

ABSTRACT

Title of dissertation:

THE ASSOCIATION OF
ACCULTURATION, SOCIAL
SUPPORT, AND ALCOHOL USE
AMONG MEXICAN AMERICAN
ADULTS

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Background: The increasing diversity of the U.S. population and the tremendous growth of the elderly population in the U.S. pose a challenge for public health practice. Mexican Americans (MAs) comprise the largest U.S. Hispanic subgroup. Previous research has shown alcohol use among MA adults varies by sex, age, acculturation level, socioeconomic status, and other factors.

Purpose: This study explored the association of social, cultural, and demographic factors among MA adults. Berry's acculturation model (1980) and social support theory provided the theoretical underpinnings for this study. Multiple proxy measures of acculturation were used: a 5-item language subscale, generation level, and length of time in the United States. The association of social support and alcohol use among MAs 60 years and older was assessed using NHANES social support interview data.

Methods: A secondary data analysis of 1999-2004 National Health and Nutrition Examination Survey data was conducted with a nationally representative sample of 1,682 MAs 40 years of age and older. Psychometric testing was performed with a language use scale and social support index. Descriptive statistics and logistic regression analyses were conducted to examine the predictors of lifetime abstention and current alcohol use.

Results: Acculturation was associated with lifetime abstention and current alcohol use among females. Lifetime alcohol abstention rates were higher among less acculturated females, and a majority of female current drinkers were light alcohol users. Among males, lifetime alcohol abstention rates were very low. Light or moderate alcohol use was reported by two-thirds of males. Socioeconomic status and marital status were predictive of heavier alcohol use among males. No association was observed between social support and alcohol use among older adults.

Conclusions: The results from this study underscore the complexity of alcohol use behavior among MAs. The strong association of acculturation and alcohol use among MA women suggests that traditional alcohol norms are altered during the acculturation process. Alcohol use among MA men is more common and heavy use was associated with social and economic factors rather than acculturation. The study findings may be used to inform health promotion and alcohol intervention programs for MA adults.

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USE AMONG MEXICAN AMERICAN ADULTS

by

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DEDICATION

My children Katie and Robbie have always supported my “mid-life project.”

Thank you for your patience and understanding. I promise to clean up the dining room!

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I am grateful to my Dissertation Committee Co-Chairs, Drs. Robert Gold and Nancy Atkinson, for their encouragement and support. Your wisdom and example have inspired me to teach and mentor others. My Committee always encouraged me and provided feedback when I was “stuck.” Thank you for helping me to see the “big picture.”

My grandparents traveled from distant lands to realize their American dreams. I owe them a debt of gratitude. You made personal sacrifices and endured personal challenges and losses so that your 14 children and 24 grandchildren would have a better life. Thank you for encouraging us to do well in school and to be good to others.

My first teacher, Miss Hedger, challenged each of her students to read twenty books in the first grade. I worked hard to earn twenty gold stars! I also had a very special teacher and friend in the fifth grade named Miss Schoonmaker. I was a shy, quiet child, and the previous year was awful for me because my sister died. My mind was a million miles away from the classroom. I believe Miss Schoonmaker rescued me and helped me to enjoy school. Thank you.

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Chapter I: Introduction

Healthy People 2010, the nation's disease prevention and health promotion plan (U.S. Department of Health and Human Services [DHHS], 2000), has targeted the elimination of health disparities as one of its two overarching goals. Specific measures of health, quality of life, and life expectancy have been targeted. The baseline and progress reports for Hispanics and other racial and ethnic groups include avoidance of risky behaviors, increased health screening, and the promotion of healthy lifestyles. Many of the mechanisms by which social and cultural factors influence the alcohol behaviors of Mexican Americans (MAs), the largest U.S. Hispanic subgroup (Ramirez, 2004), are poorly understood (Caetano, 1990; Masel, Rudkin, & Peek, 2006). A secondary analysis of the National Health and Nutrition Examination Survey (NHANES) 1999-2004 was conducted using a new conceptual model to explore the association of acculturation, social support, and alcohol use among MA adults.

More than 35 million Hispanics currently live in the U.S. (U.S. Census Bureau, 2001b). Approximately 40 percent of U.S. Hispanics, including MA, are foreign-born, with nearly half entering the U.S. after 1990. Although the median age of U.S. Hispanics is 9 years below that of the U.S. population as a whole, the elderly U.S. Hispanic population is growing significantly. By 2030 there will be 1 million Hispanics aged 85 years and over in the U.S. (Angel & Hogan, 1994), and Hispanics aged 65 and over are projected to comprise 16 percent of the nation's elderly by the middle of the next century (Hobbs, 2001). Previous research has shown that MA adults have experienced significant health disparities that are related to lower socioeconomic status (SES) and access to health services.

MAAs have lower educational attainment and higher poverty rates than other Hispanic subgroups or the U.S. population as a whole (Ramirez, 2004). Only 46 percent of MA adults have completed high school. Poverty is also more prevalent among U.S. Hispanics. Nearly 24 percent of MAAs are poor, versus 12 percent of U.S. residents (Ramirez, 2004). Racial and ethnic minorities have lower life expectancies than whites, and minority elders have been more likely than whites to suffer from disability and poor health status in their later years (Kington & Smith, 1997).

Hispanics have lower mortality rates than other ethnic groups having the same SES (Abraido-Lanza, Chao, & Florez, 2005; Franzini, Ribble, & Keddie, 2001). For specific conditions such as asthma (Hunninghake, Weiss, & Celedon, 2006) and cervical cancer (Reynolds, 2004), low education and income are inversely associated with health among U.S. Hispanics. Additionally, U.S. Hispanics have earlier and more numerous functional declines (Aguirre-Molina, Molina, & Zambrana, 2001), a reminder that lower mortality rates do not always correspond with better health status or quality of life. Adverse health outcomes may include several years of life with chronic or disabling conditions (Crimmins, Hayward, & Saito, 1994). There is evidence that physiological aging precedes chronological aging in Hispanics such that U.S. Hispanics in their late 40s have health problems and disability rates similar to those of 65-year-old non-Hispanic whites (Hooyman & Kiyak, 2005). Many of the risk factors that contribute to poor health status among older MA adults, such as diabetes, hypertension (Hertz, Unger, & Ferrario, 2006), physical inactivity (Wannamethee, Shaper, & Alberti, 2000), smoking (Kurian & Cardarelli, 2007), and heavy drinking (Masel et al., 2006), are modifiable. Factors that

have a protective effect on health and facilitate access to health care among Hispanics have not been adequately explored (Borrayo & Jenkins, 2003).

Problem Statement

Alcohol use, a complex behavior, has been described by some as a “double-edged sword” (Evans & Bienias, 2005, p. 289). When used in moderation, alcohol may confer health benefits (Evans & Bienias, 2005; Obisesan, et al., 1998), and yet, when abused, the health consequences can be devastating for alcohol users, their families, and society. Alcohol abuse is an important public health concern in the U.S. (Kirchner et al., 2007), and this problem cuts across age, sex, and race/ethnicity groups in the U.S. (National Institute on Alcohol Abuse and Alcoholism [NIAAA], 2007a).

Epidemiologic, biomedical, and psychological research studies have shown that some minority groups are more vulnerable to the adverse health effects of alcohol abuse (Russo, et al., 2004; Stinson, Grant, & Dufour, 2001). Among MAs, genetic factors are believed to modulate alcohol dependence and abuse. MAs have lower frequencies of protective genes, and they have higher frequencies of genes that are associated with early-onset alcoholism (Konishi, Smith, Lin, & Wan, 2003). Alcohol misuse is associated with liver disease, the eighth-leading cause of death among MA adults (Centers for Disease Control and Prevention [CDC], 2006), and alcohol is a factor in nearly 55 percent of fatal auto accidents among MAs (National Highway Traffic Safety Administration, 1999).

Drinking patterns among older adults, including MA, have received less attention even though numerous medical, psychiatric, and functional problems are associated with heavy drinking (Satre, Gordon, & Weisner, 2007). Among the elderly, alcohol abuse is associated with dementia and depression (Smith, 1995), osteoporosis (American Medical

Association Council on Scientific Affairs, 1996), loss of mobility (LaCroix, Guralnik, Berkman, Wallace, & Satterfield, 1993), increased risk of breast cancer (Chen et al., 2002; Zhang et al., 1999), and ischemic heart disease (Rigler, 2000). Caetano (1990) pointed out that comprehensive conceptual models are needed to understand drinking and alcohol problems among U.S. Hispanics, given that patterns have been shown to vary by sex, age, educational attainment, and many other factors.

Research on alcohol use among MA has examined the social and cultural changes that occur when Mexican immigrants acculturate. Acculturation, “phenomena which result when groups of individuals having different cultures come into continuous first-hand contact with subsequent changes in the original culture patterns of both groups” (Redfield, Linton, & Herskovits, 1936, p. 149), has been positively and negatively associated with alcohol use among MA adults (Alaniz, Treno, & Saltz, 1999; Gilbert & Cervantes, 1987; Marks, Garcia, & Solis, 1990). Length of time in the United States, has been related to increased frequency of alcohol consumption among MA males (Caetano & Mora, 1990) and among MA women, higher acculturation level has been associated with higher alcohol consumption levels (Caetano, 1988). The methods that are used to conceptualize and measure the acculturation process have varied. The acculturation strategies outlined in Berry’s model of acculturation (Berry, 1980) have provided a multidimensional framework to explore the acculturation process for many racial and ethnic groups, including Hispanics. Berry’s conceptual framework acknowledges that when groups come into contact, both groups are capable of changing. One’s personal situation may also alter the response to cultural contact (situational acculturation) as described by Trimble (in Chun et al., 2003, p. 8). Acculturative status results from a

combination of experiences and influences that vary among between and within groups. Public health researchers have observed that acculturation shapes lives and health status of U.S. Hispanics (Caetano & Clark, 2003, p. 223).

Acculturation has been positively associated with alcohol use among MA women who were surveyed during the Hispanic Health and Nutrition Examination Survey (HANES), 1982-84 (Markides, Ray, Stroup-Benham, & Trevino, 1990). The rates of past history of heavy drinking reported by MA men during Hispanic HANES were three times the rates reported by non-Hispanic males in other studies (Lee, Markides, & Ray, 1997). Findings from Waves I and II (1992-1996) of the Hispanic Established Populations for the Epidemiological Studies of the Elderly (H-EPESE) established that English-proficient MA 65 years and older were more likely to be current or former drinkers than abstainers (Masel et al., 2006). The mechanisms by which acculturation, particularly language use, socioeconomic status, and social support improve or diminish health among U.S. Hispanics have not been adequately explored (Mulvaney-Day, Alegria, & Sribney, 2007).

Acculturation may contribute to improved SES because English-language skills and familiarity with American culture may lead to improved educational and employment opportunities. Higher SES has generally been found to facilitate social connections and is associated with improved health overall (Adler & Newman, 2002). Acculturation level may alter the types of social relationships and support networks that Hispanics have in the U.S. (Angel & Angel, 2006; Arcia, Skinner, Bailey & Correa, 2001).

In addition to experiencing changes in culturally-based behaviors, group-level changes and social and political influences shape the experiences of immigrants when they come to the U.S. (Angel & Angel, 2006; Arcia et al., 2001. Ethnicity-based

differentials in health are related to social structure, perceived social support, and political factors (Angel & Angel, 2006). A large study with more than 3,000 MA adults 18-59 years of age residing in Fresno, California, reported that physical health was negatively associated with acculturation stressors such as discrimination and positively associated with social support (Finch & Vega, 2003); discrimination was associated with poorer physical health among adults who reported inadequate social support.

Research with MA and other U.S. Hispanic groups has shown that there is tremendous heterogeneity among U.S. Hispanic groups with respect to health behaviors, including alcohol use (Caetano, 1990). Lifetime rates of alcohol dependence as high as 16.6 percent have been reported in studies with U.S. MA-- more than twice the rate among Mexicans living in Mexico (8.2%) or Mexican immigrants (7.6%) (Vega, et al., 1998) (reported in Borges, et al., 2006). Results from the National Comorbidity Survey (Kessler et al., 1994) and the National Epidemiologic Survey on Alcohol and Related Conditions (NESARC) (Grant et al., 2004) have also indicated that U.S.-born MAs have a higher risk of substance abuse disorders than Mexico-born immigrants. National surveys, such as the National Health Interview Survey (NHIS)(NCHS, 2007a) and the Behavioral Risk Factor Surveillance System (BRFSS) (CDC, 2007a), and state-based health studies, such as the California Health Interview Survey (CHIS) (Bagchi, 2004), provide important information on alcohol use in the U.S. Hispanic population, but they do not specifically address the unique cultural and social characteristics that may be associated with alcohol use among MA. In contrast, NHANES 1999-2004 was specifically designed to collect and report representative health data on MA (National Center for Health Statistics [NCHS], 2006a).

NHANES is unique in other respects. Health examination data are collected in addition to household interview information in NHANES. Information on sensitive interview topics such as alcohol use, illicit drug use, and sexual behavior is collected in a private setting rather than by telephone or in the respondent's home. Unlike many studies that use one or two proxy measures of acculturation, the NHANES includes multiple proxy measures. The proxy measures of acculturation used in this study were nativity (self and parental) to construct generation level, length of time in the U.S., a 5-item language use scale, and citizenship status.

Purpose Statement

A secondary analysis of NHANES 1999-2004 data was conducted to explore the associations of acculturation, social support, and alcohol use in a nationally representative sample of MA adults 40 years and older. Berry's acculturation model (1980) and social support theory provided the theoretical underpinnings for this study. Previous research has shown that gender roles change during the acculturation process (Marin & Gamba, 2003 in Chun et al., 2003, p.88, Arcia et al., 2001; Gowan & Trevino, 1998). Therefore, separate models were used to explore the predictors of alcohol use and abstention in MA men and women. The findings from this study may be used to develop culturally appropriate programs and interventions in alcohol awareness for middle-aged and older MA men and women.

Significance of This Research

This study provides new insight on the association of acculturation and alcohol use among MA adults 40 years and older. Much of what we know about the association of acculturation and alcohol use was based on Hispanic HANES, 1982-84, which included MA adults living in the southwest U.S. and NHANES III, 1988-1994. The

findings from past surveys may not reflect current alcohol use patterns of this diverse and growing population. The U.S. MA population is larger and more geographically dispersed today. Gender-stratified multivariate models were developed to explore the unique patterns of alcohol use among MA adults. The findings from this research may be used to develop culturally appropriate alcohol awareness and education programs for MA adults and their families.

The alcohol literature has noted that episodic heavy alcohol use is common among MAs, particularly among low-income and more-disadvantaged MA men (Neff et al., 1987). NHANES 1999-2002 data showed higher age-adjusted rates of binge drinking by MA men 20 years and older (62.2%) than among non-Hispanic white (52.5%) and non-Hispanic black men (39.5%) (Fryar et al., 2006). In the U.S., aggressive alcohol marketing campaigns and declining prices of alcoholic beverage have hindered efforts to curb high-risk drinking behavior among U.S. youth and adults (Erenberg & Hacker, 1997). The U.S. alcoholic beverage industry often targets Hispanics in its English- and Spanish-language media campaigns (Center on Alcohol Marketing and Youth, 2005). Rates of alcohol use based on frequency and intensity of use are inversely associated with alcoholic beverage prices. Whereas inflation-adjusted prices for tobacco have increased significantly and have contributed to lower smoking rates among Blacks, Hispanics, and low-income persons (Chaloupka & Pacula, 1998), the trend for alcoholic beverages, particularly beer and distilled spirits, is the opposite (Chaloupka, 2002).

The acculturation hypothesis posits that traditional Hispanic cultural values and practices may have a protective influence on health behaviors including alcohol use (Abraido-Lanza et al. 2005; Caetano & Clark, 2003; Neff et al., 1987). Prior research

suggested that the association of acculturation and other health behaviors such as smoking vary by sex (Perez-Stable et al., 2001) and may reflect gender norms in the United States.

Hypotheses

Hypothesis #1: It is hypothesized that among MA women, acculturation level is positively associated with alcohol abstention. Acculturation has been associated with alcohol use by MA women (Alaniz et al., 1999; Castro & Gutierrez, 1997; Zemore, 2005). In contrast, alcohol use is prevalent among Mexican and MA men (Borges et al., 2006). Only 4.6% of MA men aged 20 years and over reported lifetime alcohol abstention, compared with 27.8% of women (Fryar et al., 2006). Among more acculturated MA women, English- language ability may promote greater opportunities for social interactions with the host (American) culture (Ortiz & Arce, 1984), many of which involve alcohol use (Gilbert, 1991). Alcohol use by non-Hispanic white women is more common (Fryar et al., 2006) and socially accepted (Gilbert & Cervantes, 1987).

Hypothesis #2: It is hypothesized that among MA men, acculturation is positively associated with alcohol use that exceeds “moderate” intake levels, including chronic heavy use and episodic or “binge” drinking. Moderate intake for men is defined as fewer than 3 drinks per day with 1 drink defined as a 12-ounce can of beer, a 4-ounce glass of wine, or 1 ounce of liquor (NIAAA, 2005). Binge drinking is defined as consuming 5 or more drinks in a single day. Alcohol use is prevalent among U.S. and Mexican men. Heavy alcohol use, including binge drinking or “fiesta” drinking, has been shown to be more prevalent among more acculturated MA men (Otero-Sabogal, Sabogal, & Perez-Stable, 1995; Abraido-Lanza, Chao, & Florez, 2005).

Hypothesis #3: It is hypothesized that social support is associated with alcohol use among MA men and women aged 60 years and older. MAs who have adequate social support, particularly family support, a pattern that is consistent with traditional Mexican culture (Bagley, Angel, Dilworth-Anderson, Liu, & Schinke, 2005), will have lower rates of heavy alcohol use compared with MAs who report lower levels of social support. Social support systems among older Hispanics are altered by the immigration process (Maldonado, 1979) and contribute to a sense of well-being (Sotomayor, 1992). Social support received from spouses, close friends, and others who provide emotional and instrumental support is hypothesized to strengthen social networks and reduce acculturative stress.

Definition of Key Terms

Acculturation: “Phenomena which result when groups of individuals having different cultures come into continuous first-hand contact with subsequent changes in the original culture patterns of both groups.” (Redfield et al., 1936)

Alcoholic drink: A 12-ounce can of beer, a 4-ounce glass of wine, or an ounce of liquor.

Alcohol user: Someone who has consumed 12 or more alcoholic drinks in a lifetime and has consumed alcoholic drinks in the past 12 months.

Binge drinking: Defined as consuming 5 or more drinks of any type of alcoholic beverage in a single day during the past year.

Culture: Integrated patterns of human behavior that include the language, thoughts, communications, actions, customs, beliefs, values, and institutions of racial, ethnic, religious, or social groups (DHHS, U.S. Department of Agriculture, & U.S. Dietary Guidelines Advisory Committee, 2005).

Current drinkers: Individuals who have consumed 12 or more drinks during their lifetime and consumed alcoholic beverages (any type or amount) during the past 12 months.

Emotional support: The feeling of being loved, valued or respected (Israel, 1982).

Ethnic group: A group of people who share normative patterns of behavior and form part of a larger population that interacts with people from other groups within the framework of a social system. Adapted from Cohen, 1974 (Loue, 2006).

Former drinkers: Persons who have consumed at least 12 drinks in their lifetime but did not consume alcohol during the past 12 months.

Heavy drinkers: Men who consumed 14 or more drinks per week on average or more than 7 drinks per week if female.

Hispanic: Persons of Hispanic or Latino origin; includes persons of Mexican, Puerto Rican, Cuban, Central and South American, and other or unknown Latin American or Spanish origins. Persons of Hispanic origin may be of any race (NCHS, 2006e).

Mexicans: First-generation immigrants from Mexico.

Mexican American: A U.S. citizen or resident of Mexican descent.

Moderate drinker: Among men, moderate drinkers are current drinkers who consume no more than 2 drinks per day. Moderate alcohol intake for men is more than 3 drinks and up to 14 drinks per week. Moderate intake for women is more than 3 drinks and up to 7 drinks per week.

Nondrinkers: Persons who did not consume at least 12 drinks in the past 12 months, including former drinkers and lifetime abstainers.

Social support: Mutual aid and comfort provided by individual people and a social network. The dimensions of social support include emotional/spiritual, informational, and practical.

Social networks: Relationships that nurture and help people to cope with the events of daily life and include family, friends, and others.

Chapter II: Review of the Literature

Introduction

The literature review for this study focused on acculturation, social support, and alcohol epidemiology research conducted with MA adults. The social, demographic, and cultural factors that were associated with alcohol use were of particular interest. Three bibliographic databases — PubMed, PsychINFO, and Social Services Abstracts were searched from 1975 to 2007 to identify original research and review articles. The Medical Subject Heading (MeSH) search terms used in the searches included combinations of the following terms: *acculturation*, *Hispanic*, *Latino*, *Mexican*, *elderly*, *social support*, and *alcohol consumption*. Priority was given to literature that reported results for MA adults. Additionally, web-based reports and websites were located using Internet search engines, including “Google” (Google Inc., 2007), and this produced citations that were published by U.S. government agencies, university researchers, health policy groups, and nonprofit organizations.

The literature review for this research was divided into two parts. The first part examined literature in the areas of acculturation theory, measurement methodology, and the role of social support and social networks and health among older adults, including MA. The review of acculturation theory and measurement methods identified the uni- and multidimensional scales and proxy measures of acculturation that have been used to study the health of U.S. Hispanics. The psychometric testing that was completed for the Hispanic HANES acculturation component informed the reliability testing for this study. The literature on social support and social structure was reviewed initially. The methods that have been used by other researchers to operationalize the emotional and instrumental

support constructs of social support guided the development of the social support indices used in this study.

The second part of the literature review explored alcohol consumption estimation methods, the epidemiology of alcohol use among MAs, and the association of acculturation and alcohol use. The acculturation literature informed the research plan for this study and provided the investigator with important information about traditional Mexican culture and gender roles. The recommendations and caveats noted by other researchers working in the field were informative and applicable to this study as well.

Part A. The Concept of Acculturation

Acculturation was first described by anthropologists as “phenomena which results when groups of individuals having different cultures come into continuous first-hand contact with subsequent changes in the original culture patterns of both groups” (Redfield et al., 1936, p. 149). Traditional definitions of acculturation conceptualized the acculturation process as a sequential event that progressed in a linear fashion from a native or tradition-oriented state, through a transitional phase, until “acculturated” status was attained (Trimble, 2003). Social scientists have noted, however, that a new culture may not be fully adopted and internalized by immigrants when they come to a new country (Gordon, 1964). A contemporary view of acculturation proposed by Berry maintains that acculturation is a complex and multidimensional process that includes changes at the group and individual levels (Berry, 1980). Consequently, several outcomes can result from contact with a new culture, and one’s personal situation and experiences play a role in the outcomes (Trimble, 1989).

