ACCULTURATION AND THE RISK OF VIOLENCE AMONG HISPANIC ADOLESCENTS IN THE UNITED STATES

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Abstract
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Acculturation and the Risk of Violence among Hispanic Adolescents in the United States (Under the direction of Stephen W. Marshall, PhD)

Context: Violence among U.S. Hispanic adolescents is a significant public health problem. All Hispanics undergo the process of acculturation when adapting to life in the United States, but little is known about how acculturation affects their risk of violence. Lengthy acculturation scales are rarely available in national, population-based surveys, and single-item, proxy measures may not accurately capture the process of acculturation.

Objectives: This research was conducted to accomplish two main objectives: 1) the validation of a proxy acculturation scale, and 2) the quantification of the association between acculturation level and interpersonal and intrapersonal violence.

Methods: The validation analysis utilized the 1984 National Alcohol Survey (NAS), a nationally representative survey which included 1,437 U.S. Hispanic adults, to validate a proxy acculturation scale. The NAS acculturation scale was used as the gold standard against which the proxy scale was compared. The associational analyses were conducted using data from the first two waves of the National Longitudinal Survey of Adolescent Health administered in 1995 and 1996. This dataset included a nationally representative, school-based sample of 2,298 U.S. Hispanic/Latino adolescents in grades 7 through 12. The associations between the exposure (acculturation level as measured by a 3-item proxy scale) and the outcomes (fighting, fight-related injury, suicidal ideation, and suicide attempt) were evaluated.

Results: The proxy acculturation scale had good internal reliability and good validity. The measure had better validity among adolescents of Mexican, Puerto Rican and Cuban heritage compared with those reporting other countries of origin. The odds of reporting a violent outcome were higher

among U.S. Hispanic/Latino adolescents of moderate-to-high acculturation compared with those of low acculturation. The elevated risk remained after controlling for confounding. Effect modification by gender and country of origin was suggested.

Conclusions: The PAS3 is a valid tool for measuring acculturation when use of a comprehensive acculturation scale is not feasible. U.S. Hispanic/Latino adolescents of moderate-to-high acculturation are at increased risk of violence compared with their less acculturated counterparts. The heterogeneity of the Hispanic population as well as acculturation level must be considered when designing and implementing violence research and prevention programs.

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List of Abbreviations

ACASI……..Audio Computer-Assisted Self-Interviewing

Add Health……..National Longitudinal Study of Adolescent Health

ARG……..……...Alcohol Research Group

ARSMA……Acculturation Rating Scale for Mexican Americans

CES-D……..Center for Epidemiologic Studies – Depression

CI……..…….……..Confidence Interval

CDC……Centers for Disease Control and Prevention

CLR……..……..Confidence Limit Ratio

DHHS……..Department of Health and Human Services

NAS……...National Alcohol Survey

NCIPC……..National Center for Injury Prevention and Control

NHIS……..National Health Interview Survey

PAS……Proxy Acculturation Scale

PAS3…… 3-item Proxy Acculturation Scale

PAS4…….. 4-item Proxy Acculturation Scale

PSU…….……Primary Sampling Unit

RR……....Risk Ratio

SES…….……Socioeconomic Status

SMSA……..Standard Metropolitan Statistical Area

SSU…….……Secondary Sampling Unit

US…….……..United States

YRBSS……Youth Risk Behavior Surveillance System

I. Introduction

Interpersonal and intrapersonal violence among adolescents is a major public health problem in the United States. Homicide and suicide are the second and third leading causes of death among Hispanic adolescents. Additionally, Hispanic males have a high prevalence of fighting and fight-related injury, and Hispanic females have the highest prevalence of suicidal behavior compared with other racial/ethnic/gender groups. In order to address this ethnic disparity, it is critical to determine the mechanisms contributing to increased risk. This knowledge is essential for developing a better understanding of the etiology of violence among Hispanics, improving risk assessment, designing evidence-based violence prevention programs addressing Hispanic/Latino youths, and informing youth violence policy.

Acculturation is an important but poorly understood factor influencing violence among U.S. Hispanic individuals. While health-related acculturation research has been conducted for more than 50 years, there is scant information in the literature about the effect of acculturation on violence risk, especially among adolescents. Prior research aimed at measuring the effects of acculturation has produced conflicting results and suffers from methodological limitations. These have included the use of convenience samples, limited sample size, cross-sectional design, and a failure to account for socio-economic status and country of origin. In addition, the measurement of acculturation has frequently focused either on a single proxy variable (e.g., nativity), or a lengthy scale that is not always available or practical to administer.

