disablement pathway. In another study examining relationships between key factors in the Disablement Process (Femia et al., 1997b), it was found that intra-individual factors mediated key relationships in the main pathway of disablement. Femia and colleagues (Femia et al., 1997a) used a sample of Swedish adults aged 79 and older to examine the relationships between aspects of the disability process and intra-individual factors. Results from this study demonstrated support for mediation within the main pathway. It was found, for example, that impairments were directly related to disability but also

indirectly related to disability through the mediating role of functional limitations. It was also found that intra-individual factors including depression, subjective health, and social integration mediated several relationships along the main pathway of disablement. In reporting the results from this study these investigators found “disability to be as much a function of an individual’s psychosocial characteristics as the degree of functional limitations and functional impairments” (Femia et al., 2001, p. 20).

It is clear from the foregoing that there are gaps in our knowledge regarding the role of intra-individual factors, such as acculturation, and the development of disability in Mexican American older adults (Peek et al., 2005). It is also clear that more work is needed to delineate the relationships among intra- and extra-individual factors and key disablement factors in the disablement process. Analysis of the relationships among the many moderators and mediators of disablement likely require methods, such as structural equation modeling (SEM), that capably capture such complexity. This dissertation aimed to link acculturation directly with the development of disability, and found evidence to support this premise. It also concurs with extant literature in suggesting indirect links among acculturation, health care access, utilization, health outcomes and disability. Finally, by providing evidence that English proficiency acts has a protective influence on the development of IADL disability, this dissertation paves the way for interventions aimed at reducing linguistic barriers in order to prevent, delay or reverse disability in this rapidly growing population.

LIMITATIONS AND STRENGTHS

Limitations

Acculturation is complex and its effect on the health outcomes of Mexican American older adults is still poorly understood. Linear acculturation scales, such as the one used in this dissertation, have been criticized as being too simplistic. It has been argued that linear scales fail to distinguish acculturative types who are bicultural and may, for example, score high or low on both cultures. It has also been argued that older adults are less acculturated and less likely to be bicultural than younger Mexican American adults (Yamada et al., 2006). If this is so, this dissertation's use of a linear scale would not represent a major weakness.

Another limitation of this study has been noted by Yamada and colleagues (2006). They argue that the developmental and psychosocial roles, and thus the acculturative demands, of older groups differ markedly from younger groups. For example, the acculturative demands of a retired Mexican American would be expected to differ from those of a younger Mexican American in the workforce, who may need to use English daily. Lack of validation on the target population is commonly regarded as a serious limitation; however, it should be noted that older Mexican Americans were included in the validation of the acculturation scale used in this study, the Hazuda Acculturation and Assimilation Scale (HAAS). Moreover, the HAAS has been used in subsequent studies of Mexican American older adults and is now considered to have the most application for use in this population (Yamada et al., 2006).

Another weakness of this study was the use of self-reported data. Epidemiological research, such as this dissertation, often uses survey data to investigate the factors that influence disability. While large, population-based surveys afford

advantages in conducting cost-effective research, there are also disadvantages. For example, the accuracy of survey data is undermined when respondents do not respond accurately or in the expected manner. Inability to understand survey questions, for example, may distort participant's responses. Participants' interpretation of survey questions is problematic in all surveys, and it has been reported that acculturation itself may compound the issue. Using data from the first wave of the Los Angeles Family and Neighborhood Survey, Bzostek and colleagues (2007) examined the impact of acculturation on self-reported health in a large population-based survey of about 3000 households in Los Angeles County. Although these investigators were unable to document significant associations between measures of acculturation and self-reported health, their findings supported the conjecture that translation issues, such as differences in meaning regarding adjectives used to describe the various health states in Spanish versus English, may underlie some of the ethnic differences in self-reported health.

Strengths

While the accuracy of self-reported data has been found to vary with the disease or condition reported (Fowles et al., 1998), the inclusion of performance-based measures, such as the MMSE and the POMA strengthens the accuracy of the H-EPESE survey data. Strength is also enhanced in surveys that include information about pathology or impairment, thereby permitting investigation of links between specific conditions and disability. Featuring these advantages, the H-EPESE's extensive database of disablement factors permits examination of disability in Mexican American older adults. Use of data from the largest population-based study of Mexican American older adults in the United States is this dissertation's major strength. With data from more than 3,000 participants

followed over a 12-year interval, the H-EPESE provides a rich source of data for comparative studies and longitudinal investigations of health-related factors.

Conclusions

The results of this dissertation support contemporary models of aging, such as the Disablement process, in which disability comprises an ever-changing trajectory in the individual's ability to adapt to environmental demands. With its recognition of the impact of multiple factors at multiple positions in the pathway, the Disablement Process model encourages consideration of how key intra-individual factors, such as acculturation, slow down, speed up or reverse the process of disability. This dissertation offers evidence of the influence of English proficiency, a measure of acculturation, in slowing down the development of disability in Mexican American older adults. It concurs with prior literature in suggesting that acculturation does not act alone in the development of disability in this population. Finally, it suggests the need for explicit examination of how low English proficiency influences disability in vulnerable Hispanic subgroups, such as Mexican American women and older adults.

Future investigation of the disablement process in Mexican American older adults clearly calls for more explicit examination of the relationships between acculturation and disablement process factors, including those inside and outside the main pathway. First, further examination of the interactions among intra- and extra-individual factors and the main disablement pathway is clearly called for. Second, further examination of the effects of gender on the relationship of English proficiency and disability is clearly needed. This will likely involve investigative methods capable of considering indirect relationships within the Disablement Process. Structural equation modeling (SEM), for

example, permits the examination of indirect effects within clearly specified conceptual models, such as the Disablement Process model. Methods such as SEM may be better able to estimate relationships between constructs such as acculturation and other key intra- and extra-individual factors within the conceptually defined causal pathway of the Disablement Process model. Better delineation of the many factors within the this model may be expected to provide a more finely-grained view of the relationships among acculturation, chronic disease, impairments, functional limitations and disability in a population who are known to delay institutional placement of their elders.

In conclusion, understanding and preventing disability in an increasingly diverse older adult population is an important priority for practitioners, researchers and elders alike. Models of disablement have been developed to help understand the relationships among disability-related factors, and to identify critical points of impact. The Disablement Process model has been utilized as a conceptual model for this dissertation because of its emphasis on the role of intra-individual factors, such as acculturation, that may prevent, retard, or reverse the disability process. Although models such as the Disablement Process model have been tested in non-Hispanic white older adults, less attention has been paid to how disability develops in Mexican American older adults. It has long been known that functionally-limiting chronic diseases to which Mexican Americans are disproportionately prone, such diabetes, render them especially vulnerable to disability.

This dissertation's findings concur with prior research documenting links between linguistic barriers, limited health care access, low health care utilization, and negative health outcomes in Hispanic Americans. Its results add to the body of knowledge by

shedding light on the relationship between one dimension of acculturation, English proficiency, and the development of disability in Mexican American older adults. By demonstrating that English proficiency is a protective factor in the disablement process, the results of this dissertation may pave the way for interventions to decrease linguistic barriers to health care services. By facilitating access to health care services needed to prevent, detect, and treat chronic disease, interventions to address linguistic barriers promise to delay disability and prolong community independence in Mexican American older adults.

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