Berry (1980) hypothesized that cultural group and individual factors are related to acculturation outcomes and posited that four acculturation strategies are used by ethnic

groups: assimilation, separation, integration, and marginalization. The strategies differentiate between maintenance of one's traditional culture and identity and the desire to interact with a new culture. Ethnic groups may relinquish their traditional cultural identity and adopt the cultural practices of the new culture (*assimilation* strategy). Alternatively, interactions with the new culture may be avoided and traditional culture maintained (*separation* strategy). Some immigrants choose to maintain their traditional culture and adopt aspects of the new culture (*integration* strategy), or to shun their traditional culture and the new culture (*marginalization* strategy). Berry's conceptualization of acculturation as a complex, multidimensional process has broadened the scope of acculturation research and has challenged researchers to consider numerous factors that may be relevant to the health behaviors of minority populations, including alcohol use (Alaniz et al., 1999; Caetano, 1987; Masel et al., 2006; Morales et al., 2002).

The Association of Acculturation and Health among Hispanics

Acculturation is a complex change process (Abraido-Lanza et al., 2005; Carter-Pokras et al., 2008) that affects behaviors and health outcomes at the individual and the sociocultural or group level (Bethel & Schenker, 2005; Chun et al., 2003; Elder et al., 1991; Sabogal et al., 1989). Research interest on the association of acculturation and health stems, in part, from research reporting a mortality advantage for Hispanic adults, including MAs (Palloni & Arias, 2004). The observation that mortality rates among MA adults were lower than those of non-Hispanic whites, despite their higher rates of poverty, low educational attainment, and lower rates of health insurance (Hummer, 2000; Singh & Siahpush, 2002), poses an epidemiologic paradox, known as the "Hispanic" paradox. Acculturation status is one of several explanations that have been proposed for

the observed paradox (Carter-Pokras et al., 2008; Franzini et al., 2001; Palloni & Arias, 2004).

The “salmon bias” (also termed “return migration”) hypothesis proposes that immigrants return to their country of birth during their final years or when their health is poor but their deaths are not counted in U.S. mortality statistics, and they remain in total population counts, thereby lowering the mortality rates (Pablos-Mendez, 1994). The healthy migrant hypothesis proposes that healthy Hispanics come to the U.S. selectively, and, therefore, migrants are not representative of the populations in their countries of origin (Markides & Coreil, 1986). A third explanation for the observed paradox is that data artifacts resulting from inconsistent vital statistics data may partially explain the observed differences in mortality rates. The quality of vital statistics data on U.S. Hispanics varies, depending upon the source of the data. The data that are used to generate death rates are based on death certificate (numerator) and census (denominator) data. The inconsistencies in ethnic classification between data systems and reporting error may result in underreported deaths among Hispanics (Rosenberg, Maurer, Sorlie, & Johnson, 1999) and this is potentially another explanation for the Hispanic Paradox (Carter-Pokras et al., 2008).

A fourth explanation for the observed paradox is the acculturation hypothesis whose main premise is that culturally based behaviors, including alcohol use, change when immigrants interact and adopt the customs of mainstream U.S. culture (Arcia et al., 2001; Balcazar & Krull, 1999). Less acculturated MAs may experience social and cultural buffering through social networks, stronger family ties, and social structures that are reinforced by traditional culture. The buffering effect is hypothesized to override the

stress that results from socioeconomic deprivation and health disparities (Caetano & Clark, 2003).

A large literature exists on the role of acculturation and traditional cultural practices as predictors of health outcomes and behaviors among U.S. Hispanics (Abraido-Lanza et al., 1999; Caetano, 1990; Chun, Organista, & Marín, 2003). This research has shown that the relationship between acculturation and health behaviors among Hispanics varies by age, sex, SES, Hispanic subgroup, and the health behavior of interest (Perez-Escamilla & Putnik, 2007; Lara, Gamboa, Kahramanian, Morales, & Bautista, 2005; Perez-Stable et al., 2001). Acculturation has been positively associated with risk behaviors such as smoking (Aguirre-Molina & Zambrana, 2001, pp. 413-434), alcohol intake (NIAA, 2002; Johnson, Grunewald, Treno, & Taff, 1998), and overweight and obesity (Abriado-Lanza et al., 2005; Goel, McCarthy, Phillips, & Wee, 2004), but it has also been shown to have protective influences on physical activity behavior among MA adults (Crespo, Smit, Carter-Pokras, & Anderson, 2001).

Several dimensions of acculturation have been studied by health researchers, posing a challenge for researchers who wish to compare findings from multiple studies (Chun et al., 2003). In public health research, the role of acculturation stems from interest in the role of culture as a potential explanation for the protective and negative aspects of traditional cultures (Abraido-Lanza et al., 2005; Lara et al., 2005; Leybas-Amedia, Nuno, & Garcia, 2005). Cultural patterns may mediate the social and biological risk factors that influence health status (Anderson, Bulatao, & Cohen, 2004; Bagley et al., 1995; Lara et al., 2005). The acculturation model predicts that disease risk among immigrants will shift gradually to resemble that of the host country as traditional customs, norms, and values

are altered by immigration (Abraido-Lanza, Armbrister, Florez, & Aguirre, 2006). The next section describes acculturation methods that have been used by health researchers.

Acculturation Measures Used in Health Research

Two conceptual frameworks have dominated the study of acculturation of Hispanics and other minority groups for more than two decades (Marin & Gamba, 1996). The unidimensional framework conceptualizes the acculturation process as a linear continuum ranging from retention of the traditional culture at one end to adoption of the host culture at the opposite end (Cuellar, Harris, & Jasso, 1980; Gordon, 1964; Park, 1928; Rogler, Cortes, & Malagady, 1991). Bicultural status is presumed to be the midpoint of the linear continuum (Cuellar et al., 1980). Several scales have been developed to measure the unidimensional concept of acculturation (see Appendix A).

The second conceptual framework uses a multidimensional or bidimensional perspective to measure independent (orthogonal) dimensions of acculturation. Linguistic, cultural, and social characteristics of immigrant groups have been assessed to evaluate adherence to U.S. culture and retention of traditional Mexican culture (Berry & Sam, 1997). Proponents of multidimensional models theorize that as immigrants become acculturated, elements of the traditional and host cultures are retained. Therefore, multidimensional models accommodate changes that occur in one or both cultures when immigrants acculturate (Cabassa, 2003; Marin & Gamba, 1996). Appendix A also presents several scales measuring bidimensional acculturation.

Since 1966, more than 2,000 articles have been indexed on Medline using the keyword “acculturation” (Chun et al., 2003; Hunt, Schneider, & Comer, 2004). Recent reviews have criticized the development and applications of the acculturation concept in research (Ailinger, 2005; Hunt et al., 2004). Critics have noted that the psychometric

properties of the instruments that have been used to measure acculturation level are often unknown. Additionally, the inherent difficulties in operationalizing “culture” have been ignored (Gutmann, 1999; Hunt et al., 2004). Researchers have not defined key concepts consistently, and ethnic stereotypes about traditional and majority cultures are common (Chun et al., 2003).

A content analysis of instruments for assessing acculturation that have been used with Hispanic and non-Hispanic minorities identified language use in one or more contexts (e.g., at home, with friends, at work) as the most frequently assessed psychosocial domain of acculturation (Zane & Mak, 2003). Language use and language preference are core components of both unidimensional and bidimensional acculturation scales. Unidimensional scales such as the Behavioral Acculturation Scale (BAS) (Szapocznik et al., 1978), the abbreviated version of the Acculturation Rating Scale for Mexican Americans (ARMSA) (Cuellar et al., 1980) used in Hispanic HANES, the Short Acculturation Scale for Hispanics (SASH) (Marin et al., 1987) used in NHANES 1999-2004, and the Brief Acculturation Scale (Norris, Ford, & Bova, 1996) (Table 1) include language use and language preference subscales (Deyo, Diehl, Hazuda, & Stern, 1985). Language variables are also major components of bidimensional scales such as the Bicultural Involvement Questionnaire (BIQ, part 2) (Szapocznik et al., 1978), the Biculturalism/Multiculturalism Experience Inventory (BMEI) (Ramirez, 1983), the Revised Acculturation Rating Scale for Mexican Americans (ARMSA-II) (Cuellar, Arnold, & Gonzalez, 1995) and the Bidimensional Acculturation scale (BiAS) (Marin & Gamba, 1996) (Appendix A).

In addition to language use and preference, many other behavioral changes that occur during the acculturation process have been assessed in an effort to measure the distinctive dimensions of the acculturation process (Table 1). When the ARMSA was developed, factors that were related to an individual's ethnic identity, cultural heritage and exposure, and ethnic interaction were included in addition to language familiarity, usage, and preferences (Cuellar et al., 1980). Other models of acculturative change have included attitudes towards culture, culturally linked habits and lifestyles such as music, dance, and television (Szapocznik et al., 1978); cultural awareness, reflecting knowledge of cultural customs, ethnic loyalty, or preference for one culture versus another (Padilla, 1980, p. 47-84; Ramirez, 1983). Work and leisure time activities, preferences for food and music; special celebrations and customs, and relationships with friends and family (Burnham et al., 1987a); and preferences for electronic media (Marin & Gamba, 1996).

Based on their content analysis of acculturation assessment methods, Zane and Mak (2003) concluded that, "...no one measure adequately samples the major behavioral and attitudinal domains related to acculturative change" (p. 54). Language indicators are important indicators of acculturation, but they are not fully representative of this complex process (Zane & Mak, 2003). When available, multiple dimensions of acculturation that reflect attitudes, behaviors, beliefs, cultural values, and psychological elements are useful to examine acculturative changes among minority groups.

A consensus has not been reached on the role of acculturation or the use of a particular method to measure acculturation among U.S. Hispanics (Berry, Trimble, & Olmedo, 1986; Cabassa, 2003; Chiriboga, 2004). The acculturation concept is complex. Furthermore, the core dimensions of acculturation may be difficult to differentiate from

other characteristics, including potential mediators (Abraido-Lanza et al., 2006). Proponents (Cabassa, 2003; Chiriboga, 2004) and critics of the acculturation concept (Gutmann, 1999; Hunt et al., 2004) agree that additional research is needed to produce conceptual models that consider the broader social (termed “macrosocial”), cultural, economic, and political conditions that affect the health of minority populations (Ailinger, 2005; Gutmann, 1999).

Use of Select Measures of Acculturation in Hispanic HANES and NHANES 1999-2004

Eight items from the 20-item ARMSA (Cuellar et al., 1980) were used to assess acculturation for the Hispanic HANES (1982-84) (Burnham, et al., 1987b). A separate validation study confirmed the validity of the Hispanic HANES measures (Burnham et al., 1987). The scale items assessed in the validation study assessed language use, nativity, and ethnic identification. Language preference and ability in multiple contexts (language spoken, preferred, read, and written better) were ascertained using a series of questionnaire items (Appendix B). The ethnic identification items used in Hispanic HANES queried ethnic self-identification by the survey respondent. The NHANES 1999-2004 acculturation questionnaire included fewer items due to time constraints. SASH language use subscale, ethnic self-identification, and nativity items were included.

The acculturation items from Hispanic HANES and NHANES 1999-2004 are listed in Appendix B. The NHANES 1999-2004 language items were based on the five-item SASH language subscale, nativity (respondent and both parents), self-reported ethnicity, and length of residence in the U.S.

Social and Cultural Determinants of Alcohol Use

Race, ethnicity, culture, class, socioeconomic status, sex, and aging interact to affect the health of underserved populations (Dressel, Minkler, & Yen, 1997). Previous research has improved our understanding of the complex relationships that influence health behaviors and outcomes among MA and other Hispanic subgroups, and yet the mechanisms by which these factors operate remain poorly understood. Researchers working in diverse disciplines, including social gerontology and social epidemiology, have called for new theoretical perspectives that are relevant to ethnic and racial groups (Burton, Dilworth-Anderson, & Bengtson, 1993). The traditional conceptual frameworks that have been based on the experiences of white, middle-class adults do not consider “macrosocial” factors such as social cohesion, income inequality, neighborhood and community characteristics, and discrimination that contribute to health disparities and inequalities among minorities (Link & Phelan, 1995; Lynch, Kaplan, & Salonen, 1997; Pahl, 1995; Torres, 2003). Understanding and explaining population-level phenomena requires different data, theory, and methods (Glass & McAtee, 2006).

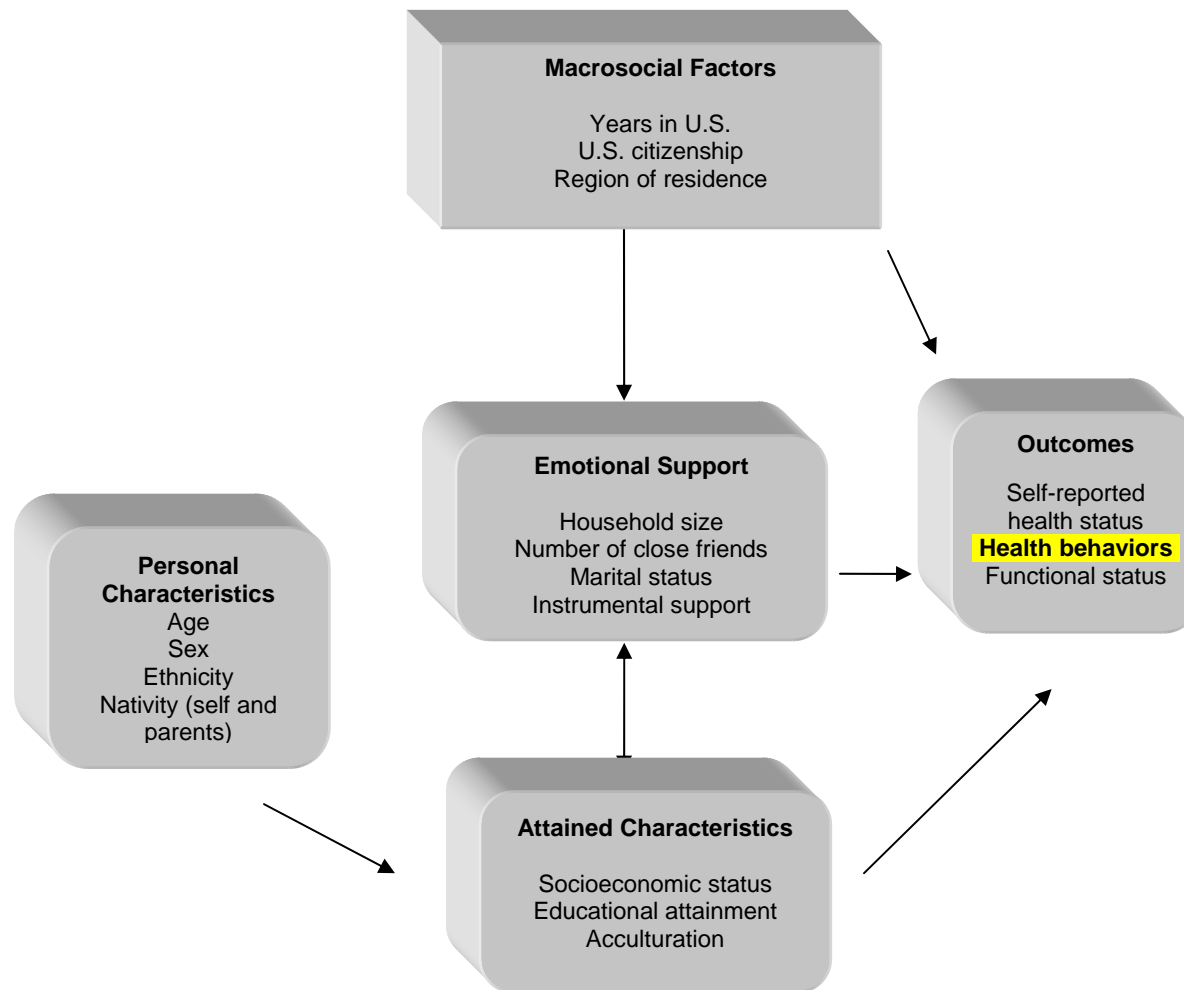
Social contextual factors are relevant to many health behaviors, including alcohol use (Glass & McAtee, 2006). Cultural identity and social incorporation into a group that provides positive social involvement can improve health (Angel & Angel, 2006) and group involvement can also encourage positive health behaviors (Lara et al., 2005). There may be structural differences between groups or generations of immigrants that alter immigrants’ sense of belonging, their instrumental social support, and the quality of their social interactions (Angel & Angel, 2006). Social epidemiologists have noted that it is important to how understand structured and institutionalized stresses affect individual-level health behaviors. The fundamental question of interest for social epidemiologists

who study health disparities is: “Who (or what) is responsible for population patterns of health, disease, and well-being?” (Krieger, 2001, p. 420). Multilevel conceptual frameworks have been used to examine individual characteristics within a broader social (termed here “macrosocial”) context that considers community, socioeconomic status, and characteristics of the social environment.

The conceptual framework for this study included individual, family/household, and geographic information to explore the association of acculturation, sociodemographic characteristics, social support, and alcohol use. The constituents of the personal, attained, social support, and social characteristics and alcohol use are shown in Figure 1. Personal characteristics (age, sex, ethnicity, and generation level or nativity) and attained characteristics (socioeconomic status, educational attainment, and language acculturation) have been used by other researchers to examine acculturation and alcohol use. This study used multiple proxy measures of acculturation. Language acculturation was measured using a 5-item scale. The literature review noted that other factors are important to consider because acculturation is a complex, multidimensional process.

Therefore, social settings and structures that MAs encounter in the U.S. were considered. Individuals shape their communities and vice versa. The conceptual framework for this study explored the association of broader social contextual factors such as household size, border status, marital status, social support, citizenship status, and alcohol use. A new method was used to explore emotional and instrumental support, two constructs of social support that reflect personal relationships and social networks (Finch & Vega, 2003).

Figure 1. Conceptual framework to examine the association of acculturation, social support, sociodemographic characteristics, and macrosocial factors on alcohol use among MA adults.



Part B. The Epidemiology of Alcohol Use among U.S. Adults

The Health Effects of Alcohol Use

Moderate alcohol use, defined as no more than 2 drinks per day for men and no more than 1 drink per day for women, may confer health benefits (DHHS et al., 2005) such as reduced risk of coronary heart disease (Goldberg et al., 2001), favorable serum lipid profiles, (Rimm et al., 1999), a reduced risk of developing gallstones (Grodstein et al., 1994; Leitzmann et al., 1999) , and a lower risk of developing type 2 diabetes (Conigrave et al., 2001). A 20-year longitudinal follow-up of Australian women who were aged 70-75 years at baseline reported that moderate alcohol intake (1-2 drinks per day, 3-6 days per week) was associated with improved survival and quality of life (Byles et al., 2006). The beneficial outcomes that are associated with light-to-moderate alcohol use are not without controversy, however. Inter-individual variability in alcohol metabolism rates (Baraona et al., 2001) and body composition (Dawson & Archer, 1992, 1993) may alter the health effects of alcohol for different sex, race/ethnicity, and age groups.

Much of the literature on the negative health consequences of alcohol consumption is based on average volume of alcohol consumed rather than the patterns of use over time (Green, Perrin, & Polen, 2004; Rehm, 1998). Patterns of use such as binge drinking confer different health risks than frequent (i.e. chronic) heavy drinking. Binge drinking patterns have been associated with increased risk of injury, stroke, and sudden coronary death (Green et al., 2004; NIAAA, 2000). Chronic heavy drinking is a risk factor for chronic liver conditions, hypertension, and several types of cancers (Anderson et al., 1993; NIAAA, 2000). Excessive alcohol use ranks as the third-leading lifestyle-related cause of death in the U.S. (CDC, 2006).

Excessive alcohol use, including heavy drinking and binge drinking, is a major public health concern. Heavy drinking (more than 2 drinks per day on average for men or more than 1 drink per day on average for women) and binge drinking (defined as more than 4 drinks during a single occasion for men or more than 3 drinks during a single occasion for women) are risk factors for liver disease and unintentional injuries and contributing factors to domestic violence, suicide, and homicide (CDC, 2006). Episodic heavy drinking was associated with significantly higher odds of poor self-rated health among NHANES III adults 40-74 years of age, and among Hispanic (primarily MA) men and women, the odds of poor health were more than three times greater than among whites (Okusun, Seale, Daniel, & Eriksen, 2005).

Measures of Alcohol Use Employed in Epidemiological Research

Research on alcohol epidemiology requires information on the alcohol consumption patterns of individuals and populations (Dawson, 2003). Both aggregate and individual-level estimation methods have been used to estimate trends in alcohol intake. Aggregate measures such as per capita annual intake were used to set target consumption levels for *Healthy People 2010* (DHHS, 2000). Data on per capita consumption are crude estimates of aggregate use by the U.S. population and do not reflect the consumption levels of individuals or of drinkers as a subgroup. Survey data are preferred to examine health outcomes that are related to drinking behavior (Dawson, 2003). Survey data provide detailed information on alcohol use by individuals, and from this we can learn about subgroups within populations such as lifetime abstainers, former drinkers, and current drinkers. Variability in alcohol use over a person's lifetime can also be determined with individual-level questionnaire data.

The reference periods used, questionnaire items, response choices, modes of interview, and data-coding methods are important considerations when evaluating information from surveys on alcohol use (Dawson & Room, 2000). The reference period or time period of recall may range from days to weeks, months, years, or even a lifetime. Although shorter reference periods are easier to recall, alcohol use often varies within individuals, particularly infrequent users, and thus reports that are based on the recent past may not reflect actual alcohol use (drinker versus nondrinker) or provide an accurate picture of usual consumption behavior. One disadvantage of using shorter reference periods is misclassification error resulting in overestimation of nondrinkers among infrequent alcohol consumers. Additionally, for epidemiological research, alcohol use in the recent past may be different from alcohol intake at other times in a person's life. For example, health problems may result in lower alcohol use or total abstinence in late adulthood. Reference periods of 1 year or longer are often used to assess alcohol behavior and problems in the U.S. population (Dawson, 2003).

NHANES and the National Health Interview Survey (NHIS) use items on the quantity/frequency method to ascertain both recent use (past year) and lifetime alcohol use. The NHANES also collects detailed information on alcohol consumption as part of the dietary interview component of the health examination (NCHS, 2004c). The focus of this study is usual alcohol intake. The data on alcohol frequency (lifetime and recent) and quantity (usual number of drinks consumed) were used. In addition to the alcohol frequency questions, two questions on binge drinking during one's lifetime and during the past year were asked. No information on the frequency of consumption for specific types of alcoholic beverages (e.g. beer, wine, and liquor) was collected in NHANES

1999-2004. Issues of data quality and potential sources of bias for self-reported alcohol information should be considered when analyzing the survey data.

The issue of social desirability is one factor to consider when using self-reported information on alcohol use. Survey respondents have a tendency to overreport socially desirable (e.g. “healthy”) foods such as fruits and vegetables and underreport less-healthy foods, including alcoholic beverages (Hebert et al., 1995; Thompson & Subar, 2001). Overreporting may also occur with reporting on alcohol, particularly when respondents are asked to estimate the frequency of consumption of multiple types of alcoholic beverages (e.g., beer, wine, and liquor) (Dawson, 2003). In general, the validity and reliability of self-reported data on alcohol quantity, frequency, and heavy drinking by adults have been shown to be acceptable (Bradley et al., 1998; Del Boca & Darkes, 2003; Giovannucci et al., 1993). Several measures are used to ensure the collection of high quality interview information in NHANES.