The research described in this document addressed these limitations by validating a proxy acculturation scale (PAS) that can be used with many national datasets (e.g., the National Health Interview Survey [NHIS]) and using that scale to explore the associations of acculturation with interpersonal and intrapersonal violence among U.S. Hispanic/Latino adolescents. While use of a

proxy measure has the potential for misclassification, the validation analysis indicated that the proxy scale reasonably approximated an established acculturation scale and improved upon several common single-item proxy measures of acculturation. The associational analyses used data collected by the National Longitudinal Study of Adolescent Health (Add Health), a large, nationally representative sample of adolescents attending middle school and high school in the United States. The study population included an over-sample of Hispanics, allowing for analysis by country of origin. Our research used a prospective design, and the extensive data collected in Add Health allowed for the examination of dozens of potential confounding or modifying variables, including measures of socioeconomic status and other predictors of violent behavior.

II. Background and Significance

A. Public Health Significance

A.1. Youth Violence

Violence among adolescents is a major public health problem, and preventing youth violence is acknowledged as a priority in the U.S. public health community. Healthy People 2010 established goals and objectives for systematically improving the health of the Nation (U.S. Department of Health and Human Services, 2000). The overarching goals are to 1) increase the quality and years of healthy life and, 2) eliminate health disparities. Specific objectives directed at achieving these goals include reducing the rates of homicide, reducing the prevalence of physical fighting among adolescents, reducing the rates of suicide, and reducing the prevalence of suicide attempt by adolescents. Additionally, the research agenda of the National Center for Injury Prevention and Control (NCIPC) at the Centers for Disease Control and Prevention (CDC) includes preventing suicidal behavior through research that will clarify the impact of individual-level risk and protective factors on suicidal behavior, and preventing youth violence by identifying modifiable factors that protect youths from becoming victims or perpetrators of violence (National Center for Injury Prevention and Control, 2002).

The working definition of violence used by the NCIPC is "the intentional use of physical force or power, threatened or actual, against oneself, another person, or against a group or community, that either results in or has a high likelihood of resulting in injury, death, psychological harm, mal-development or deprivation" (World Health Organization, 2002). Youth violence is considered to be violence among children, adolescents and young adults, ages 10 to 24 (National Center for Injury Prevention and Control, 2004).

In the United States, youth violence is a substantial burden on individuals, families, communities, and society in general. The picture of youth violence differs slightly among those 10 to 14 compared with those ages 15 to 24. Among the older group, homicide and suicide are the second and third leading causes of death, respectively, in the United States (National Center for Injury Prevention and Control, 2005a). Among the younger group, suicide is the third leading cause of death and homicide is fourth. In 2005, the last year for which fatality data are available, 5,686 youths ages 10 to 24 died from homicide, and an additional 4,482 died from suicide (National Center for Injury Prevention and Control, 2005b). The impact of non-fatal injuries is also considerable. In 2006, an estimated 720,371 youths were treated in hospital emergency departments due to assault, and another 149,171 were treated in hospital emergency departments for self-harm (National Center for Injury Prevention and Control, 2005c). It is unknown what proportion of these had a previous or subsequent episode of assault or self-harm.

A.2. Hispanic Youth and Violence

Hispanics are the largest and fastest growing minority population in the United States. As of July 1, 2007, the U.S. Census Bureau estimated the Hispanic population at more than 45 million, an increase of 3.3% over the previous year's estimate (U.S. Census Bureau, 2008a). Hispanics are expected to make up approximately 25% of the U.S. population by 2050 (U.S. Census Bureau, 2004). In 2007, the median age of Hispanics (27.6 years) was substantially lower than that of the general population (36.6 years), and the estimated number of Hispanic youths, ages 10 to 24, was 11.5 million (U.S. Census Bureau, 2008b).

As with the general population, homicide and suicide are the second and third leading causes of death, respectively, among Hispanics ages 15 to 24, accounting for 31.9% of the deaths in this age group (National Center for Injury Prevention and Control, 2005a). Among U.S. Hispanic children ages 10 to 14, homicide is the third leading cause of death, and suicide is fifth. Overall, violence accounts for 13.8% of the deaths in this age group. The age-adjusted homicide rate among Hispanic youths in 2005 was higher than among non-Hispanics (Table 2.1; National Center for Injury

Prevention and Control, 2005b). During the same time period, the age-adjusted suicide rate among Hispanic youths was lower than that for non-Hispanic whites and American Indian/Alaskan Natives, but higher than the rate for non-Hispanic black and Asian or Pacific Islander youths (Table 2.2).

More than 100,000 U.S. Hispanic youths experienced serious but non-fatal injuries from violence in 2006. An estimated 89,255 Hispanics ages 10 to 24 were treated in hospital emergency departments due to assault, and another 10,892 were treated in hospital emergency departments for self-harm (National Center for Injury Prevention and Control, 2005c). Additionally, self-reported survey data from the Youth Risk Behavior Surveillance System (YRBSS) indicate that 47.3% of Hispanic male respondents, and 33.5% of Hispanic female respondents reported being in a physical fight in the 12 months preceding the survey (Centers for Disease Control and Prevention, 2008). The prevalence of involvement in a physical fight was higher among Hispanic students (40.4%) than white students (31.7%). Hispanics (6.3%) and blacks (5.3%) were more likely than whites (3.0%) to report having been injured in a physical fight.