All of the NHANES interviewers are required to complete a comprehensive training course. The course includes formal instruction on standardized interviewing methods, the use of neutral probes to clarify or confirm responses to the survey questions, and interviewer behavior. Interviewer performance in the field is monitored using direct observation and audio-tape methods (NCHS, 2006d).

Per Capita Alcohol Consumption in the U.S.

Rates of per capita alcohol consumption are based on sales data for alcoholic beverages collected by the NIAAA Alcohol Epidemiologic Data System (AEDS) from 50 U.S. states or on data provided by beverage industry sources. The average ethanol content of alcoholic beverages is first estimated by converting the gallons of sold or shipped beer, wine, and spirits into gallons of ethanol (pure alcohol). The ethanol conversion

coefficients used to determine the pure alcohol content of each type of alcoholic beverage were .045 for beer, .129 for wine, and .411 for spirits (Doernberg & Stinson, 1985). Per capita consumption estimates are computed using U.S. Census population counts for the U.S. population aged 14 years and over and current drinking rates based on national surveys such as the NIAAA National Epidemiologic Survey on Alcohol and Related Conditions. The *Healthy People 2010* objective 26-12 is to reduce annual per capita alcohol consumption to no more than 2 gallons of ethanol (DHHS, 2000). National data have shown increasing per capita consumption in the U.S. since 1999. In 2004, the annual U.S. per capita consumption of ethanol from all alcoholic beverages was 2.23 gallons (NIAAA, 2006), a .5% increase from 2003 (Lakins, 2006).

Prevalence of Alcohol Use among U.S. Adults

Several national surveys report statistics on alcohol use. Centers for Disease Control and Prevention (CDC) surveys that report data on alcohol use among U.S. adults include the NHANES, the NHIS (NCHS, 2007a), and the Behavioral Risk Factor Surveillance System (BRFSS) (CDC, 2007a). The National Epidemiologic Survey on Alcohol and Related Conditions (NESARC) conducted by the NIAAA (NIAAA, 2007b) and the National Survey on Drug Use and Health conducted by the Substance Abuse and Mental Health Services Administration (SAMHSA) (SAMHSA, 2007a) also collect extensive information on alcohol use. The Alcohol Research Group (ARG) conducts cross-sectional and longitudinal surveys of the general U.S. population and special populations including the incarcerated, welfare clients, visitors to treatment facilities for substance abuse, and emergency room clients (ARG, 2006). The most recent National Alcohol Survey (NAS) was conducted in 2005. ARG collaborates with the World Health Organization and researchers based in several foreign countries, including Mexico (ARG,

2006). In addition to Hispanic HANES, Mexican Americans (MA) were specifically oversampled in NHANES III, 1988-1994 (Westat Inc., 2000) and NHANES 1999-2006 (NCHS, 2006a).

National survey data have consistently shown that alcohol use is common among U.S. adults (Fryar et al., 2006; NCHS, 2007d; NIAAA, 2007b; SAMHSA, 2007a). Among adults, the age-adjusted prevalence of alcohol use during the past year was 60.8 percent overall, 67.3 percent among men, and 54.9 percent among women 18 aged years and over (NCHS, 2006c). Among current drinkers, the age-adjusted prevalence of heavy drinking was 7.8 percent among males and 6.7 percent among females in 2004 (NCHS, 2004a).

Drinking behavior in the U.S. varies by race/ethnicity. Among U.S. males aged 18 years and over, the prevalence of current drinking reported during the 2002 NHIS was highest among whites (70%), followed by MA (60.9%) and blacks (54.3%). Binge drinking at least one time during the past year was reported by 28.1 percent of men overall (an age-adjusted estimate), with estimates of 30.2 percent for whites; 17.7 percent for blacks; and 29.5 percent for MA (Adams & Schoenborn, 2006). U.S. Hispanic men are similar to their non-Hispanic counterparts in that they consume more alcohol than females (Alaniz et al., 1999; Caetano & Mora, 1988; Treno, Alaniz, & Gruenewald, 1999). Researchers have also observed that, unlike white males who tend to consume larger amounts of alcohol during their early adult years, alcohol use among MA men aged 30-40 years remained high (Treno et al., 1999), thus posing a risk for chronic liver disease and cirrhosis (CDC, 2006; Green et al., 2004).

Alcohol use among females is also common in the U.S. (NCHS, 2004b). In 2002, 58 percent of females reported consuming alcohol during the past year. The age-adjusted current drinking rate for white women was 60.2 percent, compared with 40.3 percent for black women and 37 percent of MA women aged 18 years and over (NCHS, 2004b). The age-adjusted rates of binge drinking for females aged 18 years and over in 2002-2004 were 11.8 percent overall, 13.4 percent among whites, 5.6 percent among blacks, and 7.1 percent among MA. The age-adjusted lifetime abstinence rates for MA women were higher (52.9%) than for white women (26.5%) or black women (43.6%) (NCHS, 2004b).

The Determinants of Alcohol Use

Age

Alcohol use is common among U.S. adults overall. The age-adjusted rates of alcohol use based on NHIS, 2002-2004 reported that more than 60 percent (61.4%) of U.S. adults 18 years and older were current drinkers; 24.1 percent were lifetime abstainers; and 15 percent were former drinkers (Adams & Schoenborn, 2006). Both NHIS and NHANES 1999-2002 data showed that alcohol use among U.S. adults declines with age (Fryar et al., 2006). In NHANES 1999-2002, 31.1 percent of 45-64-year olds and 50.2 percent of adults 65 and older were nondrinkers (Fryar et al., 2006).

The age-adjusted rates of current drinking vary by race-ethnicity group. Current drinking rates were the same for non-Hispanic white and MA males aged 20 years and older during NHANES 1999-2002 (76.6%) whereas MA women had lower rates of current drinking (54.1%) compared with non-Hispanic white women (68.9%) (Fryar et al., 2006). The rates of alcohol abstention among U.S. women vary by race-ethnicity group (Adams & Schoenborn, 2006; Fryar et al., 2006). The rates of abstention were highest among MAs (52.9%) and lowest among white women (26.5%) (Adams &

Schoenborn, 2006). Tabulated national survey data do not report alcohol use by age and race-ethnicity group. Less information is available on alcohol use by older MAs.

Findings from Wave I of the Hispanic Established Populations for the Epidemiologic Studies of the Elderly (H-EPESE), conducted in 1992-1993, reported that 53 percent of MAs 65 years and older were lifetime alcohol abstainers, while the remainder were former (30%) or current drinkers (17%) (Masel et al., 2006). Adults aged 65 and older were more likely to be former drinkers (NIAAA, 1988). The percentage of former drinkers among U.S. adults in 1999-2002 increased from 19.9 percent among 45-64-year-olds to 28.8 percent for persons aged 65 years and over (Fryar et al., 2006).

Among current drinkers, the rates of moderate, heavy, and binge drinking decline with age. The prevalence of heavy drinking among U.S. adults aged 65 years and older was 5.4 percent for males and 3.4 percent for females (Fryar et al., 2006). Other studies have reported that late-onset alcohol abuse occurs in approximately 6 percent of older adults and is more common among adults who have higher incomes and educational attainment (American Medical Association Council on Scientific Affairs, 1996). The prevalence of heavy alcohol use among very old adults (aged 75 years or older) was 4 percent among men and 1 percent among women based on NHIS 2002-2004 data (Adams & Schoenborn, 2006).

Lower rates of alcohol use among older adults may reflect several factors. Older survey participants may have better health than their institutionalized peers, who are excluded from NHANES and NHIS. Additionally, survivor bias resulting from the premature deaths of adults who drank heavily in their early years may selectively reduce

the number of alcohol users, and among MA outmigration (the “salmon” effect) may reduce the number of adults who are in poor health.

Clinical and community-based studies of older adults have reported higher rates of heavy alcohol use than those obtained from national surveys such as NHANES and NHIS. Studies of older adults who live in retirement communities and congregate settings have reported rates of heavy drinking as high as 15-20 percent (Alexander & Duff, 1988; Rice & Duncan, 1995). Research conducted with special populations such as homeless persons, veteran’s hospitals, outpatient treatment facilities, and hospital emergency rooms have reported a higher prevalence of alcohol abuse. Alcohol abuse among the elderly is often undetected (Gomberg, 2003; Watts, 2007). Approximately 6-11 percent of elderly patients admitted to hospitals, 20 percent of elderly patients in psychiatric wards, and 14 percent of elderly patients in emergency rooms exhibit signs of alcoholism upon admission (Atkinson, 1990). The proportion of these elderly patients presenting with alcoholism who are Hispanics and other minorities is unclear because access to treatment for alcoholism problems may be limited, and there may be cultural and social barriers to seeking treatment (Gomberg, 2003). In 1996, the annual cost of alcoholism among the elderly was estimated to be \$100 million based on the added costs of hospital admissions, patient care, and substance abuse treatment (Olsin, 1996).

Sex

Men are more likely to be current drinkers than women. The age-adjusted rates of current drinking were 67.9 percent for males compared with 55.1 percent for females based on the 2002-2004 NHIS (Adams & Schoenborn, 2006). White males had higher rates of current drinking (70.3%) than MAs (62.7%) and blacks (55.2%). Among

females, current drinking rates of white women (59.4%) exceeded those of black (40.6%) and MA women (34.3%) (Adams & Shoenborn, 2006).

Sex differences have been reported with respect to the frequency and amounts of alcohol consumed by Mexican and MA adults (Caetano & Clark, 1998; Canino, 1994). Mexican (living in Mexico) and MA males aged 18 years and over used alcohol more frequently than their female counterparts. Sex differences in alcohol consumption frequency among MA adults have also been reported in U.S. alcohol surveys.

White and MA men surveyed during NHIS 2002-2004 reported similar rates of light (31%), moderate (15-18%), and heavy (5-6%) alcohol use. Among females, nondrinking rates were much higher among MA women (65.7%) compared with white women (40.6%). Overall, 16.1 percent of MA women were light drinkers, compared with 30.0 percent for whites; 2.4 percent were moderate users, compared with 8.4% for whites; and 1.4 percent were heavy users, compared with 4.4% for whites (Adams & Schoenborn, 2006).

A survey of alcohol behavior among U.S. Hispanics conducted by the ARG in 1984 reported high percentages of heavy drinking among men ages 18 years and older (Caetano, 1988). Among MA men, 44 percent reported heavy alcohol use, which included drinking once a week or more often and having 5 or more drinks at a sitting at least once a year, or weekly drinking that included consuming 5 or more drinks at a time at least once a week (Caetano, 1988); comparable rates for Puerto Rican and Cuban men were 24 percent and 6 percent, respectively. MA and Puerto Rican men surveyed during Hispanic HANES were more likely to report a history of heavy drinking (range 28-35%)

than Cuban American men (7-16%), and their odds of current heavy drinking were also higher compared with Cuban American men (Lee et al., 1997).

Differences in drinking behavior and alcohol problems were examined using data from the 1993 National Household Survey on Drug Abuse. The rates of heavy drinking among Hispanic women were much lower (range 1-8%) (Lee et al., 1997). MA men aged 18 years and older had the highest prevalence of frequent alcohol use and heavy drinking and the highest prevalence of drunkenness and alcohol-related problems in a comparison with Cubans, Puerto Ricans, and Central and South Americans (Nielsen, 2000). More recent data from the 2004 and 2005 National Survey on Drug Use and Health (NSDUH) found that 12.1 percent of Hispanic men and 3.8 percent of Hispanic women aged 12 years and over had experienced alcohol abuse or dependence during the past year, versus 10.6 percent and 5.6 percent of white males and females, respectively (SAMHSA, 2007b).

Studies of alcohol use conducted with MA have shown that MA men drink less frequently but consume larger quantities of alcohol when they drink than do non-Hispanic whites and blacks (Caetano, 1983; Neff, Hoppe, & Perea, 1987). One concept that has been cited frequently in the U.S. alcohol literature (Caetano, 1990) to explain the heavy drinking pattern among MA men is the influence of “*machismo*,” or the desire to appear masculine and strong (e.g., “drink like a man”) (Caetano & Clark, 1998). Caetano (1990) noted that the focus on deviant drinking among MA does not provide a complete picture of alcohol use in this population. Additionally, the *machismo* construct, which is often cited in the U.S. alcohol literature, has not been operationally defined or measured

by researchers. The literature consistently reports that the traditional Hispanic alcohol norms for women differ from those for men.

MA women have higher rates of abstinence than Cuban-American and Puerto Rican women (Aguirre-Molina & Caetano, 1994; Aguirre-Molina et al., 2001). Overall, alcohol use is higher among U.S.-born MA women than in MA women who were born in Mexico (Canino, 1994). Among female alcohol users, the Hispanic HANES data showed that MA women higher rates of heavy-drinking compared with Puerto Rican and Cuban drinkers (Markides et al., 1990; Marks et al., 1990).

Among MA women, more liberal drinking norms were found to apply to drinking with coworkers at lunch, while drinking with friends after work or in social situations at others' homes evoked more conservative drinking patterns (Caetano & Clark, 1999). Intergenerational research has shown that the frequency of alcohol consumption increases among successive generations of MA. Approximately 62 percent of third-generation, 49 percent of second-generation, and 25 percent of immigrant MA women reported using alcohol (Gilbert & Cervantes, 1987). Alcohol use among MA women is hypothesized to be related to increased opportunities for interaction with non-Latinos. Increased social contacts, in turn, afford greater exposure to English language and culture, particularly as the generation level increases (Gilbert & Cervantes, 1987).

Socioeconomic Status

Socioeconomic factors are widely used in health research to examine the effects of socioeconomic position and social class on health outcomes (Braveman et al., 2005). The literature on social epidemiology notes that socioeconomic status (SES) is a complex, multidimensional construct (Braveman et al., 2005) comprised of economic resources, power, and prestige (Krieger, Williams, & Moss, 1997; Lynch et al., 1997).

Socioeconomic factors operate at the individual, household, and community level and through direct and indirect causal pathways (Braveman et al., 2005). Social gradients often exist within racial and ethnic subgroups, and SES factors vary within the life cycle (Braveman et al., 2005; Smith & Kington, 1997). Research has shown that in general, persons with more education have higher income and lifetime wealth than do persons with less education (Smith & Kington, 1997). Educational attainment has a temporal order. Most people complete their education by early adulthood, and therefore educational attainment is less prone to reverse causality, i.e., it is not a result of poor health (Smith & Kington, 1997). Income status, on the other hand, may change if one's health status deteriorates. Another advantage of using educational attainment is that the percentage of missing information for this variable is much lower in surveys such as NHANES (.2%) than it is for income (6-7% in NHANES) (NCHS, 2006b, 2007a).

Patterns of alcohol use have been shown to vary by SES among U.S. adults aged 20 years and older. The Health Promotion and Disease Prevention supplement to the 1990 NHIS examined correlates of alcohol use in a predominately white sample of 12,819 U.S. adults aged 50 years and older; adults with post-high-school education had the highest odds of moderate drinking when people with less education were the referent (Ruchlin, 1997). Results from NHANES 1999-2002 also showed a positive association between current alcohol use and educational attainment. Here, current alcohol use among adults aged 20 years and older was reported by 60.6 percent of those who had less than a high school education, versus 68.7 percent and 74.6 percent of adults with a high school education or more than a high school education, respectively (Fryar et al., 2006). The prevalence of "former drinking" status was higher among less-educated persons,

however. Among less-educated adults, 21.9 percent were former drinkers, compared with 14 percent of adults with more than a high school education (Fryar et al., 2006). The prevalence of heavy drinking is inversely associated with education for men but not for women (Fryar et al., 2006; Schoenborn & Adams, 2001).

NHANES and NHIS data have shown that current drinking status is associated with income. Current alcohol use was reported by 45.5 percent of low-income adults who were surveyed during the 1997-1998 NHIS, compared with 75.6 percent of high-income adults (poverty-income ratio of 4.00 and over) (Schoenborn & Adams, 2001). Versus high-income adults, low-income persons were more than twice as likely to be lifetime alcohol abstainers.

The SES status of U.S. Hispanics has been shown to be comparable to the SES status of African Americans but significantly lower than that of non-Hispanic whites (Morales et al., 2002). Levels of alcohol consumption are associated with SES among Hispanics. Hispanic HANES data revealed that income status was inversely associated with drinking frequency, but poor women consumed larger quantities of alcohol per drinking occasion (Black & Markides, 1993). A review of research literature on alcohol research revealed that low SES, based on income and educational level, was associated with higher abstention rates among Hispanic women (Gilbert & Cervantes, 1987). Higher abstention rates were found among MA women living along the U.S.-Mexico border than among Anglos in other social and demographic groups (Holck, Warren, Smith, & Rochat, 1984). In general, the prevalence of light and moderate alcohol use increases with years of educational attainment.

Acculturation

Several mechanisms have been proposed for the role of acculturation and alcohol use among MAs. Acculturative stress, the psychological impact of adapting to a new culture (Smart & Smart, 1995), has been shown to affect the physical and mental health of Hispanic immigrants (Caplan, 2007). The rapid cultural changes, or what Durkheim described as ‘anomie’ or the absence of social norms and controls that occur during the acculturation process, may result in abusive, self-destructive tendencies (Durkheim, 1933). Rapid cultural changes are hypothesized to contribute “acculturative stress” (Al-Issa, 1997). The observed differences between the alcohol behaviors of MA men and women have been linked to MA culture.

MA family life centers on the traditional cultural norms and values (Maldonado, 1979) of *familismo*, *marianismo*, and *machismo* (Contreras, Kerns, & Neal-Barnett, 2000). Family solidarity, family duty, and the importance of parental authority are important values that children learn at a young age. *Familismo* is the commitment to family life in which the collective values and well-being of the family take precedence over those of the individual (John, Resendiz, & De Vargas, 1997). Traditional gender roles are intertwined with *familismo*, and an important part of *familismo* is the role of motherhood (Peek, Stimpson, Townsend, & Markides, 2006). *Marianismo*, a woman’s role as wife, mother, and matriarch, is modeled after the Virgin Mary, the symbol of purity and self-sacrifice in the Catholic faith. Cultural differences and cultural conflict may explain the differences by sex in alcohol use that have been observed among MA. A woman’s traditional *marianismo* roles conflict with alcohol use (Alaniz et al., 1999).

Among MA men, exaggerated “*machismo*,” or the desire to appear masculine and strong (e.g., “drink like a man”) (Caetano, 1990), may favor heavier alcohol use.

Machismo has been shown to have both beneficial and undesirable effects on MA family life (Villereal & Cavazos, 2005). The potential benefits of the *machismo* role model to the family unit include leadership, protection of the family, and honor. Traditional family decision making in MA families is often role-segregated and patriarchal, but joint role structures are becoming increasingly common among younger MA families, especially in households where the adult women are employed (Ybarra & Ybarra, 1982). Additionally, aging has been shown to alter the traditional gender roles in MA families. After retirement, married MA men often have different family roles and may interact more with their spouses and share in decision making (Villereal & Cavazos, 2005).

The literature on changes that occur in family relationships following immigration to the U.S. is mixed. Some research has shown that intrafamilial relationships among MA remain intact for generations rather than being significantly altered by increased use of the English language and interaction with American society (Rueschenberg & Buriel, 1989). Other researchers have reported that immigration has lasting effects on traditional MA family structure (Gowan & Trevino, 1998; Rueschenberg & Buriel, 1989), particularly among women (Amaro, Russo, & Johnson, 1987). Kranau, Green, and Valencia-Weber (1982) observed that more-acculturated females (predominately MA) held less-traditional attitudes toward gender roles than did the less-acculturated females. Their research suggests that acculturation is important to understanding the effects of acculturation on family roles.

The operant theory of acculturation (Landrine & Klonoff, 2004) predicts changes in minority health behavior *a priori* based on patterns of health behavior in the immigrant and host population groups. Operant theory predicts that groups with a higher (or lower) prevalence of a particular behavior such as alcohol use in the country of origin (in this

case, Mexico) will adopt the behaviors of the host country and eventually have a prevalence that is similar to that in the majority group.

Ethnographic research and regional studies have reported that drinking patterns among MA living in the U.S. vary by sex, age, geographic region, income, education, marital status, nativity (Gilbert & Cervantes, 1987), and level of acculturation (Burnam et al., 1987a; Lara et al., 2005). Alcohol use by women is less common in traditional Hispanic culture. Gilbert and Cervantes (1987) reported that U.S.-born MA were more likely than immigrant women to perceive drinking as “sociable” behavior. Correspondingly, beliefs about alcohol use among MA women vary according to acculturation level (Caetano & Mora, 1990). Highly acculturated women are more likely to use alcohol in social settings whereas less acculturated men are more likely to turn to alcohol to relieve stress (Caetano & Mora, 1990).

Epidemiological studies that have examined the association of acculturation and alcohol use among MA adults have shown mixed results (Appendix C). U.S.-born MA have higher risks for any substance use disorders than do Mexican-born immigrants (Borges et al., 2006), and no single mechanism appears to explain this pattern (DHHS, 2001). Immigration, acculturation, and nativity appear to have larger effects on alcohol use among MA women (Caetano & Mora, 1988). That is, more acculturated women were found to have higher probabilities of using alcohol and of frequent alcohol use (Markides et al., 1990).

Acculturation level, which was based on place of birth, language spoken at home, citizenship status, and years of residence in the U.S., was associated with self-reported health status among Hispanic respondents aged 51 years and older (65% MA) in the 2001

California Health Interview Survey (Bagchi, 2004). The authors speculated that cultural beliefs and practices also contributed to persistent ethnic differences in health status and noted that improved survey research methods are needed to obtain culturally specific health information from ethnic groups (Bagchi, 2004).

The 1992-96 Hispanic Established Populations for Epidemiologic Studies of the Elderly (H-EPESE) examined the association between acculturation and alcohol behavior among adults 65 years and older (Masel et al., 2006). Acculturation level was based on nativity, language use, and contact with Anglo-Americans; subscales from a scale with known psychometric properties (Hazuda, Stern, & Haffner, 1988) were adapted for use in H-EPESE. Although changes in drinking behavior over time were modest, a positive association between alcohol use and increased English language use was observed. When the association of acculturation and health was examined within a broader social contextual framework, acculturation was shown to both promote and mediate stress at the individual, family, and community levels (Masel et al., 2006).

In other studies, the association between acculturation and alcohol use appears to be mixed. For example, no association between acculturation and alcohol use was observed among Los Angeles women aged 46-94 years who were surveyed between 1984 and 1985 (Cantero et al., 1999). Similarly, no association between acculturation and alcohol use was reported for 65-74-year-old HHANES MA women (Markides et al., 1990) or among elderly Hispanic women who were enrolled in a three-generation study of San Antonio residents (Markides, Krause, & Mendes de Leon, 1988). Alcohol use among older adults, particularly women, is low to begin with, and thus studies with older MA may have insufficient power to detect differences between groups. Another

consideration is that existing acculturation methods may not capture unique cultural and social characteristics of older MA.

Researchers have noted that much of the research on alcohol use and acculturation has focused on younger populations. Yamada, Valle, Barrio, and Jeste (2006) noted that no fully validated acculturation measures have been designed to assess the acculturation process among older Hispanics. Acculturation scales that were developed for use with the general adult population have been used to measure acculturation levels of older MA (Chiriboga, 2004). The acculturation process contributes to social and cultural changes at the individual and group levels. Methods of assessing acculturation based on language use, nativity, citizenship status, and self-reported ethnicity have shown that alcohol use, both moderate and excessive, is associated with acculturation level among MA women and men. Researchers acknowledge that heterogeneity exists within MA groups living in the U.S. and that new methods are needed to understand the cultural factors that contribute to health behaviors.

Social Support

Social integration, the extent to which one participates in a range of social relationships (Cohen & Lemay, 2007), is associated with positive physical and psychological well-being, including increased longevity (Berkman, Glass, Brissette, & Seeman, 2000; House, Landis, & Umberson, 1988) and less depression and anxiety (Cohen, Mermelstein, Kamarck, & Hoberman, 1985). Social integration may be a marker for social support, which is hypothesized to protect against adverse life experiences (House et al., 1988) and stress, thereby reducing the likelihood of alcohol dependency (S. Cohen & Lemay, 2007).

Associations between social support derived from social networks, emotional support received from friends and family, religious services attendance, and participation in clubs and activities, and use of alcohol have been observed among men and women (Green, Freeborn, & Polen, 2001). Researchers have also observed that there are differences in the size and structure of men's and women's social support networks (Green et al., 2001; House et al., 1988). Men's networks tend to be larger and more diffuse. Women's social networks provide varied types of support, and women generally receive and use more support from social networks (Green et al., 2001; Shumaker & Hill, 1991).

Relationships with spouses, organization members, and friends were shown to be related to preventive health behavior, including refraining from excessive alcohol use, in a predominately white sample of adults aged 20 to 64 years (Broman, 1993). Berkman and Breslow (1983) observed that adults with higher social integration levels consumed fewer drinks and smoked fewer cigarettes. Recent studies have also found increased social integration to be associated with less smoking and alcohol consumption (Cohen & Lemay, 2007). Within individuals, however, having more interaction partners was associated with increased smoking and alcohol consumption, which may be attributed to social influence and the potential roles of alcohol and tobacco as facilitators of social interaction. Additionally, individuals who are less socially integrated may be more susceptible to social pressures that influence smoking and alcohol behavior.

Less is known about the role of social support and well-being among minority subgroups. Cross-cultural research studies have shown that social relations are fairly continuous across adulthood. People form what Kahn and Antonucci (1980) have called

“social convoys” comprised of groups of people who accompany individuals through life. Related persons tend to form the core of social convoys, and the groups provide social stability, even with age-related changes.

Longitudinal research has shown that emotional solidarity between parents and their grown children predicts parental survival (Silverstein & Bengston, 1991). Among older adults, social networks become smaller with age (Cummings & Henry, 1961), and older adults become more selective about retaining emotionally close relationships (Lang, 2000). Research on acculturation has examined the changes in social support that occur following immigration. Family support (Mulvaney-Day, Alegria, & Sribney, 2007) and support from unrelated close friends (Vega, Kolody, & Valle, 1987) are associated with positive mental and physical health status among Hispanics.

The amount of support provided by family members often varies across generations (Alegria, Canino, Stinson, & Grant, 2006). Among older Hispanics, particularly females, traditional gender roles and customs are an integral part of the social support networks in late adulthood. Trends in geographic migration among younger generations of MA may conflict with traditional family roles and expectations if younger family members leave their neighborhoods and families to pursue better career opportunities (Finch & Vega, 2003). Finally, a “socio-spatial” component might also be important to consider. The hypothesized “barrio advantage” has been attributed to community institutions, kinship structure, social cohesion, and social networks (Eschbach et al., 2004).

Conclusions

The concept of acculturation has evolved over the past several decades. A modern view of acculturation envisions the process as being complex and multidimensional and the conceptual frameworks that have been used to measure acculturation level among MAs reflect this complexity. Proxy measures of acculturation are widely used in the field of epidemiology. The acculturation hypothesis posits that social networks, family ties, and social structures are reinforced by traditional culture.

The literature review confirmed that alcohol use among MAs vary by age, gender, geographic, socioeconomic status and acculturation level. Increasingly, other factors are being explored to explain the paradoxes associated with acculturation and health behaviors. The interplay of social and contextual factors and acculturation among MAs has generated great interest and this research provided the impetus for exploring macrosocial factors in this study. Finch and Vega (2003) hypothesized that other mechanisms that are unique to the acculturation experience need to be explored. A broader view of the acculturation experience that considers the social, cultural and physical environments may provide new insight into this important and complex topic.

Chapter III: Study Methodology

This study was a secondary analysis of national cross-sectional data that was designed to examine the association of sociodemographic factors, acculturation, social support, and alcohol use among MA adults. The analyses for this research were completed using descriptive, correlation, and logistic regression methods.

Survey Description

The NHANES is conducted to assess the health and nutritional status of the U.S. population. National surveys were conducted on a periodic basis between 1971 and 1994. NHANES I was conducted from 1971 to 1975, NHANES II from 1976 to 1980, and NHANES III from 1988-1994. Hispanic HANES was a special survey of Mexican Americans, Cuban-Americans, and Puerto Ricans living in the U.S. (NCHS, 2004c). NHANES became a continuous annual survey in 1999.

The NHANES and HHANES samples are composed of the civilian, noninstitutionalized U.S. population (NCHS, 2006d). The survey samples are selected using a complex, multistage probability design (NCHS, 2006a). NHANES I sampled persons aged 1 to 74 years; Hispanic HANES and NHANES II, those aged 6 months through 74 years; and NHANES III those aged 2 months and older. The continuous NHANES includes all ages.

With the exception of NHANES 1999, the annual NHANES samples (interviewed and examined) are composed of approximately 5,000 persons. Typically, the annual survey samples are drawn from 15 geographic locations around the U.S. using a complex, multistage sample design method (NCHS, 2006a). In 1999, the survey began 3 months later than usual such that only 12 survey locations (primary sampling units, or “PSUs”) were selected. Mexican Americans, blacks, low-income white persons, and adults aged

60 years and over were oversampled during NHANES 1999-2004, and the expanded samples resulted in larger sample sizes for the oversampled subgroups, thus improving statistical reliability and precision.

NHANES collects household interview and health examination data. Initially, all survey participants completed a 1-2-hour household interview. Following the household interview, survey participants were examined in mobile examination centers. The interview and examination components varied according to the age of the respondent. During their 3-hour examination, all adults were asked to complete the body measurements, dietary interview, oral health, body composition, physician examination, vision, body composition, private health interview, and laboratory components of the health examination. Survey participants received remuneration for participating in the examination component as well reports of findings from many of their examination tests. All of the survey questionnaires, consent forms, survey brochures, and examination protocols have been approved by the NCHS Ethics Review Board before their use in the survey.

Primary Data Collection Methodology

The data used for this research were collected during the NHANES 1999-2004 household and health examination interviews (NCHS, 2006d). English- and Spanish-language questionnaires were used, and all consent forms, information materials, and correspondence were produced in English and Spanish. Spanish-language questionnaires and information materials were translated by certified translators before use in the survey. Backward- and forward-translation methods were used to verify that the wording and response choices on the survey were culturally appropriate and accurate with respect to the meaning and intent of the questions. Spanish-language interviews were conducted by

bilingual interviewers, many of whom were Hispanic; survey participants selected the language of interview.

The NHANES interviewers completed a 2-week training program. The training modules included ethics and standards for collecting survey data; procedures for screening sampled dwelling units; administration of the NHANES computer-assisted personal interview modules; interview methodology, including techniques to probe for detailed information; and strategies for successful interpersonal communication (NCHS, 2006d). Interviewers were monitored by contractor and NCHS staff using audiotape and direct observation. The laptop computers that were used to collect the household interview data were encrypted to ensure the security of personal information. The NHANES interview system software was preprogrammed with verification screens to reduce data entry errors; when prompted, interviewers were required to verify unusual responses. The survey questionnaires also had preprogrammed ‘skip’ patterns that have been shown to reduce interviewer error and respondent burden and improve the completeness of interview data (Gardenier, 1994).

Secondary Data Analysis Methodology

Sources of Data

Public release files and publicly accessible data were used for the analyses. Publicly released data were downloaded from the NHANES website (NCHS, 2006b). The NHANES public data files were accompanied by data file codebooks, documentation, and analysis guidelines.

Publicly accessible data were obtained from the NCHS Research Data Center (RDC). Publicly accessible data include data variables that have not been released publicly and other data that may pose a disclosure risk if publicly released. The RDC

staff prepares special analytic datasets for NCHS and non-NCHS data users, and measures are taken to mask potentially identifiable information. A formal research proposal describing the intended uses of the publicly accessible data was approved by the NCHS RDC and the NCHS Data Disclosure Board. The University of Maryland Institutional Review Board subsequently approved the investigator's proposal to conduct this research as part of the requirements for a doctoral dissertation (Appendix D).

Analytic Sample

The base sample for this analysis was composed of the interviewed and examined MA adults aged 40 years and older. The criteria for inclusion in the analytic sample included being Mexican American and having complete information on language use (five SASH items), nativity, educational attainment level, income, and alcohol use. A special analysis was completed on a subsample of MA aged 60 years and older (n=902) to explore the association of social support and alcohol use. Social support information was collected on adults 60 years and older during NHANES 1999-2004. Social support interview questions were added for 40-59 year old adults in 2002, but the sample size was insufficient (n=202) to include younger adults in the social support analyses for this study.

Sample Design Considerations

The use of sampling weights and sample design variables is recommended for all NHANES analyses because the sample design is a complex, clustered design, and there are differential probabilities of selection (NCHS, 2006a). The impact of the complex sample design upon variance estimates is measured by the design effect which is defined as the ratio of the variance of a statistic which accounts for the complex sample design to the variance of the same statistic if a simple random sample of the same size was used. A

design effect of 1 means that the variance for the estimate under the cluster sampling is the same as the variance under simple random sampling. The NHANES design effects are usually greater than 1 (NCHS, 2007b). The size of the design effect is an important consideration because design effects that are greater than 1 reduce the effective sample size, resulting in a loss of statistical precision for estimation purposes (NCHS, 2007b). The effective sample size is calculated by dividing the sample size in a subgroup by the design effect.

Another consideration regarding the design effects is that the design effects for a particular variable can be different for race-ethnicity and age groups. Because DEFFs are highly variable for different variables within each 2-year cycle of the continuous NHANES, it is difficult to set a single minimum sample size for analysis. The general statistical consideration is that an estimated proportion should have a relative standard error of 30% or less. The required sample size depends on the design effect for the variable of interest.

Requirements for Sample Size

Requirements for sample size were determined to confirm that the NHANES sample was adequate for the planned analyses. The desired level of power was .80, and an alpha level of .05 was used for all calculations of sample size. The NCHS Analytic Guidelines note that the minimum sample size to estimate a 10% prevalence with relative standard error of 30% or less, given a survey design effect (the ratio of the complex sample variance to the simple random sample variance) of 1.5 and greater than 16 degrees of freedom (df) for the standard error is 150 persons (NCHS, 2006a). The average design effect was computed for the lifetime and current alcohol use questions using SUDAAN. An average design effect of 2.0 was computed using PROC DESCRIPT

with a DEFT2 statement that denotes use of SUDAAN's method 2 for computing the average design effect (NCHS, 2007b). All calculations of sample size were computed using an average design effect of 2.0.

- 1) *Differences between Two Proportions*: The estimated sample size needed to detect differences in proportions for the alcohol use outcomes was based on a method described by Netter and Wasserman (Netter & Wasserman, 1974). The formula used for the calculation incorporates the average design effect for the NHANES complex sample design.

The critical value for the alpha value was computed using a SAS function and 44 degrees of freedom (df) for the NHANES 1999-2004 analytic sample. The critical value for a two-sided t-test with 44 df was 2.015. An adjustment is made for the complex sample design of the survey by including an average design effect term. The estimated sample size to detect differences in the proportions of male and female moderate drinkers was computed as follows:

$$Z_{\alpha .05} = 2.015 \qquad Z_{\beta .80} = .84$$

$$D = p_1 - p_2$$

$$p_{\text{mean}} = \frac{1}{2} (p_1 + p_2)$$

Formula (Netter & Wasserman, 1974):

$$n = \frac{2 * \text{average design effect} * p_{\text{mean}} (1 - p_{\text{mean}}) [Z_{\alpha} + Z_{\beta}]^2}{d^2}$$

Moderate drinking rates for older adults were estimated using NHANES 1999-2002 results reported by Fryar et al. (2006) for U.S. adults 65 years and older in which the total sample prevalence was 19.3% for men and 5.9% for women.

P_1 (male proportion) = .193 P_2 (female proportion) = .059

$P_{\text{mean}} = \frac{1}{2}$ [mean proportion for males (.193) + mean proportion for females (.059)]

$P_{\text{mean}} = .126$.

Calculation:

$$n = \frac{2 * (2.0)(.126)(1 - .126)[2.015 + .84]}{(.193 - .059)^2}$$

$$\frac{(4)(.126)(.874)(2.855)}{(.134)^2} = \frac{1.258}{.0179} = 70.3, \text{ or } 71 \text{ persons per group}$$

At least 71 males and 71 females are needed to detect differences in the prevalence of moderate drinking between males and females.

Larger samples were required to detect smaller effect sizes. For example, the prevalence of heavy drinking among MA 20 years and older was 8.4% for men but only 2.7% for women. Therefore, $p_{\text{mean}} = (.084 + .027)/2 = .056$. The sample size required to detect a difference in heavy drinking among adults aged 65 years and older was computed:

$$n = 2*(2.0)(.056)(1 - .056)[2.015 + .84]/(.057)^2 = .604/.0032 = 189 \text{ persons per group}$$

2) *Sample size to detect differences between independent means using a two-sample independent t-test*

The number of subjects was estimated using a method described by Lehr (1992):

Sample size = $16/d^2$ (Lehr, 1992)

Medium effect size (d) of .5 was used (J. Cohen, 1988)

Calculation: $16/ (.5)^2 = 64$

This sample size will be multiplied by an average design effect factor of 2, yielding a figure of 128 per group.

- 3) *Adjustment for Multiple Comparisons:* When planned, pairwise comparisons were made, the number of comparisons was minimized to reduce the risk of Type I error. If three or more comparisons were made, an adjustment for family-wise error was made using a Bonferroni approach that involves dividing the p value of .05 by the number of comparisons.
- 4) *Criterion for the Stability of Statistical Estimates:* The relative standard errors of estimates, which are the ratios of the standard error of the estimate divided by the estimate multiplied by 100, were evaluated to determine the reliability of statistical estimates. NCHS recommends that statistical estimates that have relative standard errors of 30% or more be considered statistically unreliable (NCHS, 2006a).

Variables Used in the Analysis

Independent Variables

The independent variables used in the data analyses are listed in Appendix E.

Demographic Variables

Age: Age at the time of screening was reported by individual years for survey participants aged zero through age 84 years. An upper limit of 85 years (termed “top coding”) was used to code age for all adults who were aged 85 years or over to reduce the risk of disclosure for older survey participants. Two age categories (in years) were used for this study: 40-59 and 60 and over. Age was also included as a continuous variable in correlation and regression analyses.

Marital status: Survey participants reported their marital status as married, cohabiting/living with a partner, separated, widowed, divorced, or never married. Marital status was coded as a dichotomous variable for all analyses: “married or cohabiting/living with a partner” versus “not married” (all of the other marital status categories).

Educational attainment: Educational attainment level was based on the number of years of education completed by an individual. Four education categories were included in the RDC file used for this study: less than 9th grade; 9th-11th grade, no diploma (code 2); high school diploma or general equivalency diploma (code 3); more than high school (code 4).

Race/ethnicity: The Demographics file variable RIDRETH1 was used; this variable was based on self-reported information on race/ethnicity. All survey participants were asked whether they considered themselves to be Hispanic or Latino. Respondents who reported Hispanic or Latino ethnicity were asked to choose one or more Hispanic/Latino ethnic groups. Respondents who self-identified as being of Mexican or Mexican American ancestry were coded Mexican American. Other Hispanic ethnicities were not reported separately and were coded “Other Hispanic” in the public release files. Other Hispanic persons were excluded from these analyses.

Income status: The NHANES public release data files included family income (variable name: INDFMINC) and poverty-income ratio (PIR), a ratio of income to the official poverty threshold for families (U.S. Census Bureau, 2000). The income status variable used in this study was based on the PIR. The PIR income criterion adjusts for family size and is based on poverty income threshold criteria that are updated annually. Families with PIR values less than 1.00 are considered to be living in poverty. PIR values

were computed for survey participants using information on family income and family size. A small number of records ($n = 79$) had partial income information. Some families reported their incomes as being below/greater than a cut-point value of \$20,000, or they reported an income range. A median substitution method was used to assign a PIR value to the partial income records. The median substitution values for PIR were based on computations with MA who had complete income information. A weighted median PIR value of .87 was used for respondents with family incomes under \$20,000; a value of 2.70 was used for respondents with incomes of \$20,000 and over. The PIR data were used to code a dichotomous variable (POVERTY). A PIR value less than 1.00 has been used by Federal statistical surveys, including NHIS to report health statistics relative to income status (Adams & Schoenborn, 2006) and national poverty statistics (U.S. Census Bureau, 2000). In this study, persons with PIR values below 1.00 were defined as living in poverty and persons with PIR values of 1.00 and over were considered above poverty.

Household size: A categorical variable (DMDHHSIZ) was included in a special version of the 1999-2004 demographic data file obtained from the RDC. NCHS coded household sizes from one to six separately; households composed of seven or more members were grouped in a single category labeled as “7 or more.” DMDHHSIZ categories were combined for this analysis. The new variable, HHSIZE, had three categories for household size: one, two, and three or more members.

Region of residence: A dichotomous variable (BORDER) was coded as U.S.-Mexico border resident or non-border resident. A border resident was someone who resided in a survey location within approximately 200 miles of the U.S.-Mexico border.

Acculturation

The variables used to assess acculturation included language use, nativity, length of residence in the U.S., and generation level.

Language use: The five-item language subscale of the Short Acculturation Scale for Hispanics (SASH) (Marin, Sabogal, Marin, Otero-Sabogal, & et al., 1987) was used in this study. The language items were: 1) language read and spoken, 2) language used as a child, 3) language used to think, 4) language spoken at home, and 5) language used with friends. The responses to all of the language items were coded from one to five with 1- “exclusively Spanish,” 2-”more Spanish than English,” 3- “English and Spanish equally,” 4- “more English than Spanish,” and 5- “English only.” Correlation methods were used to confirm the internal consistency reliability of the five language items. Scale scores for language use were produced by summing the responses to each of the language items (scale score range: 5-25), and mean language use scores were produced by dividing the language scale sums by five.

Information on the language used during the household interview was not available on all of the public use files and was not used in this study.

Country of birth: Respondent and parental country of birth was categorized as U.S.-born or non-U.S.-born. Almost all of the non-U.S.-born MAs (98%) were born in Mexico.

Generation level: The U.S. Census definition of generation level was used to code three generation categories (U.S. Census Bureau, 2001a). Generation level was derived from information on country of birth (respondent and both parents). Foreign-born MA were considered to be ‘first generation’ MA; U.S.-born MA who had one or two foreign-

born parents were ‘second generation’ MA; MA who were born in the U.S. to U.S-born parents were ‘third generation’ MA.

Length of U.S. residence: Non-U.S.-born respondents were asked the year when they came to the U.S. to stay. NCHS recoded the responses into nine categories: less than 1 year (code 1), 1-4 years (code 2), 5-9 years (code 3), 10-14 years (code 4), 15-19 years (code 5), 20-29 years (code 6), 30-39 years (code 7), 40-49 years (code 8), and 50 years or more (code 9). Only 71 adults in the total interviewed sample reported living in the U.S. for fewer than 5 years, and 144 had lived in the U.S. for fewer than 10 years. Three residence groups were used in the data analyses: < 10 years, 10-19 years, and 20 or more years (includes U.S.-born MA).

U.S. citizenship: Non-U.S.-born survey participants were asked, “Are you a citizen of the United States?” Responses were coded as yes, no, refused, or don’t know. No questions are asked about legal residency status in NHANES.

Social Support Variables

Social support information was obtained on a subsample of adults 60 years and older. The NHANES social support questionnaire consisted of a subset of questionnaire items that had been used previously in the Alameda County Study (Seeman, et al., 1987) and the Yale Health and Aging Study to assess the adequacy of emotional support received during the past year and having a source of financial and instrumental support.

A four-item social support index was developed for this study. Social support household questionnaire (SSQ) items were used to create a 4-item index (Appendix F). The index was designed to differentiate between persons who: 1) either had (or did not have) emotional support, 2) had adequate (or inadequate) emotional support during the past year, 3) had (or did not have) a source of financial support, and 4) had larger (or

smaller) emotional support groups. The first three items were coded using the response structure in the social support questionnaire section. The fourth item, emotional support group size, was derived.

SSQ021 responses were used to derive an emotional support group size variable. The responses to the SSQ021 items were initially recoded into four categories of support sources: spouse, children, other relatives (included siblings, parents), and community sources (neighbors, church members, co-workers, professionals, and friends). The sources of emotional support were summed to create a variable support group score. After examining the frequency distribution of TEAM values, a dichotomous variable (“SSGROUP”) was coded such that respondents had either smaller or larger emotional support groups.

Social Support Index Reliability Testing

The internal consistency reliability for the social support index was assessed with correlation methods. A Kuder-Richardson-20 (KR-20) coefficient which is equivalent to Cronbach’s coefficient alpha for binary data (Nunnally & Bernstein, 1994) was determined. A KR-20 reliability coefficient of .70 has been suggested as a criterion for acceptable reliability (Pett, Lackey, & Sullivan, 2003).

Dependent Variables

Information on alcohol use was collected during the private health interview and dietary interview components of the NHANES. The dietary interview consisted of a 24-hour dietary recall of all foods and beverages consumed during the previous day. Detailed information was obtained on the types and amounts of all foods and beverages consumed.

The primary focus of this study was usual alcohol consumption, reflecting longer periods of time (i.e., the past 12 months or lifetime). Alcohol used based on responses to

the private health interview alcohol section (ALQMEC) was used for this study. The questionnaire was administered to adults aged 20 years and older in a private room by a trained interviewer. The questionnaire items on alcohol use are listed in Appendix G. The alcohol questions in each of the survey cycles did not differ substantively. Recoding was required, however, because individual question item numbers changed between survey cycles. The alcohol outcomes for this study included *lifetime alcohol use* (lifetime abstainer, former drinker, and current drinker) and *current drinking status*. Current drinkers were categorized as *light, moderate or heavy users* as described in the Key Terms section. Average number of drinks per week was calculated as follows: ((number of days per year alcohol was used)*(number of drinks per day)/365)*7. *Binge drinking* during the past 12 months was based on the responses to question ALQ140 (Table 7).