Intrapersonal violence data from the YRBSS also indicate that Hispanic/Latino youths are at increased risk of depression and self-harm. Feelings of sadness or hopelessness among high school students were more frequently reported among Hispanic females (42.3%) compared with white females (34.6%) and black females (34.5%) during the 12 month period prior to the survey. Although the prevalence was lower among males in general, Hispanic males reported feelings of sadness or hopelessness more frequently (30.4%) than black males (24.0%) or white males (17.8%). The prevalence of seriously considering suicide during the 12 months prior to the survey was highest among Hispanic females (21.1%). Lastly, suicide attempts during the 12 months preceding the survey were more frequently reported among Hispanic students (10.2%) compared with white (5.6%) or black students (7.7%).

A.3. Violence Prevention

There is little evidence of the effectiveness of violence prevention programs, largely because few interventions have been well-evaluated (Christoffel & Gallagher, 1999; Orpinas et al., 2000;

Runyan et al., 2005). The Center for the Study and Prevention of Violence at the University of Colorado at Boulder, after reviewing more than 600 violence prevention and intervention programs, identified 11 that met strict, scientific criteria for program effectiveness, and 18 additional programs labeled as 'promising' (Center for the Study and Prevention of Violence, 2008). The 'model programs' employ several strategies, including reducing substance abuse (a proximate cause of violence), incorporating skills training for youth, focusing on the schools as the primary program delivery site, including parental skills training, home visitation and mentoring, and, in two of the programs, professional therapists. Other projects, such as the Multi-site Violence Prevention Study, have undergone process evaluations but the impact evaluations are still pending (Miller-Johnson, Sullivan, & Simon, 2004). One large scale study evaluating a suicide prevention program conducted within the Air Force did show a significant decrease in suicide and other adverse outcomes among adults (Knox, Litts, Talcott, Feig, & Caine, 2003). This intervention worked to change social norms and resulted in a significant reduction in suicides, as well as reductions in homicides, family violence, and unintentional injury. However, a review of the literature on adolescent suicide has shown that, while there are several promising strategies, there remains a need for the thorough evaluation of empirically-based suicide prevention and treatment programs (Gould, Greenberg, Velting, & Shaffer, 2003).

A systematic review of universal school-based programs showed a decrease in the rates of aggressive behavior among school-aged children (Hahn & al, 2007). These programs are directed at all students in a school or grade and target emotional control, self-esteem, social and problem solving skills, conflict resolution and team work. However, there were few studies on violent behavior in schools in which the population was majority Hispanic.

Research on strategies to reduce risk of violence among Latino adolescents is in its infancy (Jemmott, et al., 2001). Of the existing programs that include Hispanic adolescents, most do not specify any measures taken to adapt to cultural differences, or whether the Hispanic population was impacted differently by the intervention compared with the non-Hispanic population (Knox, Litts,

Talcott, Feig, & Caine, 2003; Miller-Johnson, Sullivan, & Simon, 2004; Zun, Downey, & Rosen, 2006). One exception is the combination of Brief Strategic Family Therapy, combined with bicultural effectiveness training, which has been shown to reduce substance abuse and behavioral problems among Hispanic adolescents by addressing intercultural and inter-generational conflict (Szapocznik & Williams, 2000).

B. Literature Review

B.1. Risk and Protective Factors for Youth Violence

There is a substantial amount of research documenting risk and protective factors associated with interpersonal violence (Tables 2.3 & 2.4). The most common risk factors cited for interpersonal violence include substance abuse and mental health disorders. Substance abuse disorders are highly correlated with violence, exhibiting rates 12 to 16 times higher than rates among individuals without such disorders (Nestor, 2002). Alcohol and drugs act to impair regulation of emotions and impulse control which can lead to aggressive or violent behavior. Those with a major mental illness exhibit rates of violence five times as high as those without disorders. Paranoid, narcissistic and passive-aggressive personality disorder symptoms are significantly correlated with violence among adolescents and young adults (Johnson et al., 2000). The co-morbidity of substance abuse disorder with antisocial personality disorder and/or depressive disorder is thought to have an additive or multiplicative effect on risk of violence (Nestor, 2002).