Data Analysis Plan

Statistical Analysis Software

All statistical analyses were completed using SAS 9.1 for Windows software (SAS Institute, Cary, NC) and SAS-callable SUDAAN software (RTI, Research Triangle Park, NC). Standard errors of the estimates were produced in SUDAAN using Taylor series linearization, a design-based method that incorporates the sample weights and accounts for the complex sample design.

Datasets

All of the data used in the analyses were reviewed and edited by NCHS before release. SAS transport files were downloaded from the NCHS website (NCHS, 2006b). The data files, codebooks, and file documentation were located on the NHANES 1999-2000, NHANES 2001-2002, and NHANES 2003-2004 websites. Twelve NHANES public release files were used for this analysis: demographics (n = 3), social support (n =

3), acculturation (n = 3), and alcohol use (n = 3) files. The remaining variables were obtained from the NCHS Research Data Center (RDC). The survey respondent identifier (variable name: Sequence Number) was used to link the RDC and public data file records.

NHANES Survey Design Considerations

Mexican Americans (MA), blacks, persons aged 60 years and over, adolescents aged 12-19 years, and low-income white persons were oversampled during NHANES 1999-2004. Within the MA subsample, adults aged 60-69 years were specifically oversampled. This design feature necessitated grouping the older MA adults in a “60 years and over” age category to maintain optimal sample sizes for the analyses. The age groups used for this analysis were “middle-aged adults” (ages 40-59 years) and “older adults” (ages 60 years and over).

Sample Weights and Weighting

NCHS advises analysts to use the complex sample design weights to produce nationally representative estimates based on NHANES data. In addition to accounting for the survey design features, the sample weights adjust for survey nonresponse response and post-stratification. The information on alcohol use was collected during the NHANES health examination component. The NHANES examination sample weights were used for all of the analyses.

Six-year examination sample weights were computed using the 4-year weights for NHANES 1999-2002 and the 2-year weights for NHANES 2003-2004. A calculation method recommended by NCHS was used to compute the 6-year weights used in all analyses (NCHS, 2006a). All of the estimates presented in the data tables are weighted unless stated otherwise.

Statistical Significance

A p value less than .05 ($< .05$) was used to denote statistical significance for all descriptive and regression analyses.

Evaluation of Missing Data

Questionnaire responses that were coded as refusals or “don’t know” were set to missing. Item nonresponse was evaluated. NCHS recommends that reweighting be considered if more than 10% of the values for a particular variable are missing (NCHS, 2006a). None of the variables used in this analysis had more than 7% missing data. There were 135 missing responses to the question on lifetime alcohol use and 106 persons with missing information on poverty status after the median substitution method described earlier was used.

Evaluation of Item Nonresponse

A survey design-consistent chi-square method which produces F-adjusted p values was used to compare the characteristics of the analytic sample to the excluded persons. The age, sex, educational attainment, nativity, income, and region of residence characteristics of the two groups were compared to determine whether there was a selection bias.

Descriptive Analyses

Univariate analyses were used to examine the weighted distributions of the continuous variables. The PROC UNIVARIATE output included descriptive statistics that included the means, medians, percentiles, frequencies, skewness indices, graphs, and lists of extremely high and low values. SAS PROC UNIVARIATE with the options “FREQ” (frequency distribution), “PLOT” (box, scatter, and stem-leaf), and “NORMAL” (tests of normality) was used to examine the distributions of the analytic variables.

SUDAAN PROC DESCRIPT was used to produce weighted means and standard errors of the means. Nonparametric methods were used for categorical variables. SUDAAN PROC CROSSTABS was used to produce weighted frequency counts for the categorical variables and chi-square statistics. A survey design-consistent chi-square method was used for testing the hypothesis of no association between the categorical variables and p-values for the chi-squares were examined to determine statistical significance. The degrees of freedom for the test statistics were computed based on the number of primary sampling units (PSUs) minus the number of strata containing observations. The SUDAAN *subpopn* statement was used to subset the MA population for the SUDAAN analyses. The statistics that are produced using the SUDAAN software with the *subpopn* statement reflect the degrees of freedom for the MA subsample in the analyses.

Bivariate Analyses

Spearman rank order correlations were used to evaluate bivariate associations. Unweighted correlations were produced using SAS PROC CORR with the SPEARMAN, ALPHA, and NOMISS options. The correlations were used to identify highly correlated independent variables that might contribute to multicollinearity. Multicollinearity was also explored with regression analysis methods.

Regression Analyses

Multicollinearity diagnostic procedures were run using SAS PROC REG. SUDAAN does not have multicollinearity diagnostic options. An approach described by Field (Field, 2003, page 201) was used that involves using the logistic regression outcomes and predictors in linear regression models. Multicollinearity diagnostics including tolerance and variance inflation factor (VIF) statistics were produced for the

multivariable models. The standard errors of the regression coefficients were examined given that inflated standard errors may be indicative of multicollinearity.

Logistic regression was used for all hypothesis testing. SUDAAN PROC RLOGIST was used to test Hypotheses #1 and #2. NCHS recommends the PROC RLOGIST procedure to produce the Satterthwaite adjusted chi-square or the Satterthwaite adjusted F statistics and corresponding p values to evaluate the predictors in the models (NCHS, 2007b). Crude and adjusted odds ratios were produced. Model fit was assessed using a Hosmer-Lemeshow chi-square statistic. Odds ratios and 95% confidence intervals that did not include unity were considered statistically significant for the logistic regression models. SUDAAN PROC MULTILOG, was used to produce generalized multinomial logit models with dependent variables that had more than two outcomes (Research Triangle Institute, 2005) to test Hypothesis #3; Satterthwaite adjusted F statistics were produced for the models.

Evaluation of Instrument Reliability

The internal consistency reliability of the SASH language subscale items and the social support index were examined. Cronbach's coefficient alpha and item-to-total correlations were examined for the total 6-year sample (1999-2004) and for each of the 2-year survey cycles. The Kuder-Richarson-20 (KR-20) statistic was used to estimate the internal consistency reliability of the social support index (Pett et al., 2003).

Validity

Construct validity or the logical relationships among variables (Babbie, 2001, page 143) was assessed using correlation data. Theory and prior research findings were used to select the variables for the correlation analyses and Cohen's criteria for effect sizes (Cohen, 1988) were used to measure the strength of the associations. The

correlations between language scale scores and generation level, length of residence in the U.S., citizenship, and border status were examined with the total and older adult samples. The correlations between the social support index score and marital status, household size, and years in the U.S were examined in the older adult sample.

Chapter IV: Results

The study results are organized into four sections. The first section presents the psychometric testing results for the language acculturation scale and social support index. Section two describes the findings from the review of the data. The third section includes the descriptive characteristics of the analytic sample and the crude rates of lifetime and current alcohol use. The hypothesis testing findings are presented in the fourth section of this chapter.

Psychometric Testing

Language Acculturation Scale Reliability

Language use scale inter-item correlations are shown for the total sample and for each survey cycle (Table 1). The total sample language items acculturation items had a Cronbach's alpha (raw) value of .94. Total sample item-to-total correlations ranged from a low of .70 for language used as a child to .90 for language read and spoken and language usually used to think. The Cronbach's alpha and item-to-total correlations for each 2-year survey cycle were also examined. High Cronbach alpha values were observed for the 2-year survey cycles (raw Cronbach alpha range: .94-.95). The item-to-total correlations the 2-year cycles were similar to the values for the entire 6-year sample. Although the language used as a child had consistently lower item-to-total correlations than the other SASH items, it was retained in the subscale because the item was highly correlated with the other scale items and the alpha level remained very high with the item in the scale (above .90) (DeVellis, 2003, p. 96).

Table 1. Cronbach coefficient alpha and item-to-total correlations for the language scale items: MA adults aged 40 years and older, United States, 1999-2004.

Description	Total Sample (n = 1,682)	Cycle 1 1999-2000 (n = 642)	Cycle 2 2001-2002 (n = 506)	Cycle 3 2003-2004 (n = 534)
SASH Scale Cronbach Alpha	.94	.95	.94	.94
Item-to-total correlations				
Language read and spoken	.90	.92	.89	.88
Language used as a child	.70	.71	.70	.68
Language usually spoken at home	.88	.90	.88	.85
Language usually used to think	.90	.90	.90	.89
Language usually used with friends	.88	.89	.90	.86

SOURCE: CDC/NCHS, National Health and Nutrition Examination Survey, 1999–2004.

Cronbach coefficient alpha values for the SASH language use were also produced for the older adult subsample. The Cronbach coefficient alpha for the SASH language use items was .94. Language use as a child had the lowest item-to-total correlation ($r = .64$); the item-to-total correlations for the other SASH items exceeded .85.

Social Support Index Instrument Reliability

The KR-20 value for the social support index was .66, a minimally acceptable level (DeVellis, 2003, p.95). The item-to-total correlations ranged from .40 for social support group size (SSGROUP) and having a source of financial help (FINANCE) to .55 for having a source of emotional support (HELP). The KR-20 values for the two-year survey cycles were .67 (NHANES 1999-2000), .71 (NHANES 2001-2002), and .61 (NHANES 2003-2004).

Initial Data Review

A total of 38,077 persons (all race-ethnicity groups) were sampled in NHANES 1999-2004 and this figure included 10,051 MAs. Of the MAs who were sampled, 8,738 were interviewed and 8,372 were also examined. The NHANES public release data files included information on 2,037 MAs 40 years and older (Table 2), 111 of whom were not examined and were excluded from this study. The base sample consisted of the interviewed and examined sample (n=1926). Persons who did not have the required household interview information (n=107) or alcohol use information (n=137) were excluded from the study. The final analytic sample was 1,682 persons.

Table 2. Interviewed and examined samples for MA adults aged 40 years and older, NHANES, 1999-2004.

Sample	Number Interviewed	Interviewed Only	Interviewed and Examined
		N (Row Percent)	N (Row Percent)
Total	2,037	111 (5.4%)	1,926 (94.6%)
Age (yr)			
40-59	924	34 (3.7%)	890 (96.3%)
60+	1,113	77 (6.9%)	1,036 (93.1%)
Sex			
Males	1,002	60 (6.0%)	942 (94.0%)
Females	1,035	51 (4.9%)	984 (95.1%)

NOTE: Unweighted data.

SOURCE: CDC/NCHS, National Health and Nutrition Examination Surveys, 1999–2004.

Missing Data

A review of frequency counts of missing data for all items was produced using SAS PROC MEANS. Among household interview variables, income was the one with the most missing information. The characteristics of the analytic sample were compared with those of the excluded sample. The chi-square tests of independence for sex, age

category, poverty status, border region, country of birth, years of residence in the U.S., citizenship status, and generation level of the included and excluded samples were not statistically significant.

NHANES Sample Weights for MA Adults

The analytic sample examination weight values ranged from 587 to 25,202. The mean examination weight for MA adults 40-59 years was 5,516, versus a mean sample weight value of 1,616 for the older adults. The sample weights were examined for the alcohol outcome and language acculturation scale scores to determine whether a particular population subgroup or item value was influenced disproportionately by the sample weights. The distribution of sample weights was skewed in the nondrinker group because the record for the individual with the largest sample weight (25,202) was included in that category. The outcomes were not altered, however when the outlier sample weight record was excluded from the analysis. A visual inspection of the scatter plot for sample weight plotted against summed SASH scores showed that the sample weights were dispersed evenly over the range of SASH scores, and no one alcohol use group was disproportionately influenced by the sample weights, which means that the estimates of alcohol use are representative of the civilian, noninstitutionalized MA population aged 40 years and over.

Descriptive Statistics

Sociodemographic Characteristics of MA Adults 40 Years and Older

Table 3 presents the characteristics of the analytic sample. The sample was composed of 837 men and 845 women. A quarter of the sample (25.4%) was aged 60 years or older. There was higher proportion of females than men in the older adult sample (27.6% versus 23.3%). A majority of the sample (70.9%) was married or living with a

partner. Most of the adults lived in households composed of three or more persons (66.4% percent); the remainder lived in two-person (26.5%) or single-person (7.1%) households.

More than 45 percent of the analytic sample (45.8%) resided in a geographic area located within 200 miles of the U.S.-Mexico border. Overall, two-thirds of the sample reported having U.S. citizenship; 20.6 percent were naturalized citizens. More than half of the sample (54.2%) was first-generation MA; the rest of the sample included second-generation (21%) and third-generation (24.8%) MA. A majority of the non-U.S.-born MA had lived in the U.S. for several years. Only 9 percent of the sample had lived in the U.S. for less than 10 years and 44.8 percent had been in the U.S. for 10 years or longer. The remaining 46.2 percent were U.S. born. With respect to educational attainment, 25.7 percent of the sample had completed education beyond a high school level, 16% had completed some high school, 15.3 percent were high school graduates, and 43 percent reported less than 9 years of education. Essentially one-fourth of the sample (25.1%) had a family income below the federal poverty level.

The sociodemographic characteristics of the analytic sample were compared by sex and age (Tables 3 and 4, respectively). The proportions of men and women differed by age group ($p < .01$), years of U.S. residence ($p < .05$), citizenship status ($p < 0.05$), and marital status ($p < .001$), but not by educational attainment, birthplace and citizenship, generation level, border status, poverty status, or household size (Table 3). In summary, men were younger, less likely to be U.S. born, and more likely to be married or cohabiting.

Table 3. Characteristics of MA aged 40 years and older by sex, United States, 1999-2004.

Characteristic	Males N Percent (SE%)	Females N Percent (SE%)	Chi-square
Age (yr)			
Total	837	845	7.62**
40-59	386 76.7 (2.17)	394 72.4 (2.23)	
60+	451 23.3 (2.17)	451 27.6 (2.23)	
Education attainment			
Less than 9 th grade	451 44.8 (2.30)	427 41.2 (1.92)	4.43 NS
Some high school	123 15.1 (1.61)	132 16.9 (1.36)	
High school graduate	98 14.2 (1.79)	111 16.4 (1.93)	
More than high school	165 25.9 (2.56)	175 25.5 (2.10)	
Country of birth			
U.S.	378 43.2 (3.94)	412 49.1 (3.44)	4.44*
Non-U.S.	459 56.8 (3.94)	433 50.9 (3.44)	
U.S. citizenship			
Citizen	572 64.2 (3.05)	601 69.6 (2.49)	4.58*
Noncitizen	263 35.8 (3.05)	241 30.4 (2.49)	
Birthplace and citizenship			
U.S.-born	378 43.3 (3.94)	412 49.3 (3.45)	5.41 NS
Foreign-born, U.S. citizen	194 20.9 (1.76)	189 20.3 (2.71)	
Foreign-born, non-U.S. citizen	263 35.8 (3.05)	241 30.4 (2.49)	
Years in U.S.			
U.S.-born	378 43.3 (3.95)	412 49.2 (3.45)	5.73 NS
Less than 10	58 8.7 (1.50)	66 9.2 (1.66)	
10 or more*	399 48.0 (3.46)	365 41.5 (3.00)	
* includes unknown number of years			
Generation level			
First	459 56.9 (3.93)	433 51.4 (3.46)	3.96 NS
Second	211 20.0 (2.09)	216 21.9 (2.62)	
Third	164 23.1 (3.35)	190 26.7 (4.00)	
Border status			
Near border	409 45.1 (7.36)	411 46.6 (8.38)	.47 NS
More distant	428 54.9 (7.36)	434 53.4 (8.38)	
Poverty status (PIR)			
Less than 1.00	233 24.6 (2.04)	235 25.6 (1.83)	.20 NS
1.00 and over	604 75.4 (2.04)	610 74.4 (1.83)	
Marital status			
Married/cohabiting	658 78.4 (2.29)	493 63.1 (3.73)	18.04 ***
Not married	179 21.6 (2.29)	352 36.9 (3.73)	
Household size			
One	59 6.6 (0.96)	88 7.6 (0.90)	1.89 NS
Two	260 25.8 (2.20)	254 27.2 (2.13)	
3 or more members	518 67.7 (2.68)	503 65.2 (2.66)	

NOTE: Weighted data. Chi-square test of independence for differences in proportions by sex; bold font denotes statistically significant differences; * denotes $p < .05$; ** denotes $p < .01$; *** denotes $p < .001$.
SOURCE: CDC/NCHS, National Health and Nutrition Examination Surveys, 1999–2004.

Higher percentages of older MA were lifetime U.S. residents (Table 4) (55.8% compared with 43% for younger adults), and higher percentages of younger adults were noncitizens (37.3% compared with 21% of older adults). With respect to generation level, 57.5 percent of younger adults were first generation, compared with 44.5 percent of older adults, and 16.2 percent of younger adults were second generation, versus 34.8 percent of older adults. More than 13 percent of older adults lived in single-person households, compared with 4.8 percent of 40-59-year-olds, and 73 percent of 40-59-year-olds lived in households composed of three or more persons, compared with 47.3 percent of older MA. Nearly one-third of older adults (32.2% lived in poverty, compared with 22.7% of younger MA. The proportions of adults living in the border region did not differ by age category (45.8% and 45.9%, respectively).

Table 4. Characteristics of MA aged 40 years and older by age group, United States, 1999-2004.

Characteristic	40-59 Years N Percent (SE%)	60 Years and Older N Percent (SE%)	Chi-square
Age (yr)			
Total	780	902	7.62**
Male	386 53.3 (1.54)	451 46.6 (1.15)	
Female	394 47.7 (1.54)	451 53.4 (1.15)	
Educational attainment			
Less than 9 th grade	310 37.3 (2.07)	568 59.8 (2.20)	16.67**
Some high school	137 16.9 (1.37)	118 13.4 (1.31)	
High school graduate	125 17.0 (1.88)	84 10.1 (1.02)	
More than high school	208 28.8 (2.26)	132 16.6 (1.85)	
Country of birth			
U.S.	314 42.8 (3.15)	476 55.7 (4.71)	9.74 **
Non-U.S.	466 57.2 (3.15)	426 44.3 (4.71)	
U.S. citizenship			
Citizen	62.7 (2.56)	79.0 (2.40)	19.24***
Noncitizen	37.3 (2.56)	21.0 (2.40)	
Birthplace and citizenship			
U.S.-born	314 43.0 (3.16)	476 55.8 (4.69)	21.22***
Foreign-born, citizen	160 19.7 (1.80)	223 23.2 (3.13)	
Foreign-born, non-citizen	302 37.3 (2.56)	202 21.0 (2.40)	
Years in U.S.			
U.S.-born	314 43.0 (3.17)	476 55.8 (4.69)	12.02**
Less than 10	381 46.6 (2.87)	383 39.7 (4.25)	
10 or more *	82 10.5 (1.60)	42 4.5 (1.14)	
* includes unknown number of years			
Generation level			
First	466 57.5 (3.19)	426 44.5 (4.69)	22.51***
Second	117 16.2 (1.97)	310 34.8 (3.06)	
Third	193 26.2 (2.98)	161 20.7 (5.42)	
Border status			
Near border	367 45.8 (7.36)	453 45.9 (9.80)	NS
More distant	413 54.2 (7.36)	449 54.1 (8.80)	
Poverty status (PIR)			
Less than 1.00	178 22.7 (1.61)	290 32.2 (1.98)	9.22**
1.00 and over	602 77.3 (1.61)	612 67.8 (1.98)	
Marital status			
Married/cohabiting	570 73.4 (3.28)	581 63.6 (2.15)	11.67**
Not married	210 26.6 (3.28)	321 36.4 (2.15)	
Household size			
One	34 4.8 (0.70)	113 13.7 (1.72)	13.93**
Two	167 22.2 (2.13)	347 39.0 (2.75)	
3 or more members	579 73.0 (2.20)	442 47.3 (3.85)	

NOTE: Weighted data. Chi-square test of independence for differences in proportions by age group; bold font denotes statistically significant difference; * denotes $p < .05$; ** denotes $p < .01$; *** denotes $p < .001$.
SOURCE: CDC/NCHS, National Health and Nutrition Examination Surveys, 1999–2004.

Sociodemographic Characteristics of MA Adults 60 Years and Older

The sociodemographic characteristics of older MA (n = 902) were compared by sex (Table 5). Significant differences were observed between men and women with respect to marital status. There were no significant differences by sex among older MA with respect to poverty status, educational attainment level, generation level, border status, years of U.S. residence, and household size. More than 90 percent of older MA had lived in the U.S. for 10 or more years with over half of these having been born in the United States (3.6% of men and 5.4% of women had lived in the U.S. for less than 10 years). Substantial percentages of older MA lived in poverty (34.6% of women and 29.4% of men) and a majority of older adults (58.9% of men and 60.7% of women) had less than 9 years of education.

Table 5. Characteristics of MA adults aged 60 years and older by sex, United States, 1999-2004.

Variable	Males (n=451) Percent (SE%)	Females (n=451) Percent (SE%)	Chi-square
Marital status			
Married/cohabiting	78.9 (1.84)	50.2 (3.15)	20.38***
Not married	21.1 (1.84)	49.8 (3.15)	
Generation level			
First	43.3 (4.67)	45.5 (5.21)	NS
Second	36.7 (3.57)	33.1 (3.15)	
Third	20.0 (5.19)	21.4 (5.82)	
Education level			
Less than 9 th grade	58.9 (2.72)	60.7 (2.45)	NS
Some high school	13.6 (1.69)	13.2 (1.79)	
High school graduate	9.7 (1.55)	10.5 (1.43)	
More than high school	17.8 (3.03)	15.6 (1.50)	
Poverty-income ratio			
Less than 1.00	29.5 (2.23)	34.6 (2.61)	NS
1.00 and over	70.5 (2.23)	65.4 (2.61)	
Citizenship and nativity			
U.S. born	57.1 (4.64)	54.7 (5.23)	NS
Naturalized citizen	22.7 (3.21)	23.6 (3.37)	
Noncitizen	20.2 (2.37)	21.7 (3.15)	
Border status			
Near border	46.2 (9.13)	45.7 (10.55)	NS
More distant	53.8 (9.13)	54.3 (10.44)	
Years in U.S.			
Less than 10	3.6 (1.18)	5.4 (1.49)	NS
10 or more	39.4 (4.31)	39.9 (4.71)	
U.S.-born	57.1 (4.64)	54.7 (5.23)	
Household size			
One	9.0 (1.20)	17.7 (2.83)	NS
Two	42.0 (3.47)	36.5 (2.64)	
3 or more members	49.0 (3.10)	45.8 (4.93)	

NOTE: Weighted data. Chi-square test of independence for differences in proportions by sex; bold font denotes statistically significant differences; *** denotes $p < .001$.

SOURCE: CDC/NCHS, National Health and Nutrition Examination Surveys, 1999–2004.

Language Use by Sex and Age

Differences by sex in language use are presented in Table 6. Language(s) read and spoken and language(s) used to think differed by sex. Spanish was the primary language read and spoken by men and women as evidenced by the percentages of men and women who used only Spanish or more Spanish than English. Women were more likely to read

and speak only Spanish than were men. Similar percentages of men and women reported using Spanish and English equally (18.7% of men and 21.1% of women). English was the primary language used by approximately 30 percent of MA men and women.

Table 6. Language use by sex for MA adults aged 40 years and older, United States, 1999-2004.

Language Variable	Males (n = 837) Percent (SE%)	Females (n = 845) Percent (SE%)	Chi-square
Language read and spoken			
Spanish only	27.9 (3.0)	35.4 (2.7)	22.18**
More Spanish than English	24.9 (1.7)	14.4 (1.4)	
Spanish and English equally	18.7 (2.1)	21.1 (2.9)	
More English than Spanish	20.0 (2.0)	19.8 (1.4)	
English only	8.5 (1.1)	9.3 (2.1)	
Language used as a child			
Spanish only	63.7 (2.5)	62.4 (2.4)	4.02 NS
More Spanish than English	12.0 (1.5)	11.1 (1.7)	
Spanish and English equally	9.9 (1.3)	9.4 (1.2)	
More English than Spanish	7.7 (1.2)	8.6 (1.0)	
English only	6.7 (1.3)	8.4 (1.4)	
Language usually spoken at home			
Spanish only	45.1 (2.9)	42.2 (2.8)	10.3 NS
More Spanish than English	12.2 (1.4)	7.2 (1.0)	
Spanish and English equally	12.8 (1.8)	16.4 (2.9)	
More English than Spanish	11.3 (1.7)	14.6 (1.4)	
English only	18.6 (2.3)	19.6 (2.7)	
Language usually used to think			
Spanish only	43.4 (3.1)	44.4 (2.3)	10.47*
More Spanish than English	11.1 (1.4)	7.6 (1.1)	
Spanish and English equally	17.2 (2.0)	15.1 (1.6)	
More English than Spanish	8.6 (1.4)	9.8 (1.6)	
English only	19.8 (1.8)	23.1 (2.4)	
Language used with friends			
Spanish only	37.1 (2.9)	42.2 (3.3)	10.19 NS
More Spanish than English	14.8 (2.1)	8.5 (1.3)	
Spanish and English equally	23.3 (2.3)	17.5 (2.8)	
More English than Spanish	9.4 (1.6)	13.1 (1.4)	
English only	15.4 (1.9)	18.7 (2.7)	

NOTE: Weighted data. Chi-square test of independence for differences in proportions by sex; bold font denotes statistically significant results; * denotes $p < .05$; ** denotes $p < .01$.

SOURCE: CDC/NCHS, National Health and Nutrition Examination Surveys, 1999–2004.

Age was associated with language use as a child. Older adults reported more use of the Spanish language during childhood than did younger MA adults (Table 7). The differences between age groups for the other items on language use were not statistically

significant. With respect to current language use, more than half of MA adults reported that Spanish was the primary language they read and spoke, used at home, used to think, and used with friends.

Table 7. Language use by age group for MAs aged 40 years and older, United States, 1999-2004.

Language Variable	Adults aged 40-59 years (n = 780) Percent (SE%)	Adults aged 60+ years (n = 902) Percent (SE%)	Chi-square and p value
Language read and spoken			
Spanish only	30.5 (2.2)	34.7 (3.6)	10.24 NS
More Spanish than English	19.7 (1.1)	17.2 (1.5)	
Spanish and English equally	19.9 (2.2)	25.1 (2.8)	
More English than Spanish	19.9 (1.2)	16.1 (1.8)	
English only	8.9 (1.3)	6.9 (1.6)	
Language used as a child			27.16 *
Spanish only	61.9 (2.4)	66.5 (2.6)	
More Spanish than English	10.7 (1.5)	14.2 (1.6)	
Spanish and English equally	9.2 (1.2)	11.2 (1.2)	
More English than Spanish	9.3 (0.9)	4.8 (1.1)	
English only	9.0 (1.3)	3.2 (0.9)	
Language usually spoken at home			9.69 NS
Spanish only	43.9 (2.5)	43.0 (3.6)	
More Spanish than English	9.5 (0.9)	10.5 (1.9)	
Spanish and English equally	12.7 (2.0)	20.1 (2.9)	
More English than Spanish	13.8 (1.7)	10.2 (1.2)	
English only	20.1 (2.3)	16.2 (3.0)	
Language usually used to think			7.11 NS
Spanish only	44.1 (2.3)	43.3 (3.1)	
More Spanish than English	9.3 (1.0)	9.5 (1.5)	
Spanish and English equally	14.4 (1.5)	21.3 (2.4)	
More English than Spanish	9.5 (1.7)	8.5 (0.8)	
English only	22.8 (1.7)	17.3 (2.9)	
Language used with friends			2.16 NS
Spanish only	39.4 (2.5)	40.1 (3.6)	
More Spanish than English	11.4 (1.6)	12.5 (1.9)	
Spanish and English equally	20.1 (2.0)	21.5 (3.1)	
More English than Spanish	11.3 (1.2)	11.0 (1.2)	
English only	17.8 (2.0)	14.9 (2.9)	

NOTE: Weighted data. Chi-square test of independence for differences in proportions by sex; bold font denotes statistically significant results; * denotes $p < .01$.

SOURCE: CDC/NCHS, National Health and Nutrition Examination Surveys, 1999–2004.

Language Acculturation Scale Scores

Approximately 29 percent of the sample used Spanish exclusively and 4.7 percent used English exclusively (Table 8). The remainder of the NHANES sample (approximately 66%) used English and Spanish. The median language use scores for MA adults did not differ by age, sex, or border status.

Table 8. Distribution of language scale scores by age group for MA adults aged 40 years and older.

Summed Language Scale Score Value	40-59 Years (n = 780) Percent	60+ Years (n = 902) Percent
5 (Spanish only)	28.3	31.7
6-10 (more Spanish than English)	21.2	17.3
11-15 (both English and Spanish)	15.6	23.5
16-24 (more English than Spanish)	29.4	25.3
25 (English only)	5.6	2.3

NOTE: Weighted data. Summed score values ranged from 5 (only Spanish used) to 25 (only English used).
SOURCE: CDC/NCHS, National Health and Nutrition Examination Surveys, 1999–2004.

Mean language use scale scores are shown in Table 9. There were no differences in the total sample mean language scores by age group, sex or border region. Total sample mean language scores differed by years of U.S. residence, educational attainment level, generation level, and citizenship status. Higher mean language scores were associated with more years in the U.S., having U.S. citizenship, and higher educational attainment level. Among females, but not males, mean language scores also differed by age group and border status. Younger females and women who were non-border residents had higher mean language scores that were indicative of greater English language use.

Table 9. Mean language use scale scores by selected characteristics for MA aged 40 years and older, United States, 1999-2004.

Characteristic	Mean (SEM) n = 1,682	t-test p- value for pairwise comparisons
Total sample	12.04 (.30)	
Sex		
Males	11.86 (.36)	NS
Females	12.22 (.35)	
Age group (yrs)		
40-59	12.23 (.31)	NS
60+	11.48 (.45)	
Nativity and citizenship		
U.S.-born	17.46 (.65)	p-values < .001 for all comparisons
Naturalized citizen	8.90 (.38)	
Noncitizen	6.46 (.14)	
Years in U.S.		
Less than 10	5.77 (.30)	p-values for all comparisons <.001
10 or more	7.73 (.20)	
U.S.-born	17.46 (.65)	
Educational attainment		
Less than 9 th grade	7.54 (.23)	NS for Some High school vs. HS graduate
Some high school	13.49 (.62)	
High school graduate	15.10 (.66)	Other comparisons: p < .05
More than high school	16.83 (.49)	
Border region		
Border	11.53 (.45)	NS
Non-border	12.47 (.37)	
Generation level		
First	7.39 (.18)	p-values < .01 for all comparisons
Second	16.22 (.58)	
Third	18.43 (.86)	

NOTE: Weighted data. SEM denotes standard error of the mean; higher language score denotes greater use of English; NS denotes not statistically significant; bold font denotes statistically significant results. SOURCE: CDC/NCHS, National Health and Nutrition Examination Surveys, 1999–2004.

Social Support Characteristics of Older MA

Social support characteristics were compared by sex (Table 10). Men and women were similar with respect to having a source of emotional support, having adequate emotional support, and emotional support group size. MA men and women differed, however, with respect to having a source of financial support. A significantly higher percentage of women (77.2%) than men (69.1%) reported having a source of financial support.

Table 10. Social support characteristics of MA adults aged 60 years and older, United States, 1999-2004.

Variable	Males (n = 448) Percent (SE%)	Females (n = 446) Percent (SE%)	Chi-square
Has a source of emotional support? (variable: HELP)			
Yes	88.4 (1.9)	88.1 (1.8)	NS
No	11.6 (1.9)	12.1 (1.8)	
Had enough social support during the past year? (variable: ENOUGH)			
Yes	65.1 (3.5)	66.5 (2.8)	NS
No	34.9 (3.5)	33.5 (2.8)	
Has source of instrumental and financial support? (variable: FINANCE)			
Yes	69.8 (2.4)	78.4 (2.0)	4.99*
No	30.2 (2.4)	21.6 (2.0)	
Social support group size			
Smaller support group	53.2 (2.8)	55.6 (3.2)	NS
Larger support group	46.8 (2.8)	44.4 (3.2)	

NOTE: Weighted data. Chi-square test of independence for differences in proportions by sex; bold font denotes statistically significant results; * denotes $p < .05$.

SOURCE: CDC/NCHS, National Health and Nutrition Examination Surveys, 1999–2004.

Alcohol Use among MA Adults

Lifetime and current alcohol use among MA adults differed by age and sex as shown in Tables 11-13.

Lifetime Alcohol Use among MA Adults

Nearly three-fourths (74.7%) of men aged 40 years and over were current drinkers, compared with 52.1 percent of women (Table 11). Lifetime alcohol abstention rates were much lower among men (3.7%) than women (26.1%) and older women had higher rates of abstention (34.7%) than younger women (22.8%) (Table 11).

The rates of former drinking were similar among men and women. Approximately 22 percent of MA men and women were former drinkers (21.5% and 21.8% of men and women, respectively) (Table 11). The rates of former drinking were higher among older MA men and women compared with their younger counterparts. Approximately one-

third of older men and women (37.3 percent of men and 30.9 percent of women) were former drinkers compared with 16.8 percent and 18.3 percent of 40-59 year old men and women, respectively.

Table 11. Crude rates of lifetime alcohol use among MAs aged 40 years and older by sex and age group, United States, 1999-2004.

Sex and Age	Lifetime Abstainer n Percent (SE %)	Former Drinker n Percent (SE %)	Current Drinker n Percent (SE %)
Males by age			
Total 40+	34 3.7 (.9)	238 21.5 (1.9)	565 74.7 (2.0)
40-59	12 3.2 (1.0)	67 16.8 (1.9)	307 80.0 (2.3)
60+	22 5.3 (1.2)	171 37.3 (2.9)	258 57.4 (3.1)
Females by age			
Total 40+	255 26.1 (2.1)	207 21.8 (2.0)	383 52.1 (3.1)
40-59	94 22.8 (2.5)	68 18.3 (2.4)	232 58.9 (3.4)
60+	161 34.7 (2.7)	139 30.9 (2.2)	151 34.4 (2.7)

NOTE: Weighted data. SE % denotes standard error of the percent.

SOURCE: CDC/NCHS, National Health and Nutrition Examination Surveys, 1999–2004.

Current Alcohol Use among MA Adults

Current alcohol use patterns differed by age and sex (Tables 12 and 13). Crude current drinking rates were 74.7 percent for males (Table 12) and 52.1 percent for females (Table 13). Overall, 25.3 percent of MA males and 47.9 percent of females aged 40 years and over were nondrinkers (Table 12 and 13, respectively). A higher percentage of older MA were nondrinkers (42.6% of males and 65.6 percent of females) compared with younger adults (20% of males and 41.1 percent of females 40-59 years) (Tables 12 and 13).

Light drinking was the most frequent pattern of alcohol use among MA men (42%); moderate and heavy drinking rates among MA men were 23.8 percent and 9 percent, respectively (Table 12). The rate of heavy alcohol use among younger men (10.4%) was more than two times that of older men (4.4%).

Table 12. Crude rates of current alcohol use among MA males aged 40 years and older by age group, United States, 1999-2004.

Age (yrs)	Nondrinker n Percent (SE %)	Light Drinker n Percent (SE %)	Moderate Drinker n Percent (SE %)	Heavy Drinker n Percent (SE %)
Total 40+	272 25.3 (2.0)	336 42.0 (2.1)	168 23.8 (1.7)	61 9.0 (1.1)
40-59	79 20.0 (2.3)	170 43.7 (2.6)	97 26.0 (2.3)	40 10.4 (1.4)
60+	193 42.6 (3.1)	166 36.4 (3.0)	71 16.5 (1.9)	21 4.4 (1.3)

NOTE: Weighted estimates. SE % denotes standard error of the percent.

SOURCE: CDC/NCHS, National Health and Nutrition Examination Surveys, 1999–2004.

More than half of MA women (52.1%) were current drinkers, and of these, 91.9 percent were light drinkers (Table 13). Older women had higher rates of nondrinking (65.6%), and of the older women who used alcohol, more than 90 percent (92.4%) were light drinkers. The rates of moderate and heavy alcohol use among MA women 40-59 years and 60 years and older were very low (2.2% and 2.4%, respectively). The estimates of moderate and heavy alcohol use were statistically unreliable.

Table 13. Crude rates of current alcohol use among MA females aged 40 years and older, United States, 1999-2004.

Age (yrs)	Nondrinker n Percent (SE %)	Light Drinker n Percent (SE %)	Moderate Drinker n Percent (SE %)	Heavy Drinker n Percent (SE %)
Total 40+	462 47.9 (3.1)	347 47.6 (2.8)	18 2.2 (.5)	18 2.4 (.7)
40-59	162 41.1 (3.4)	208 53.6 (3.1)	12 2.5 (.8)*	12 2.8 (.9)*
60+	300 65.6 (2.7)	139 31.8 (2.8)	6 1.2 (.5)*	6 1.4 (.7)*

NOTE: Weighted estimates. * denotes relative standard error > .30; SE % denotes standard error of the percent.

SOURCE: CDC/NCHS, National Health and Nutrition Examination Surveys, 1999–2004.

Hypothesis Testing Results

Gender-stratified logistic regression models results are presented in this section. The results for the analysis that examined the association of acculturation and alcohol abstinence among MA women are presented in Table 14. The second set of analyses explored the association of acculturation and chronic heavy and heavy episodic alcohol

use among MA men 40 years and older (Hypothesis #2). The third set of analyses explored the association of social support and alcohol use among older MAs.

Hypothesis #1: It is hypothesized that among MA women, acculturation level is associated with alcohol abstention.

In this study, acculturation, based on generation level, language use, and nativity and citizenship was positively associated with alcohol use among MA women (Table 14). In the unadjusted analyses, the odds of lifetime alcohol abstention were significantly lower among women with higher language use scores, denoting more English language use, U.S. born women, and third generation MAs. Lifetime abstention was also higher among older MA women and women who lived in poverty. Age, poverty status, and border region were also significantly associated with alcohol abstention in the unadjusted models. Poor women had higher odds of lifetime abstention and residence in the U.S.-Mexico border region was associated with lower odds of lifetime abstention in the unadjusted model. The interactions of age with poverty status, border region, educational attainment level, or marital status (borderline) were not statistically significant. In the adjusted model, age, income status, and education level, border region, generation level (second), and language use were independent predictors of lifetime abstention (Table 14).

Table 14. Crude and adjusted odds ratios predicting lifetime alcohol abstention among MA women aged 40 years and older (n = 845), United States, 1999-2004.

Variable	Unadjusted Odds Ratio (95% CI)	Adjusted ¹ Odds Ratio (95% CI)
Age (continuous)	1.04 (1.02, 1.05)	1.03 (1.01, 1.04)
Poverty status (PIR) Less than 1.00 1.00 and over	1.72 (1.12, 2.65) Reference Group	1.14 (.68, 1.91) Reference Group
Marital status Married/cohabiting Not married	.89 (.65, 1.22) Reference group	.99 (.71, 1.37) Reference Group
Educational attainment Less than 9th grade Some high school High school graduate More than high school	3.71 (2.12, 6.51) 2.41 (1.17, 4.99) 1.52 (.77, 2.99) Reference Group	1.30 (.60, 2.81) 1.76 (.78, 3.98) 1.30 (.65, 2.60) Reference Group
Generation level First Second Third	2.44 (1.46, 4.06) 2.24 (1.35, 3.70) Reference Group	1.06 (.55, 2.05) 1.89 (1.09, 3.31) Reference group
Border status Near border More distant	.60 (.41, .86) Reference Group	.48 (.31, .74) Reference group
Mean language score	.64 (.56, .73)	.60 (.47, .77)
Hosmer-Lemeshow Chi-Square (p value)		6.34 (.61)

¹ Adjusted for all other variables in the model.

NOTE: Bold font denotes statistically significant odds ratios; CI indicates confidence interval; PIR indicates poverty-income ratio; higher language score denotes greater use of the English language. Interactions of age and poverty status, border region, educational attainment level, and marital status (borderline) were not statistically significant.

SOURCE: CDC/NCHS, National Health and Nutrition Examination Surveys, 1999–2004.

Hypothesis #2: It is hypothesized that among MA men, acculturation is associated with alcohol use that exceeds “moderate” intake levels.

Part A. Heavy Alcohol Use among Male Current Drinkers

The association of acculturation and frequent heavy alcohol use among current male drinkers 40 years and older was examined (Table 15). Age, years in the U.S., language use, border status, generation level, and household size were not significantly associated with heavy alcohol use in the unadjusted models, but poverty status and marital status were. The interactions of age with generation level, poverty status, and

education group were not statistically significant. The odds of heavy alcohol use were higher among poor men, and lower among men who were married or cohabiting.

Parsimonious multiple logistic models were tested because the number of heavy alcohol users in the sample was small (n=44). After controlling for age and poverty status, marital status and education group were independent predictors of heavy alcohol use.

Table 15. Crude and adjusted odds ratios of the likelihood of heavy alcohol use among MA male alcohol drinkers aged 40 years and older (n = 565), United States, 1999-2004.

Variable	Unadjusted Odds Ratio (95% CI)	Adjusted ¹ Model Odds Ratio (95% CI)
Age (yrs)	.97 (.94, 1.00)	.96 (.92, 1.00)
Mean language scale score	.95 (.78, 1.17)	
Border status Near border More distant	1.08 (.59, 1.95) Reference group	1.43 (.78, 2.62) Reference group
Poverty status (PIR) Less than 1.00 1.00 and over	1.93 (1.06, 3.50) Reference group	1.81 (.98, 3.32) Reference group
Generation level First Second Third	.74 (.36, 1.50) .90 (.32, 2.53) Reference group	1.41 (.68, 2.91)
Years in U.S. Less than 10 10 or more U.S.-born	1.08 (.34, 3.39) .68 (.38, 1.20) Reference group	
Marital status Married/cohabiting Not married	.43 (.21, .87) Reference group	.45 (.21, .96) Reference group
Household size One Two 3 or more members	1.35 (.43, 4.23) .71 (.32, 1.58) Reference group	
Educational attainment Less than 9 th grade Some high school High school graduate More than high school	.82 (.38, 1.78) 1.22 (.49, 3.05) Reference group .37 (.14, 1.01)	3.17 (1.32, 7.62) 3.55 (1.08, 11.65) 2.88 (1.06, 7.81) Reference group
Hosmer-Lemeshow Chi-square (p-value)		10.75 (.22)

¹Adjusted for all other variables in the model.

NOTE: Bold font denotes statistically significant odds ratios; CI indicates confidence interval; PIR indicates poverty-income ratio; higher language score denotes greater use of the English language. Interactions of age and generation level, poverty status, and education group were not statistically significant.

SOURCE: CDC/NCHS, National Health and Nutrition Examination Surveys, 1999–2004.

Part B. Binge Drinking Among Current Male Drinkers

The NHANES alcohol questionnaire item on binge drinking in the past year was used to examine the rates of heavy episodic drinking among current drinkers. Binge

drinking during the past year was reported by 61% of male drinkers aged 40 years and this pattern of use occurred among light, moderate, and heavy alcohol users (Table 16). More than 40 percent (42.8%) percent of men who reported binge drinking during the past 12 months were classified as moderate alcohol users based on their reported frequency of alcohol use during the past year; 37.9 percent were light users; and 19.3 percent were heavy alcohol users. MA men who did not report binge drinking during the past year were more likely to be light (84.7%) or moderate alcohol users (14.6%) ($p < .001$).

When the number of binge drinking episodes during the past year was examined, the heavier alcohol users reported more binge drinking episodes in the past year than did light drinkers (not shown). Among males 40 years and older, 91.6 percent of heavy drinkers ($n=61$) reported 11 or more binge drinking episodes during the past year compared with 68 percent of moderate drinkers (168) and 17 percent of light drinkers ($n=335$).

The predictors of binge drinking among current male alcohol users were examined and the analysis revealed that men who reported binge drinking during the past year differed from their non-binge drinking counterparts with respect to age (O.R.: .95; 95% C.I.: .94, .97) (Table 16). The odds of binge drinking were lower among older men. The other factors that were examined--educational attainment, poverty status, marital status, generation level, citizenship and nativity, border status, or language use--were not predictive of heavy episodic alcohol use.

Table 16. Predictors of binge drinking among MA male alcohol users aged 40 years and older, United States, 1999-2004.

Variable	Unadjusted Odds Ratio (95% CI)	Model 1: Adjusted ¹ Odds Ratio (95% CI)
Age (yrs)	.95 (.94, .97)	.95 (.93, .97)
Border status		
Near border	1.02 (.64, 1.62)	.95 (.60, 1.51)
More distant	Reference group	Reference group
Marital status		
Married/cohabiting	.94 (.54, 1.65)	
Not married	Reference group	
Educational attainment		
Less than 9 th grade	1.10 (.67, 1.83)	
Some high school	1.48 (.86, 2.55)	
High school graduate	1.19 (.61, 2.34)	
More than high school	Reference group	
Mean language use scores	.88 (.74, 1.04)	.78 (.58, 1.05)
Generation level		
First	.94 (.45, 1.97)	
Second	.67 (.34, 1.34)	
Third	Reference group	
Poverty status		
Below poverty	1.55 (.98, 2.46)	1.40 (.80, 2.45)
Above poverty	Reference group	
Nativity		
U.S.-born		1.88 (.90, 3.94)
Born elsewhere		
Hosmer-Lemeshow Chi-square (p-value)		14.1 (.08)

¹ Adjusted for all other variables in the model.

NOTE: CI indicates confidence interval; higher language score denotes greater use of the English language. Interactions of age and generation level, education group, poverty level, and border region were not statistically significant.