Additional risk factors, associated with the home environment and family, include poverty, single-parent households, bad parental relationships, abusive or violent behaviors by parents, and the presence of a gun in the home. Poverty and single-parent households are correlated with each other and with community poverty levels. Individuals who are unemployed, less affluent or have less education experience higher risks of homicide than those who are employed, more affluent or more educated (Krueger, Bond Huie, Rogers, & Hummer, 2004). Low-levels of parental support also significantly predict youth violence, with this impact being stronger among females compared with males (Saner & Ellickson, 1996). A history of previous violent behavior is also a good predictor of

future interpersonal violence, and may serve to identify individuals for intervention, but it does not offer much insight into causal pathways.

At the community level, neighborhood poverty and being a witness to violence are risk factors for violence (Cheng et al., 2003; Krueger, Bond Huie, Rogers, & Hummer, 2004). Additionally, those living in areas of greater income inequality experience higher risks of homicide (Krueger, Bond Huie, Rogers, & Hummer, 2004). Furthermore, living in an urban environment, in general, is predictive of homicide (Branas, Nance, Elliott, Richmond, & Schwab, 2004).

Age and gender are also associated with interpersonal violence. Homicide death rates increase during adolescence until the mid-twenties when the rate begins declining and continues to do so until age 65 when it levels off (National Center for Injury Prevention and Control, 2005b). Males have a higher risk of violent activity compared with females (Saner & Ellickson, 1996). Adolescent males also have a higher homicide rate (14.7 per 100,000) compared with adolescent females (2.5 per 100,000; National Center for Injury Prevention and Control, 2005b).

Research has found that a positive relationship with parents, commitment to school, and involvement in a religious community are all associated with a lower risk of interpersonal violence (Table 2.4). Parental and school connectedness have been shown to be important primary prevention measures, reducing the likelihood that adolescents get involved in weapons violence (Henrich, Brookmeyer, & Shahar, 2005). Religiosity has been shown to play a significant protective role, but only for females (Resnick, Ireland, & Borowsky, 2004). Living in a neighborhood with a high proportion of immigrants has also provided a measure of protection from interpersonal violence (Haynie, Silver, & Teasdale, 2006; Krueger, Bond Huie, Rogers, & Hummer, 2004).

Many of the risk and protective factors for interpersonal violence have also been associated with suicide, suicide attempts, and suicidal ideation (Tables 2.5 & 2.6). Numerous studies have linked alcohol use and abuse as well as illicit drug use with intrapersonal violence (Borges et al., 2004; Borowsky, Ireland, & Resnick, 2001; Christoffel & Gallagher, 1999; Donald, Dower, Correa-Velez, & Jones, 2006; Hallfors et al., 2004). In one example, Borowsky and colleagues (2001)

reported that the adjusted odds ratio for attempting suicide ranged from a low of 4.1 among white girls who used alcohol compared to those who abstained, to a high of 15.1 among Hispanic girls who used alcohol compared to those who abstained. Slightly lower odd ratios were found with marijuana use when compared with no marijuana use. The odd ratios of attempting suicide ranged from 2.9, among Hispanic boys who used marijuana compared to those who did not use marijuana, to 10.3, among black girls who used marijuana compared to those who refrained from use.

Although mental health problems are linked to both types of violence, interpersonal violence has been associated with personality and conduct disorders whereas intrapersonal violence is more closely associated with depression. Previous analyses of the Add Health data found major depression to be a strong independent predictor of suicidal ideation with an odds ratio of 5.69 (Hallfors et al., 2004), and mental health treatment has been shown to be predictive of attempted suicide among females and white males (Borowsky, Ireland, & Resnick, 2001).

A previous suicide attempt is the single strongest risk factor for attempting suicide (Borowsky, Ireland, & Resnick, 2001). Having a friend or family member attempt or complete suicide also increases the risk of intrapersonal violence. Both male and female adolescents were more likely to report suicidal ideation if a family member had attempted suicide in the last 12 months (male OR: 2.14; female OR: 1.48), or a friend had attempted suicide in the past 12 months (male OR: 2.73; female OR: 2.37; Bearman & Moody, 2004).

Several risk factors associated with intrapersonal violence involve relationships with parents, friends and romantic partners. The prevalence of reported suicide attempts is higher among adolescents who perceived low maternal caring, compared with those who perceived high maternal caring (Ackard, Neumark-Sztainer, Story, & Perry, 2006). Additionally, distress resulting from problems with parents, friends or due to the break-up of a relationship is associated with medically serious suicide attempts among females (Donald, Dower, Correa-Velez, & Jones, 2006). Bearman & Moody (2004) found that socially isolated female adolescents were more likely to have suicidal thoughts, as were females whose friends were not friends with each other. Lastly, previous research

has shown that homosexual youth, particularly males, are more likely than heterosexual youth to attempt suicide (OR: 3.74, 95% CI: 1.92, 7.28; Garofalo, Wolf, Wissow, Woods, & Goodman, 1999). Adolescents and young adults reporting same sex attraction have greater odds of suicidal ideation, deliberate self-harm and suicide attempt compared with adolescents who do not report same sex attraction (Borowsky, Ireland, & Resnick, 2001; Skegg, Nada-Raja, Dickson, Paul, & Williams, 2003). Although the reasons for this are not clear, there is some evidence that the risk may be due to a difference between actual gender and gender role. Research indicates that homosexuals are more likely to adopt cross-gender roles, which has been associated with decreased coping skills and increased social rejection, placing individuals at increased risk of suicidal behavior (Fitzpatrick, Euton, Jones, & Schmidt, 2005).

Access to weapons is also of concern with intrapersonal violence. In 2005, firearms were used in 44% of youth suicides (National Center for Injury Prevention and Control, 2005b). Presence of a firearm in the home is reported to be positively associated with suicide risk (Brent et al., 1993; Kellermann et al., 1992). Brent and colleagues (1993) found that the availability of a gun in the home increased the risk of suicide among adolescents, after adjusting for psychiatric disorder. Adolescents with any gun in the household had 4.4 times the odds (95% CI: 1.1, 17.5) of suicide compared with adolescents without guns in the home. Those adolescents who resided in a home with a handgun had 9.4 times the odds (95% CI: 1.7, 53.9) of suicide compared with those living in a home without any handguns.

Demographic characteristics such as age and gender are also predictive of suicidal behavior. Prior to age 11, the number of suicide deaths is small, and rates are not reliable (National Center for Injury Prevention and Control, 2005b). Beginning at age 12, suicide rates climb sharply through the teens and into young adulthood, where death rates level off. Suicide rates fluctuate little until age 70 when they increase to peak at age 82. The suicide rate for males ages 10 to 24 (11.1 per 100,000) is four times the rate for females ages 10 to 24 (2.5 per 100,000; National Center for Injury Prevention and Control, 2005b). While adolescent males have higher rates of completed suicides, adolescent

females report attempting suicide twice as often as adolescent males (Centers for Disease Prevention and Control, 2008).

Lastly, suicide rates are higher in rural areas than in urban areas. Rural men have approximately twice the suicide rate of men from the most urban areas (Singh & Siahpush, 2002). Additionally, adjusted firearm suicide rates in the most rural counties are 1.54 times the adjusted suicide rates in the most urban counties (Branas, Nance, Elliott, Richmond, & Schwab, 2004).

Several factors protective against intrapersonal violence have also been studied. Having parents present at key times during the day was found to be protective against suicide attempt among white females (Borowsky, Ireland, & Resnick, 2001). Parental and family connectedness, measured by the adolescent's perception of parental closeness and caring, as well as feelings of being loved and wanted, significantly reduced the odds of suicide attempt among adolescents (Borowsky, Ireland, & Resnick, 2001). Marital status is also relevant to injury risk, but too few adolescents were married to warrant inclusion of marital status in this study.

Donald and colleagues (2006) found that social connectedness, measured by the reported number of close friends, frequency of socializing with friends, participation in organized sports, and the ability to confide in others, was significantly protective against suicidal behavior. Academic performance, measured as a higher grade point average in school, was negatively associated with suicide attempt, specifically among males and white females (Borowsky, Ireland, & Resnick, 2001). Lastly, safe firearm storage practices have been identified as protective against suicide attempts. A case-control study reported that guns from case households (i.e., those homes in which a child or adolescent gained access to a firearm and shot himself or herself, intentionally or unintentionally, or shot someone else unintentionally) were less likely to be stored unloaded, locked, separated from ammunition, or to have ammunition stored locked, when compared with guns from control households (Grossman et al., 2005).

The Add Health dataset is extensive and contains variables that measure the majority of these risk and protective factors. Only two of the risk factors previously described in this chapter were not

collected by Add Health. The presence of major mental illness or other specific mental health disorders, with the exception of a scale measuring depressive symptomology, was not captured, and data were not available regarding previous child maltreatment. Lastly, although there are data regarding the availability of firearms in the home, the survey question was not precise regarding the respondent's ability to access weapons, nor is there specific information regarding gun storage practices. Despite these few omissions, the Add Health dataset has a wealth of violence-related variables, which made it an excellent data source for this analysis.

B.2. Acculturation Research

Acculturation is defined as the changes that occur in culture patterns when groups of individuals having different cultures come into continuous contact (Berry, 2003; Redfield, Linton, & Herskovits, 1936). The United States historically has welcomed large numbers of immigrants, and acculturation has occurred among many different groups in different ways. The focus of this research is the acculturation of Latinos living in and immigrating to the United States over the past quarter-century. Acculturation is a complex process that has been associated with behavior change and a variety of health-related outcomes.