SOURCE: CDC/NCHS, National Health and Nutrition Examination Surveys, 1999–2004.

Hypothesis #3: It is hypothesized that social support is associated with alcohol use among MA men and women aged 60 years and older.

Part A. Lifetime alcohol use and social support among MA women 60 years and older

Multinomial logistic regression was used to examine the association of social support and lifetime alcohol use among older MA women. The reference category for the analysis was current alcohol users (n=149). The predictors of lifetime abstinence (n=159) and former alcohol use (n=138) were compared with those of current users. In the

unadjusted models (not shown), women who were in the lowest educational attainment group, those who were first generation, and poor women had increased odds of lifetime abstention. Women who were married, resided near the U.S. Mexico border, and those who used more English had lower odds of lifetime abstention. Social support index scores (coded high versus low) were not predictive of lifetime abstention versus current alcohol use. Age, lower generation, border region, and language use were significantly associated with alcohol abstention versus current use in the adjusted model (Table 17).

Former versus current alcohol use among older women was examined. Older women, first generation women, and women in the lowest education group had increased odds of being former versus current users whereas women who were married and those who had higher language use scores denoting more English language use had lower odds of being former versus current users. No association of social support was observed in the unadjusted model. Age was the only significant (positive) predictor of former versus current alcohol use in the adjusted model (Table 17).

Table 17. Adjusted¹ multinomial logistic regression models testing the relationship between social support, sociodemographic characteristics, and lifetime alcohol use among MA women 60 years and older.

Variable	Lifetime Abstainers²	Former Drinkers²
Age (yrs)**	1.07 (1.04, 1.11)	1.03 (1.01, 1.06)
Education level < 9 th grade	.64 (.22, 1.85)	1.94 (.91, 4.13)
Poverty status Below poverty	1.05 (.45, 2.43)	1.06 (.45, 2.48)
Level of social support Low	1.25 (.74, 2.12)	1.02 (.60, 1.72)
Marital status Married/cohabiting	.74 (.52, 1.00)	.80 (.53, 1.21)
Generation level First	.38 (.17, .85)	.80 (.42, 1.54)
Border status* Border resident	.47 (.24, .92)	.88 (.48, 1.64)
Mean language use scores**	.40 (.24, .68)	.77 (.55, 1.08)

¹Adjusted for all other variables in the model.

² Reference category is current users.

NOTE: Bold font denotes statistically significant results; * denotes Satterthwaite adjusted $F p < .05$; ** denotes $p < .01$.

SOURCE: CDC/NCHS, National Health and Nutrition Examination Surveys, 1999–2004.

Part B. Current alcohol use and social support among MA men 60 years and older

Multinomial logistic regression was used to examine the association of social support and current alcohol use among older MA men. The reference category for the analysis was heavy users (n=21). The predictors of nondrinking (n=191) and light or moderate alcohol use (n=236) were compared with those of heavy users. Given the small number of heavy users, the multiple regression models were designed to be as parsimonious as possible and some of the multiple category predictors were recoded as binary variables. The four-level educational attainment variable was recoded to compare persons having less than a high school education to those having a high school education or above and nativity was coded as U.S. born versus non-U.S. born.

In the unadjusted models (not shown), older age was significantly associated with higher odds of nondrinking and moderate alcohol use. Poverty status, generation level,

marital status, border status, nativity, and level of social support were not predictive of nondrinking or moderate alcohol use compared with heavy use in the unadjusted analyses. The interaction of poverty with marital status, poverty status and education level, social support and language use, and education and language use were not statistically significant.

The adjusted models consistently showed the association of age and level of current alcohol use (Table 18). When age, poverty status, level of social support, nativity, and language use were examined in a multivariable model, age was a significant predictor of nondrinking and moderate use compared with heavy alcohol use. Also, language use (greater English language use) was significantly associated with lower odds of nondrinking, and being U.S. born was associated with increased odds of nondrinking versus heavy alcohol use. Age was the only significant predictor of light to moderate versus heavy alcohol use among older MA men (Table 18).

Table 18. Adjusted¹ multinomial logistic regression models testing the relationship between social support, sociodemographic characteristics, and levels of current alcohol use among MA men 60 years and older.

Variable	Nondrinkers²	Light and Moderate Users²
Age	1.12 (1.05, 1.20)	1.08 (1.01, 1.15)
Poverty status		
Below poverty	1.17 (.24, 5.61)	.90 (.19, 4.18)
Level of social support		
Low	.64 (.24, 1.68)	.68 (.24, 1.88)
Country of birth		
U.S. born	3.86 (1.27, 11.74)	3.16 (1.00, 10.02)
Mean language use scores	.51 (.28, .91)	.66 (.33, 1.32)

¹Adjusted for all other variables in the model.

²Reference category is heavy users.

NOTE: Bold font denotes statistically significant associations.

SOURCE: CDC/NCHS, National Health and Nutrition Examination Surveys, 1999–2004.

Conclusion

The results from this study showed that considerable heterogeneity exists among MAs 40 years and older with respect to acculturation level, socioeconomic status, immigration characteristics, and patterns of alcohol use. Distinctive patterns of alcohol use were observed among MA men and women and the predictors of alcohol use also differed by gender.

The hypothesized association of acculturation and lifetime abstention was observed among MA women. Lifetime alcohol abstention rates were higher among women who used more Spanish and were first or second generation. A majority of MA women who used alcohol were light users.

Among males, lifetime alcohol abstention rates were very low. Light or moderate alcohol use was reported by more than two-thirds of MA males, and alcohol use continued into late adulthood. Socioeconomic status and marital status were predictive of heavy chronic alcohol use among males, but acculturation level was not. Binge drinking was reported by a significant percentage of MA men and occurred more often among younger men, but was not significantly associated with acculturation level.

The hypothesized association of social support and alcohol use among older MAs was not observed in this study. There was no association of social support and lifetime alcohol use among older women. The rates of heavy alcohol use were lower among older men compared with younger men. No association of social support and current alcohol use was observed among older MA men.

Chapter V: Discussion

This study was conducted to examine the association of acculturation, sociodemographic characteristics, social support, and alcohol use among MA adults. The conceptual framework used in this study was influenced by acculturation theory (Berry, 1980) and research on social integration and social networks (S. Cohen & Lemay, 2007; Green et al., 2001; Berkman et al., 2000; House et al., 1988). Multiple proxy measures of acculturation were used to explore the association of acculturation and alcohol use among MA adults in this study.

In this nationally representative sample, the hypothesized association of acculturation and lifetime abstention was observed among women. Spanish language use, being first or second generation MA, and having lived in the U.S. for fewer years were associated with lifetime alcohol abstention. Among older MA women, language use, lower generation level, and Spanish language use were predictive of abstention versus current alcohol use, and age was positively associated with former versus current alcohol use. The study results suggest that alcohol abuse is not common among MA women. Light alcohol use was the predominant pattern of alcohol use among MA women and low rates of moderate and heavy use were observed. Two-thirds of older MA women were nondrinkers.

The findings from this research are consistent with previous studies with respect to reports of greater alcohol abstention among less acculturated MA women and low rates of alcohol abstention among MA males (Otero-Sabogal, Sabogal, & Perez-Stable, 1995; Black & Markides, 1993; Gilbert & Cervantes, 1987; Holck et al., 1984). Other recent survey results based on the 2004 and 2005 NSDUH (SAMHSA, 2007b), and NHIS

(NCHS, 2007d) have also reported lower alcohol use among Hispanic and MA women than men.

Given the low rates of lifetime alcohol abstinence that have been reported among MA men and earlier reports of heavy alcohol use among MA men, this study examined alcohol use among current male users. The NHANES 1999-2004 data showed that alcohol use was common among MA men and that the rates of current alcohol use among MA men remained high into later adulthood. The phenomenon known as “aging out” of alcohol use wherein alcohol use declines with increasing age (NIAAA, 2008) was not observed in this study. More than half of MA males 60 years and over reported alcohol use during the past year. Current alcohol use among MA males in this study differed by generation level, educational attainment level, and years in the U.S. First-generation MA men had lower rates of nondrinking and higher rates of moderate alcohol use than second- or third-generation men, whereas the rates of light drinking increased with generation level.

No associations of language use or years in the U.S. with heavy alcohol use among MA males were observed in this study. Rather, socioeconomic status and marital status were significantly associated with heavy alcohol use among men. Unmarried men with low incomes were more likely to be heavy alcohol users. Men who were married or cohabiting, and those who had higher incomes, were more likely to be light or moderate alcohol users rather than heavy users.

The association of acculturation and alcohol use is believed to be more ambiguous among MA men compared with women because MA men have higher rates of alcohol use to begin with (Lara et al., 2005). The NHANES 1999-2004 results are consistent with

results reported for MA surveyed in Hispanic HANES in which alcohol use was associated with acculturation among women but not men (Markides et al., 1990), and in more recent regional studies (Alaniz, et al, 1999) and surveys (SAMHSA, 2007b; NCHS, 2007d; Masel et al., 2006). The results from this study are also consistent with the operant theory of acculturation that predicts higher alcohol use among acculturated MA women and smaller changes among MA men whose alcohol behaviors are similar to those of Mexican males (Landrine & Klonoff, 2004).

In this study, binge drinking during the past year was reported by 61 percent of male current alcohol users. Although binge drinking frequency was higher among men who reported frequent alcohol use, binge drinking also occurred among light and moderate alcohol users. Binge drinking among MAs has been reported previously (Galvan & Caetano, 2003; Caetano, 1988; Caetano & Clark, 1998), and this study confirms that binge drinking is still a problem of public health importance for MA men. In this study, the predictors of binge drinking differed from those of frequent heavy alcohol use. Unlike heavy chronic use, binge drinking was associated with age, but not with acculturation level or socioeconomic status, thus illustrating the complex nature of alcohol use and the importance of examining both heavy chronic and heavy episodic alcohol use behavior.

This investigator and others have considered other dimensions of the acculturation process that may be associated with heavy alcohol use among MA men. Several researchers have reported that social and structural factors are associated with harmful drinking behavior among U.S. adults, including Hispanics (Ahern, Galea, Hubbard, Midanik, & Syme, 2008; Zemore, 2005). Social structure has been shown to be related to

minority group status and healthful aging (Angel & Angel, 2006). Perhaps redirecting attention from individual-centered acculturation models to structural frameworks of acculturation that consider social and economic inequalities would provide a more useful framework to study health inequalities that exist among minority populations (Viruell-Fuentes, 2007). The social environment (e.g., neighborhood sociodemographic characteristics, legal status, and discrimination), the physical environment (e.g. overcrowding, housing quality, and neighborhood characteristics), and the cultural environment (e.g. normative behaviors of the groups on interacts with including family, friends, and neighbors) have not been adequately explored (Carter-Pokras et al., 2008; Angel & Angel, 2006; Finch and Vega, 2003). Angel and Angel (2006) have proposed combining traditional epidemiological methods and ethnographic techniques to improve our understanding of health status among population subgroups, including Hispanics.

Using binge drinking as an example, societal forces such as alcohol availability and advertising (Alaniz, 1998), alcohol policies Gruenewald, Remer, & Lipton, 1993), and neighborhood and social group norms (Ahern et al., 2008) have been shown to be associated with binge drinking among men and women. The contextual factors that were explored in this study—geographic region, citizenship status, years of U.S. residence, emotional social support, and household size—demonstrated that the U.S. MA population is heterogeneous rather than monolithic.

The association of social support and alcohol use among older MAs was explored in this study. A majority of older MAs in this study had high emotional support index scores and more than 80 percent of older adults lived in households that were composed of two or more persons. The rates of moderate and heavy alcohol use among older MAs

were low to begin with. No associations of social support and lifetime alcohol use were reported among older MA women, nor was social support associated with current alcohol use among older MA men.

Of note is that marital status, a component of some social support instruments including the ENRICH Social Support Instrument (ESSI), (Vaglio, J., Conard, M., Poston, W.S., O’Keefe, J., et al., 2004), was negatively associated with heavy alcohol use among MA men 40 years of age and older in this study. Being married or living with a partner appeared to have a protective influence on heavy alcohol use among MA men. Heavy alcohol use was more prevalent among men who were not married or living with a partner. Other studies have also reported associations with marital status and alcohol use. Treno et al. (1999) reported that being divorced or single was associated with heavier alcohol use among U.S. Hispanics, including MAs.

The findings from this study underscore the importance of using multidimensional conceptual frameworks to explore health disparities among minority populations. The U.S. MA adult population is heterogeneous with respect to acculturation level, geographic distribution, socioeconomic status, and alcohol use. The NHANES data provide serial “snapshots” of health characteristics in the U.S. population. Qualitative research that is conducted with MA men who use alcohol heavily would provide insight into the risk factors for heavy alcohol use among MA men.

Strengths and Limitations of the Study

A major strength of the current study is that the findings provide nationally representative estimates on MAs living in the U.S. Excellent interview and examination response rates were achieved for all of the sampled age and race/ethnicity groups. Health interview and examination data were collected using standardized interview and

examination methods. The NHANES interviews were conducted by well-trained professional interviewers, many of whom were bilingual and Hispanic. The performance of field interviewers was monitored continuously by NCHS and contractor staff through the use of direct observation and reviews of audio-taped interviews in English and Spanish.

The other strengths of this study include the use of a multidimensional conceptual framework to examine alcohol use among MA adults, the use of gender-stratified models to explore the unique patterns of alcohol use among men and women, and the use of multiple proxy measures of acculturation. The use of a comprehensive conceptual framework elucidated relationships that have not been adequately explored in earlier research. For example, the use of nativity alone would not have provided as complete a picture of current alcohol use because in this study, other variables such as generation level, border region, and citizenship status were significant acculturation-related predictors of alcohol use in this study.

The multi-item language scale which was used in this study had excellent psychometric properties. Researchers often rely on language use in a single context such as language used at home or in social settings with friends to characterize language acculturation level. The use of multiple language use items in this provided a more complete picture of this complex behavior and it enabled the investigator to examine the variability in language use among MAs.

This study used a new method to examine regional and macrosocial influences on alcohol use based on geographic region, citizenship, years of U.S. residence, and level of social support. The conceptual framework used for this study made it possible to compare

more recent NHANES results to reports that were based on earlier studies and to explore the association of broader macrosocial factors and alcohol use.

This study has certain limitations. The NHANES data are cross-sectional and causality cannot be established. The NHANES samples were composed of MA adults who resided in households. Other groups of MAs, such as institutionalized persons, migrant workers, and homeless persons, are not represented in NHANES. Additionally, the study findings reflect alcohol use among U.S. MAs, and the results cannot be extrapolated to regional populations of MAs or to other U.S. Hispanic subgroups.

Analytic limitations were encountered during the analysis. Despite the fact that the 6-year analytic sample was robust, very few MA women and older adults reported moderate or heavy alcohol use and several estimates of moderate and heavy alcohol use were statistically unreliable. The design effects for the variables which were used in the analysis varied and this characteristic, together with small sample sizes may have reduced the statistical power of the study. The NHANES public release files do not include household or family identification variables. Therefore, it was not possible to adjust for alcohol use within family units. The study findings were based on self-reported information and several potential sources of error should be considered.

Instrument error, interviewer error, and respondent error may have occurred during data collection. Underreporting of alcohol use may have occurred because of social desirability bias, interviewer error, interviewer effects, or recall bias. Finally, the analytic sample for this study included older adults and memory loss, recall bias, and cognitive issues may have disproportionately affected the estimates of alcohol use for this group.

Implications for Research and Practice

This comprehensive assessment of the behavioral, social, and cultural determinants of alcohol use may be used to develop a new framework to address alcohol risk factors among MA adults. *Healthy People 2020* will focus on the determinants of health and diseases that affect communities with a special emphasis on the social determinants of health (U.S. Department of Health and Human Services [DHHS], 2008). Public engagement initiatives are already underway to develop this framework and to identify priorities. Healthy lifestyles, injury prevention, and consumer education are among the roles identified by the CDC to promote health for older Americans (CDC, 2007b). Meeting the public health needs of an increasingly diverse population poses unique challenges for health care providers and researchers. This research has implications for public health practice and future acculturation research.

With respect to public health practice, this study identified low SES men as a priority subgroup to target for alcohol awareness and intervention efforts. Alcohol awareness and intervention efforts targeting low SES men should consider the lower literacy skills of this group, likely reduced access to health care services, and the social, structural and environmental characteristics of the communities where the target population resides.

Alcohol awareness and education efforts for MA women, particularly women who have been in the U.S. for several years, should reinforce the importance of using alcohol in moderation and the adverse health consequences that are associated with alcohol misuse among women. Additionally, MA women and their families may require assistance locating family counseling and alcohol intervention program resources in their communities. Bilingual, culturally competent health care providers who understand MA

cultural norms and family values should consult with community leaders and consumers to identify specific program needs.

An important implication for future research is that multidimensional conceptual frameworks that consider individual and broader social and contextual influences provide a more complete picture of alcohol use among MA adults. In this study, the hypothesized association of proxy acculturation measures and lifetime alcohol use was observed among MA women, but the study findings suggest that new theory-based models and measures are needed to elucidate alcohol use behaviors among MA men. Social and economic factors were associated with heavy alcohol use among MA men and may reflect social inequalities and structural factors which were not assessed in NHANES 1999-2004. The elimination of health inequalities requires that we have a better understanding of the social and economic determinants of health. A broader view of acculturation that considers structural and economic factors in addition to cultural factors may provide a more complete picture of the health care needs of MAs. The findings from this study provide the basis for several new lines of research.

Recommendation #1: Include questions in future NHANES that may be used to measure social stress including perceived racism and discrimination.

Comment: This study used the available NHANES information on personal and macrosocial characteristics to explore the association of acculturation and alcohol use among MA adults. It was not possible to explore characteristics of the social and cultural environment including perceived racism and discrimination that may be part of the acculturation experience among MAs. Health inequalities have been shown to contribute to differential care within the U.S. health care system, differential access to care, and differences in exposures and life opportunities that ultimately affect health status and

health behaviors (Jones, 2001). This shortcoming hinders research that has attempted to understand broader social issues that may be related to health inequalities and health behaviors of MAs and other minority populations. One could hypothesize that as the MA population becomes more geographically diverse, and as political sentiment within the U.S. increases to restrict immigration, MA men might experience greater stress related to discrimination, family separation, limited employment prospects, and frequent geographic relocation than do MA women. Added stress, in turn, may contribute to greater alcohol misuse than in population groups that do not experience social and acculturative stress.

A pathway which includes discrimination has been proposed by other to examine the health of Mexican immigrants and their descendents (Viruell-Fuentes, 2007). In-depth interviews conducted with first and second-generation Mexican immigrant women living in Michigan revealed that second generation women reported more “othering” messages that reflected ethnic stereotyping, and discrimination experiences than first generation women (Viruell-Fuentes, 2007). The adoption of new questions in NHANES on perceived racism and discrimination would permit researchers to examine the race-ethnicity component of health inequalities as was proposed by the Measures of Racism and Social Position Working Group (BRFSS, 2002).

The Working Group proposed the addition of a 6-item module on “Reactions to Race” to NHANES 2009-2010. The module, which was successfully piloted in the 2002 BRFSS (CDC, 2002), was designed to assess *socially-assigned race-ethnicity* (how other people classify the respondent), as distinct from *self-reported race-ethnicity*; *race consciousness* (i.e. how often someone thinks about their race), which reflects racial

climate at a given time and place; *perceived differential treatment at work*; *perceived differential treatment when seeking health care*; and *experiences of physical symptoms of emotional upset* resulting from perceived differential treatment by race-ethnicity.

The Reactions to Racism module has been translated into Spanish. In addition to the 2002 BRFSS, the module was included in two large postal surveys, the 1995 Nurses' Health Study II with 93,681 respondents, and the 1997 Black Women's Health Study with 53,269 respondents (Jones, 2003). Cognitive interviews with English- and Spanish-speaking respondents were completed by NCHS in 2008 and the findings are currently under review.

Recommendation #2: Improve the linkages between NHANES and other data sources.

Comment: No information on regional and neighborhood characteristics is asked of survey participants nor is Census tract information on the survey locations included in the NHANES public release files. Data disclosure concerns preclude the public release of geographic information. One option for analysts who wish to combine information collected by the U.S. Census and other state and federal agencies is to submit a research proposal to the NCHS RDC (NCHS, 2008, a secure facility, that provides access to NCHS vital and health statistics information that is not released publicly. The RDC mechanism can also be used to obtain access to combined datasets containing NCHS survey data, U.S. Census data, state and federal government data on alcohol sales and alcohol outlet density, and potentially other data sources.

Recommendation #3: Conduct a comprehensive review and evaluation of the NHANES acculturation questionnaire items.

Comment: Language use questions were an important part of the acculturation component of this study. Unfortunately, potentially useful information on languages of

interview for the household interview was not available for this analysis because household interview language was not included in the NHANES 1999-2002 data releases. Additionally, the 5-item language use subscale that was used in this study was dropped from NHANES in 2005. The 5-item subscale was replaced with a single question about language use at home. Language use at home does not provide complete information on language knowledge and use. This study reported that language use among MA adults varies considerably, depending on the setting and context of language use. Respondents may use one or two languages at home, one language at work, and another language in social settings.

The NHANES 1999-2004 language items included a question on language(s) that were “read *and* spoken.” This is a double-barreled question (i.e. a question that combines two or more issues or concepts in a single question) (DeVellis, 2003), thus posing a source of response bias. For example, it is possible for someone to speak one or more languages but be unable to *read* any languages or to read in one language. Future NHANES language use questions should ascertain language use in a single context.

Another concern is that the NHANES acculturation questions have not been reviewed for many years. Given the expanded scope of the NHANES sample design, which now over samples *all* Hispanics, a thorough review and evaluation of the NHANES acculturation questionnaire is needed. An expert group could be convened as was done during the planning phase of Hispanic HANES, to conduct a systematic review of the acculturation questionnaire section. The expert review should encompass questions that pertain to language use, acculturation stress, and structural factors that have been shown to be associated with immigration experiences of Hispanic population subgroups.

Given the diversity that exists within the U.S. Hispanic population, Hispanic ethnicity-specific items might also be considered for future NHANES acculturation questionnaires.

Recommendation #4: Alternative alcohol use questionnaires should be explored for use in NHANES.

Comment: Qualitative research may be needed to develop questionnaires that are appropriate for assessing alcohol use among minority populations. Alcohol use over the lifespan is described in the NIAAA Fiscal Year 2008 Strategic Plan (NIAAA, 2008). An examination of alcohol use over the lifespan requires additional information. The current NHANES alcohol questionnaire for adults 20 years of age and older ascertains lifetime abstinence, former, and current alcohol use and frequency of alcohol use during the past year. No information is ascertained about patterns of alcohol use, changes in alcohol use over the lifespan, attitudes about personal alcohol intake, or the types of alcohol that are consumed. In contrast, the NHANES adult questionnaire sections on tobacco use and sexual behavior, and the alcohol questionnaire for youth 14-19 years of age ascertain lifetime history information. A consistent approach should be used for the NHANES personal health questionnaires to improve their utility with respect to collecting and reporting health behaviors over the lifespan.