Acculturation has been studied with regard to general health indicators, access to health care, specific diseases, and health-related behaviors. The association between acculturation and alcohol has been a focus of epidemiological research since the 1960s. Several studies have found a positive relationship, meaning that the more acculturated the individual, the greater the likelihood of higher alcohol intake (Abraido-Lanza, Chao, & Florez, 2005; Caetano, 1987b; Cherpitel, 1992). A study of Mexican Americans treated in a California emergency department found that those with a high level of acculturation were more likely to report current alcohol and drug use, heavy drinking, and negative consequences related to drinking in the previous year compared with those who scored lower on the acculturation scale (Cherpitel & Borges, 2001). The authors attributed this increase in alcohol consumption to the adoption of U.S. drinking patterns. Individuals are also more likely to use alcohol for the first time if they are more acculturated (Vega, Gil, & Zimmerman, 1993). A comprehensive

review of studies regarding the association between acculturation and alcohol use or abuse determined that this relationship was strong and consistent among women, but equivocal among men (Zemore, 2007).

Previous research among Hispanic adolescents using the Add Health dataset found that, among youth with no history of alcohol consumption at baseline, acculturation-related variables were not associated with subsequent binge drinking at follow-up (Guilamo-Ramos, Jaccard, Johansson, & Tunisi, 2004). However, among youth with a history of alcohol use at baseline, there was an increased likelihood of binge drinking associated with living in the United States for a longer period of time, and with speaking mostly English in the home.

Research has also been conducted examining acculturation level and illicit drug use. Higher acculturation level has been associated with higher levels of illicit drug use (Amaro, Whitaker, Coffman, & Heeren, 1990; Cherpitel & Borges, 2002; Epstein, Botvin, & Diaz, 2001). However, a more recent study found that acculturation was not significantly associated with polydrug use; peer drinking norms were the most predictive factor (Epstein, Doyle & Botvin, 2003).

Limited research has been conducted regarding the association between acculturation level and intrapersonal violence. Low acculturation level has been associated with suicidal ideation among Hispanics (Olvera, 2001), and higher acculturative stress has been linked with increased suicidal behavior (Hovey, 2000; Hovey & King, 1996).

There is also evidence in the literature that acculturation produces different outcomes by gender. The relationship between acculturation and risk factors for violence such as alcohol (Zemore, 2007) and illicit drug use (Amaro, Whitaker, Coffman, & Heeren, 1990) have been consistent among females but have been inconclusive among males. The greater impact of acculturation on females has been attributed to the deterioration of traditional gender roles with acculturation and adoption of U.S. norms (Rogler, Cortes, & Malgady, 1991). Acculturation also produces greater internal conflict among females as they adapt to their new gender roles, and may cause greater conflict between female adolescents and their more traditional parents (Marin & Gamba, 2003).

Socioeconomic status (SES) is associated with acculturation (Hurtado, 1995; Recio Adrados, 1993) as well as violence (Saner & Ellickson, 1996). Hispanics tend to be less economically advantaged compared with non-Hispanic white Americans, although there is considerable variation (Suro et al., 2007). Higher levels of acculturation are associated with higher education levels and higher income (Abraido-Lanza, Chao, & Florez, 2005). When conducting acculturation research it is important to distinguish cultural differences from socioeconomic differences. Income and employment status are normally considered good measures of SES. However, these measures are not as meaningful among the adolescent population studied because their reasons for unemployment likely involve their age and school attendance. Furthermore, adolescents are often unaware of their annual household income. Instead, parental education and household welfare status were used as markers of SES in this research analysis.

The equivocal results of research examining the association between acculturation level and substance abuse and suicidal behavior reflect differences in study methodologies, and differences in the definitions and measures of acculturation and outcomes. The studies also vary with regard to whether and how SES and country of origin were included or whether other relevant variables were controlled during analysis.

B.3. Heterogeneity of the Hispanic Population

The Hispanic population is frequently studied as if it were a homogeneous entity. In reality, the population is fairly diverse. Hispanics from different countries of origin differ by median age, median income, and education level (Suro et al., 2007). Puerto Rican adolescents are significantly more likely to live in a single-parent household compared with Cuban Americans and Mexican Americans, and parental education level differs among these three subpopulations (Guilamo-Ramos, Jaccard, Pena, & Goldberg, 2005).

Hispanics from different countries of origin also differ in other factors that influence the process of acculturation including the reason for immigration (e.g., political, employment), characteristics of the host community (e.g., attitude toward immigrants, bilingual services), and U.S.

policies toward immigrants from differing countries (Berry, 2003; Caetano & Clark, 2003). Understanding the heterogeneity of the Hispanic population, including the differences by country of origin, is essential to any study of acculturation.

The three largest groups of Hispanics in the United States are of Mexican, Puerto Rican, and Cuban heritage, and their patterns of immigration to the United States differ dramatically. Mexican-Americans fall largely into two groups: those whose families have been in the United States for generations, and new immigrants. The majority of immigrants coming to the United States from Mexico in the last 30 years have done so for economic reasons. They tend to have low education levels and come to the United States seeking employment opportunities and often face prejudice and discrimination.

In contrast, Puerto Ricans have migrated under unique circumstances in that they are U.S. citizens. They are permitted to travel to the U.S. mainland and are able to work without restriction; consequently, they often migrate for employment opportunities (Arcia, Skinner, Bailey, & Correa, 2001; Bettes, Dusenbury, Kerner, James-Ortiz, & Botvin, 1990). Because Puerto Rico is a U.S. territory, English is uniformly taught in the public schools, which may allow for easier integration into U.S. culture. However, the country has a history of colonization that may lead to resentment or anti-American sentiment which can influence the acculturation experience of Puerto Ricans in the United States (Balls Organista, Organista, & Kurasaki, 2003).

The Cuban American population has had a dramatically different immigration history, with three large, group migrations during the past 60 years. The first group of Cubans came to the United States in the 1950s and 1960s for political reasons, and were mainly upper-middle and middle class professionals and skilled workers concerned with Fidel Castro's rise to power (Ortiz, 1995). They were welcomed to the United States and were assisted in their relocation efforts. They tended to settle in south Florida where they have since built a strong social and political network. An additional 125,000 Cubans came into the United States during a mass migration lasting six months in 1980, and another 30,000 fled to the United States in 1994 to escape the repressive regime.

In addition to Mexico, Puerto Rico and Cuba, each country in Central and South America has its own migration history. Since considerable variation among immigrants from each country exists, acculturation research should strive to account for the differences among countries (Hurtado, 1995; Recio Adrados, 1993; Vega, 1995). However, relatively few studies have done so. Instead, most studies examine Hispanics/Latinos as a homogenous group, or study Hispanics/Latinos from only a single country of origin.

Among the studies comparing subpopulations, several results of relevance to this study have been reported. Researchers found that Puerto Ricans were more bicultural from the outset, compared with Mexican-Americans, and as a consequence, may not be as susceptible to acculturative stress (Arcia, Skinner, Bailey, & Correa, 2001). Guilamo-Ramos et al., (2004) reported that Cuban-American adolescents had a lesser tendency to binge drink compared with Mexican-American and Puerto Rican adolescents, although the difference was not statistically significant. Dominican youths have been found to have a higher risk of alcohol use compared with Puerto Rican youths (Bettes, Dusenbury, Kerner, James-Ortiz, & Botvin, 1990). Colombians reportedly drink more frequently than Dominicans, and Puerto Ricans are much more likely to use drugs compared with other Hispanic men (Zayas, Rojas, & Malgady, 1998). As national origin does play a role in acculturation and risk factors for violence, this current research included country of origin as a potential effect modifier in the analyses where sufficient numbers permitted.

B.4. Theoretical Framework

Although there is general agreement that acculturation is an important topic of research in healthcare and social science, there is little agreement on how to conceptualize and measure it (Berry, 2003). Recently there has been some effort to treat acculturation as multi-dimensional in which individuals may identify with one culture, the other, neither culture, or both equally (biculturalism). In this orthogonal paradigm, an individual's competence or preference for one culture is independent of any other culture (Oetting, 1993). With this theory, Hispanic individuals may be highly acculturated to both U.S. culture and their native culture, or they may not identify with either culture.

While the field is moving toward this multi-dimensional approach, its complexity means that it is difficult to measure and interpret. As a consequence, acculturation has most frequently been treated as linear, taking place on a single scale, moving from one end, in this case the Hispanic culture, to the other end, in this case U.S. culture. These more traditional measures examine adaptation to U.S. culture without measuring adherence to the culture of origin.

The most common theoretical framework employed when studying acculturation and poor health outcomes is that of acculturative stress (i.e., stress that directly results from the acculturative process; Vega & Gil, 1999). The increased stress can overwhelm an individual's resources for coping resulting in the adoption of negative behaviors (Rogler, Cortes, & Malgady, 1991; Vega, Zimmerman, Gil, Warheit, & Apospori, 1993). Although new immigrants experience significant stress related to migration, adaptation, and language acquisition, they may also feel safe, hopeful, and optimistic (Balls Organista, Organista, & Kurasaki, 2003). As they acculturate, stress may be caused by marginalization, discrimination, separation from a traditional way of life, and/or intergenerational conflict (Viruell-Fuentes, 2007; Williams & Berry, 1991). The latter can be especially significant among adolescents because they acculturate more rapidly than their parents, they are attempting to develop a new sense of identity, and they are experiencing changing values and communication patterns (Vega, 1995). Stressful life events, in turn, contribute significantly to involvement in various types of violent behavior (Saner & Ellickson, 1996).