Recommendation #5: Improve the NHANES social support questionnaire items.

Comment: Social support is a multidimensional construct. The use of a battery of questions that focuses rather narrowly on the emotional support component was a limitation in this study. The low internal consistency reliability of the social support indices in this study likely reflected the limited scope and small number of items that were available. Although social support was not significantly related to alcohol use, the lack of internal consistency reliability of the derived social support indices calls into

question the validity of the findings. Larger item pools are needed to capture the universe of items that are related to this construct. New qualitative research may be needed to examine family structure and community factors that influence social support structure among MAs.

The social support questionnaire items that were used in this study will be discontinued after 2008 to permit other questionnaire content to be included in NHANES 2009 and beyond. This leaves a void for researchers who are interested in the association of social support and health. A comprehensive social support questionnaire module that has acceptable psychometric properties should be considered for future NHANES.

Recommendation #6: The adult alcohol use information should be collected using an A-CASI (audio computer-assisted self-interview) mode of interview, as is done currently for youth aged 14-19 years.

Comment: The NHANES adult alcohol questionnaire was administered in-person by professional interviewers. Although the information was collected in a private room, the potential for social desirability bias and interviewer effects cannot be ruled out.

Conclusion

The results from this study illustrate the complexity of alcohol use behavior among MA adults. The strong association of acculturation and alcohol use among MA women suggests that traditional alcohol norms are altered during the acculturation process. Alcohol use among MA men is common and in this study, heavy use was associated with social and economic factors rather than acculturation. The study may be used to inform health education and alcohol intervention programs for MA adults. The investigator recommends new research to explore other social and contextual factors that may be associated with heavy chronic and episodic alcohol use among MA men and

improved survey methods for national health surveys that are conducted to assess health and nutritional status of the U.S. population and major race/ethnic groups.

Appendix A: Acculturation Scales That Have Been Used to Study U.S. Hispanics

Scale Name and Researchers	Scale Type	Scale Description and Sample Characteristics	Psychometric Properties
Behavioral Acculturation Scale (BAS): Szapocznik, Scopetta, Kurtines, & Aranalde, 1978	Unidimensional	24 items; 5-point Likert scale. Cuban American high school student sample (n = 69). Cuban/Spanish culture studied. Language use and preference, culturally linked habits, idealized lifestyle.	Alpha = .97; 4-week test-retest r = .96. Correlation with years of U.S. residence: r = .49 males and r = .59 females.
Acculturation Rating Scale for Mexican Americans (ARMSA): Cuellar, Harris, & Jasso, 1980	Unidimensional	20 items derived from a 126-item cultural assessment questionnaire. Subjects: 222 MA subjects (92 males and 129 females); subjects included 88 hospitalized psychiatric patients and 134 students or hospital staff. Measures extent of acculturation to white American culture; 4 factors: language familiarity, use, and preference; ethnic identification and generation; language of reading and writing and cultural heritage and exposure; and ethnic interaction social affiliation.	Positively related to BAS and BMEI. Among patients Alpha = .81 and non-patient Alpha = .88. Construct validity assessed.
Bicultural Involvement Questionnaire (BIQ): Szapocznik, Kurtines, & Fernandez, 1980	Multidimensional	33 items; bipolar and bicultural components assessed Based on the BAS. Enculturation to Hispanic culture and acculturation to American culture measured separately with 24 items. "Americanism" and "Hispanicism" scores derived. Difference scores used to measure bi- versus monocultural involvement. Cultural preference measured with 9 bipolar items.	Alpha = .93 for Hispanicism; .89 for Americanism; 6-week test-retest r = .79.
Biculturalism/Multiculturalism Experience Inventory (BMEI): M. Ramirez, 1983	Multidimensional	Mexican American and/or Latino culture (69 items total) Sample: 1,046 university students with Spanish surnames. Components: 1) demographic and linguistic characteristics, 2) socialization and education history, and 3) cultural participation. Subjects grouped into Anglo, bicultural, or traditional (Hispanic) orientation groups.	Split-half reliability for parts 2 and 3 were .79 and .68, respectively.

Scale Name and Researchers	Scale Type	Scale Description and Sample Characteristics	Psychometric Properties
Short Acculturation Scale for Hispanics (SASH): Marin, Sabogal, VanOss Marin, Otero-Sabogal, & Perez-Stable, 1987	Unidimensional	Bipolar scale (12 items) Evaluates behaviors related to Hispanic or American culture; 5-item language use subscale widely used as stand-alone acculturation measure.	Alpha = .92. Correlated w/ age at arrival in U.S. $r = .69$; generational status $r = .65$; and length of U.S. residence $r = .70$.
General Acculturation Index (GAI): Balcazar, Castro, & Krull, 1995	Unidimensional	Bipolar scale Uses language spoken and read; where subjects spent their early life; ethnicity of subjects' friends; subject's pride in being Hispanic/Latino; 5-point Likert scale. Score ≥ 3.0 indicative of more Americanized.	Alpha = .83.
Los Angeles Epidemiologic Catchment Area Acculturation (LAECA) Scale: Burnam, Hough, Karno, Escobar, & Telles, 1987	Unidimensional	26 items Subjects: 1,245 Mexican American adults. Built on work of Cuellar et al. (1980) and Szapocnik et al. (1978). Components: 1) language use, skills, and contact with Mexico; 2) social activities; and 3) ethnic background. Examined relationship of age and sex to acculturation and controlled for education and employment status.	Alpha = .97 Factor analysis used to if scale scores reflected independent dimensions of acculturation. Unidimensional scaling of 26 items reported (Burnham et al. unpublished in Burnham et al., 1987)
Cultural Life Styles Inventory (CLSI): Mendoza, 1989.	Unidimensional	29 items 97 first generation MA and 82 Anglo-Americans 17-55 years of age. Assesses 4 factors: language use (intra- and extra-family), social affiliation and activities, cultural familiarity and activities, and cultural identification and pride. 5-point Likert scale ratings used.	Alphas ranged from .84 (cultural familiarity) to .91 (extrafamilial language factor). Test-retest (2-week) with subsample of 88 MAs was .88 for English instrument and .95 for Spanish version.

Scale Name and Researchers	Scale Type	Scale Description and Sample Characteristics	Psychometric Properties
Acculturation Rating Scale for Mexican Americans-Revised (ARMSA-II): Cuellar, Arnold, & Gonzalez, 1995	Multidimensional	2-part questionnaire. Part 1 (30 item) assess involvement in Mexican and Anglo cultures. Part 2 (18 items) assess acceptance of attitudes and behaviors in the Mexican, MA, and Anglo cultures. Modeled on Berry's (1980) acculturation strategies: assimilation, integration, separation, and marginalization (Berry, 1980). Attitudes toward Hispanic and American culture assessed. Mexican Orientation Subscale (MOS) and Anglo Orientation Subscale (AOS).	Difference scores correlated with original ARMSA (Cuellar et al., 1980) ($r = .89$). ARMSA-II correlated with socioeconomic status.
Bidimensional Acculturation Scale (BiAS) for Hispanics: Marin & Gamba, 1996	Multidimensional	24 items 3 language-related areas: language use (6 items); proficiency (12 items); preferences w/ electronic media (6 items). Provides scores for 2 cultural dimensions: Hispanic and non-Hispanic.	
Brief Acculturation Scale (BrAS): Norris, Ford & Bova, 1996	Unidimensional	10 items Derived from Short Acculturation Scale for Hispanics (SASH) (Marin et al., 1987). Four items on language use; 1 item on generation status; 5 items on perceived closeness to racial/ethnic groups in cultural contexts.	For Mexican Americans, BrAS correlated with generation status ($r = .74$) and length of time in the United States ($r = .59$)

Appendix B: Acculturation Information Collected in Hispanic HANES,
1982-1984, and NHANES 1999-2004

Acculturation Component	Hispanic HANES, 1982-1984	NHANES 1999-2004
Language Use	1: What language do you speak? 2: What language do you prefer? 3: What language do you read better? 4: What language do you write better? <u>Response Choices for 1 and 2:</u> 1) Spanish only 2) Mostly Spanish, some English 3) Spanish and English about equally 4) Mostly English, some Spanish 5) English only <u>Response Choices for 3 and 4:</u> 1) Reads (writes) Spanish only 2) Reads (writes) Spanish better than English 3) Reads (writes) Spanish and English equally well 4) Reads (writes) English better than Spanish 5) Reads (writes) English only	1. What language(s) do you read and speak? 2: What was the language(s) used as a child? 3: What language(s) do you usually speak at home? 4: In which language(s) do you usually think? 5: What language(s) do you usually speak with your friends? <u>Response Choices:</u> 1) Only Spanish 2) More Spanish than English 3) Both (Spanish and English) equally 4) More English than Spanish 5) Only English
Ethnic Identification	What ethnic identification do you use? What ethnic identification does/did your mother use? What ethnic identification does/did your father use?	1: Do you consider yourself Hispanic/Latino? 2: Which of the groups (hand card) best represents your Hispanic/Latino ancestry. Please select one or more of these categories. (hand card list shown/read)
Nativity	Where were you (respondent) born? Where was your mother born? Where was your father born?	Where were you (respondent) born? Where was your mother born? Where was your father born?

Appendix C: Studies That Examined Acculturation and Alcohol Use among Mexican American Adults

Author (year)	Sample	Results
Holck, Warren, Smith, & RoCHAT (1984)	Anglo (n = 1,233) and Mexican American (MA) females (n = 798)	<p>MA had higher proportion of abstainers in most social and demographic categories (examined age, marital status, education, and employment status).</p> <p>Alcohol consumption levels increased markedly with the years of education completed. Ethnic differences accounted for by the generally lower level of education among MA.</p> <p>Ethnic subgroups of MA reported different levels of alcohol consumption not explained by education attainment. Other ethnic factors may contribute to drinking patterns.</p>
Gilbert & Cervantes (1987)	Review article	<p>Low SES (income and education) associated with higher abstention rates among Hispanic women. Lower alcohol consumption associated with marriage and being a housewife. MA women who drank did so fewer times per year compared to Anglos. Protective mechanism by which traditional Hispanic values protect against alcoholism in some Hispanic groups remains unknown.</p> <p>Role attributes of Hispanic culture and acculturation may explain some of the differences. By the third generation, drinking patterns of MA women resembled those of other U.S. women.</p>
Neff, Hoppe, & Perea (1987)	Random sample of regular drinkers: 164 Anglo and 149 MA males aged 20-50 years	<p>Developed multi-item acculturation instrument. MA less frequent, but higher quantity drinkers. No ethnic differences for alcohol-related problems. Less acculturated MA consumed higher alcohol quantities than highly acculturated MA. "Escape" drinking motives more common among MA, especially less acculturated. Heaviest drinking patterns and highest prevalence of both alcohol-related problems and escape drinking motives among the least acculturated second generation males. Results do not suggest "simple acculturation" or an "acculturation stress" model. Support for cultural marginality/stress model with increased problem drinking among younger, less acculturated MA.</p>
Markides, Krause, & Mendes de Leon (1988)	3 generations of MA (San Antonio, TX)	<p>Examined the role of acculturation on alcohol consumption. Acculturation was not related to alcohol consumption in the older generation.</p>
Markides, Ray, Stroup-Benham, & Trevino (1990)	Hispanic HANES MA	<p>The role of acculturation with alcohol consumption examined. Acculturation was not found to be related to alcohol consumption of MA men; acculturation positively related to the consumption of younger MA women. Among employed middle-aged women, employed women were heavier drinkers.</p>

Author (year)	Sample	Results
Black (1993)	Hispanic HANES MA	Examined relationship between aging and drinking. Age differences in patterns of consumption among Hispanic subgroups. MA males showed increasing percentages of former drinkers; low percentages of abstainers at all ages. Age differences among Hispanic females reflected cohort effects. Large proportions of lifelong abstainers across all age cohorts.
Marin & Posner (1995)	391 MA and 531 Central Americans aged 21-65 years living in California	MA had lower proportion of abstainers (56.8%) than Central Americans (64.4%). MA reported drinking more often and in greater quantities than Central Americans. Acculturation level affected proportion of abstainers; gender associated with frequency, total number of drinks, and volume of drinking for MA and Central Americans.
Otero-Sabogal, Sabogal, & Perez-Stable (1995)	Latino and non-Latino whites (CA) aged 35-74 years	Latino ethnicity was a significant predictor of alcohol consumption after adjusting for sex, education, age, employment, health insurance, marital status, county of residence, and self-perceived health status; heavy drinking among Latino men was associated with level of acculturation. Latino men were significantly more likely to be binge drinkers. Latinas were significantly more likely to have abstained from drinking alcohol.
Lee, Markides, & Ray (1997)	Hispanic HANES males and females	The prevalence of past heavy drinking among MA and Puerto Rican males ranged from 28%-35%; rates for Hispanic women were much lower (1%-8%). Prevalence of past heavy drinking among MA males was approximately three times higher than rates for non-Hispanic males.
Caetano & Clark (1998)	2 survey datasets: 1985 and 1995	National trends in alcohol consumption among whites, blacks, and Hispanics between surveys. Per capita consumption declined in U.S.; rate of abstention increased in Hispanics. Frequent heavy drinking remained stable among Hispanic men (17% and 18%) and Hispanic women (2% and 3%).
Johnson, Gruenewald, Treno, & Tran (1998)	General population sample (n = 13,553) aged 12 to 80 years Telephone interviews 20 urban areas of the U.S.	Examined drinking patterns over the life course by gender and race/ethnicity. Men consumed more total alcohol, were more likely to participate in drinking, drank more often, and drank more per occasion than women. Average number of drinks per occasion among older Hispanic men exceeded those of whites.
Cantero, Richardson, Baezconde-Garbanati, & Marks (1999)	573 Latinas aged 46-92 years (CA); housing project residents Personal interview	Examined role of acculturation (language use and years of U.S. residence) and health practices, including alcohol consumption. Interaction between age and acculturation; acculturation role stronger among Latinas aged < 65 years and has more harmful effects on alcohol behavior; level of acculturation did not affect practices of women aged 75+ years.
Alaniz, Treno, & Saltz (1999)	932 MA males and females; 3 CA cities Telephone survey	Acculturation (measured by language usage) was related to drinking behavior among women but not men. Low acculturation associated with high abstention among women and low rates among men; as acculturation increased, female drinking status converged with that of men. Higher acculturation among women was associated with heavier drinking patterns.

Author (year)	Sample	Results
Treno, Alaniz, & Gruenewald (1999)	<p>Hispanic subsample (MA included) of a community trial (5 year) population</p> <p>Telephone survey</p> <p>Adults aged 18+ years; 6 communities; mostly CA residents</p>	<p>MA at greatest risk of alcohol-related problems and they continue high rate of alcohol consumption into middle age. Higher drinking levels among divorced and separated rather than single.</p>
Neilsen (2000)	<p>1993 National Household Survey on Drug Abuse</p> <p>Adults aged 18+ years included 2,467 MA; other Hispanic groups included</p>	<p>Reported significant differences in drinking patterns across Hispanic groups. MA men reported the most frequent and heavy drinking and highest prevalence of drunkenness and alcohol-related problems. Speculated about the role of acculturation but did not assess acculturation level.</p> <p>Fewer ethnic differences among women compared to men. Puerto Ricans and MA drank more often and heavily and experienced more problems than the other groups. Reasons for ethnic differences in alcohol use are unclear.</p>
Masel, Rudkin, & Peek (2006)	<p>Community-dwelling MA aged 65+ years living in the southwestern U.S. enrolled in the Hispanic Established Populations for the Epidemiological Studies of the Elderly (H-EPESE), Waves I and II; baseline 1992-1995 (n = 3,050) and 2-year follow-up (n = 2,438).</p>	<p>English-proficient MA were more likely to be current or former drinkers than abstainers. Adults with more contact with Anglo-Americans were also more likely to be current or former drinkers than abstainers. No evidence that smoking and alcohol behaviors changed much over time.</p> <p>Females were more likely to be abstainers than males (75.2% vs. 26.8%); males were more likely to be former drinkers (44% vs. 18.6%) and current drinkers (29.2% vs. 6.2%).</p>

Appendix D: University of Maryland Institutional Review Board Approval



UNIVERSITY OF
MARYLAND

INSTITUTIONAL REVIEW BOARD

2100 Blair Lee Building
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Notice: IRB Review Is Not Required Because Research Does Not Involve Human Subjects

Date: September 19, 2007

To: Nancy Atkinson, Ph.D.
Dr. Robert S. Gold
Margaret McDowell
Department of Public and Community Health

From: Roslyn Edson, M.S. *Par*
IRB Manager
University of Maryland, College Park

Re: IRB Application #07-0460
Title of Research Project: *The Association of Acculturation and Social Support and Alcohol Use Among Mexican American Adults*

Type of Application: Initial

The above-cited Institutional Review Board (IRB) initial application does not include any activities that meet the Federal definition of research involving human subjects. Specifically, the collection and analysis of data that do not contain individually identifiable information is not research involving human subjects. Individually identifiable data are data for which the identity of the subject is or may readily be ascertained by the investigator or associated with the information. Since the data do not contain individually identifiable information, your IRB application does not need to be reviewed by the IRB under the requirements of the U. S. Department of Health and Human Services (HHS) regulations in 45 CFR Part 46 and the University's Federal Wide Assurance. Therefore, the application was not reviewed under exempt, expedited or full Board review procedures.

If you plan to modify your research to include any of the following activities, you are required to submit an IRB application and obtain IRB approval: obtaining data through intervention or interaction with human subjects; obtaining identifiable private information about living individuals; or analyzing identifiable private information about living individuals. Please contact the IRB Office at 301-405-0678 if you have any IRB-related questions or concerns. Please include the above-cited IRB application number in any future communications with our office regarding this research project.

Appendix E: Independent Variables Used in the Analysis

File Name and Questionnaire Section (NHANES 1999-2004 Variable Prefix)	Variable Description
Demographic File (Public Release) (DEMO)	<ol style="list-style-type: none"> 1) Age (yr) 2) Sex 3) Country of birth (respondent) 4) Survey examination component sample weights 5) Marital status 6) Family income: poverty-income ratio (PIR) 7) Race/ethnicity 8) Household size
NCHS Research Data Center File	<ol style="list-style-type: none"> 1) Region: U.S.-Mexico border state? (yes/no) 2) U.S. citizen? (yes/no) 3) Years of U.S. residence 4) Educational attainment (expanded version)
Sample Person File (Public Release) Acculturation (ACQ) section	<ol style="list-style-type: none"> 1) <u>Language Use (5 SASH items)</u>: language read and spoken, used at home, used with friends, used to think, and used as a child 2) Mother's and father's country of birth
Sample Person File (Public Release) Social Support (SSQ) section (adults aged 60+ years)	<ol style="list-style-type: none"> 1) Source of emotional support 2) Adequacy of emotional support in past 3) Amount of additional emotional support needed during the past year 4) Number of close friends 5) Has a source of financial support?

Appendix F: NHANES 1999-2004 Social Support Questionnaire Items for
Adults Aged 60 Years and Older

Variable	NHANES Social Support Questions (SSQ)	Recoded Variable
SSQ011	<p>Can you count on anyone to provide you with emotional support such as talking over problems or helping you make a difficult decision?</p> <p>Response choices: 1 =Yes, 2 =No, 3 =Doesn't need help, 7 =Refused, 9 =Don't know</p>	Variable "HELP" (has source of emotional support) coded 1 if SSQ011 =1; otherwise coded 0.
SSQ021	<p>In the last 12 months, who was most helpful in providing you with emotional support? (Code all that apply)</p> <p>SPOUSE..... 10 DAUGHTER..... 11 SON..... 12 SISTER/BROTHER..... 13 PARENT..... 14 OTHER RELATIVE..... 15 NEIGHBORS..... 16 CO-WORKERS..... 17 CHURCH MEMBERS..... 18 CLUB MEMBERS..... 19 PROFESSIONALS..... 20 FRIENDS..... 21 OTHER..... 22 NO ONE..... 23 REFUSED..... 77 DON'T KNOW..... 99</p>	Emotional support group variable "TEAM" created.
SSQ031	<p>In the last 12 months could you have used more emotional support than you received?</p> <p>Response choices: 1 =Yes, 2 =No, 7 =Refused, 9 =Don't know</p>	Variable "ENOUGH" (adequacy of emotional support) coded 1 if SSQ031 =2 (i.e., had enough support); otherwise coded 0.
SSQ041	<p>Would you say you could have used..</p> <p>Response choices: 1 =A lot more, 2 =Some more, or 3 =A little more emotional support; 7 =Refused, 9 =Don't know</p>	Not used
SSQ051	<p>If you need some extra help financially, could you count on anyone to help you; for example by paying any bills, housing costs, hospital visits, or providing you with food or clothes?</p> <p>Response choices: 1 =Yes, 2 =No, 3 =Offered help but wouldn't accept it, 7 =Refused, 9 =Don't know</p>	Variable "FINANCE" (source of financial and instrumental support) coded 1 if SSQ051 =1; otherwise coded 0.
SSQ061	<p>In general, how many close friends do you have? By "close friends" I mean relatives or non-relatives that you feel at ease with, can talk to about private matters, and can call on for help.</p> <p>Response choices : Number of friends 0-50, Refused, or Don't know</p>	Not used

Appendix G: NHANES 1999-2004 Alcohol Questionnaire Items from the
Private Health Interview Component (ALQMEC)

Alcohol Questionnaire Item	Variable Description
Lifetime alcohol use (Used for Hypothesis #1)	<p>ALQ100: In any one year, have you had at least 12 drinks of any type of alcoholic beverage? By a drink, I mean a 12 oz. beer, a 4 oz. glass of wine, or an ounce of liquor.</p> <p>If ‘no’ response to ALQ100 ask ALQ110, otherwise continue to ALQ.120:</p> <p>ALQ110: In your entire life, have you had at least 12 drinks of any type of alcoholic beverage?</p>
Frequency of alcohol use during the past 12 months (Used for Hypotheses #2 & 3)	<p>ALQ120: In the past 12 months, how often did you drink any type of alcoholic beverage? PROBE: How many days per week, per month, or per year did you drink? ENTER ‘0’ FOR NEVER.</p>
Quantity of alcohol consumed on days when alcohol was consumed (Used for Hypotheses #2 & 3)	<p>ALQ130: In the past 12 months, on those days that you drank alcoholic beverages, on the average, how many drinks did you have? IF LESS THAN 1 DRINK, ENTER ‘1’. IF 95 DRINKS OR MORE, ENTER ‘95’.</p>
Binge drinking in the past 12 months (Used for Hypothesis #2)	<p>ALQ140: In the past 12 months, on how many days did you have 5 or more drinks of any alcoholic beverage? PROBE: How many days per week, per month, or per year did you have 5 or more drinks in a single day? ENTER ‘0’ FOR NONE.</p>
Lifetime history of binge drinking:(not used)	<p>ALQ150: Was there ever a time or times in your life when you drank 5 or more drinks of any kind of alcoholic beverage almost every day?</p>

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