In the acculturative stress model, stressors such as intergenerational conflict and perceived discrimination may lead to substance abuse, delinquency, or other deleterious coping mechanisms. Acculturative stress may be ameliorated by strong support mechanisms. The quality of social support provided by traditional Latino family networks provides powerful protective effects on health and emotional well-being (Vega, 1995). The concept of familism, or putting the family interests ahead of individual interests, is a cultural value among traditional Hispanic/Latino families (Hurtado, 1995; Marin & Gamba, 2003). Acculturation and acculturative stress have been shown to lead to the deterioration of this protective factor (Gil, Wagner, & Vega, 2000).

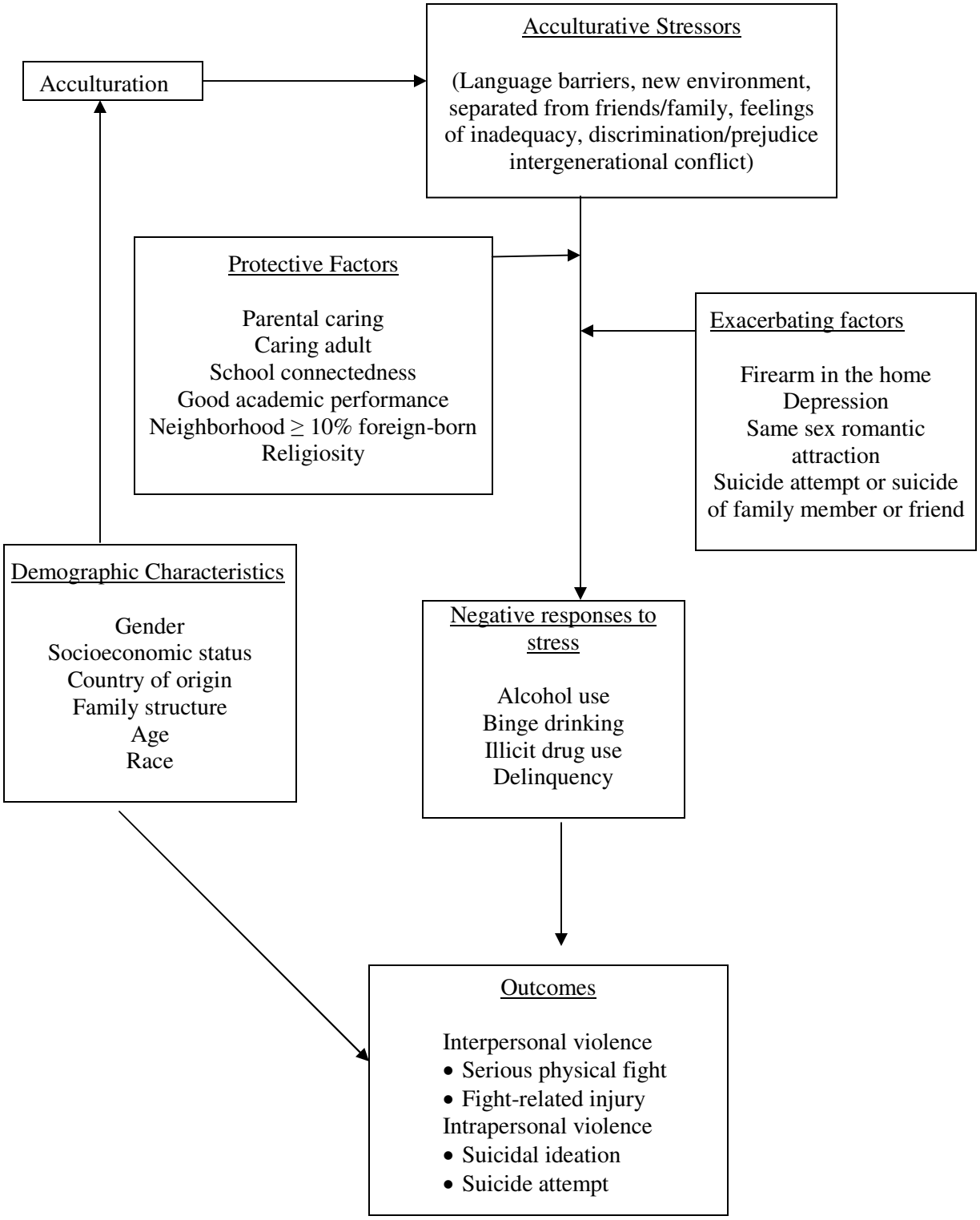
The acculturative stress model has been utilized for more than 20 years and has been the standard for examining the relationship between acculturation and poor health outcomes among immigrants. However, the model has been questioned by some researchers. For example, one study failed to find support for this model when examining data for an association between acculturation and depression (Zemore, 2005). The model would benefit from the identification and assessment of specific stressors (Recio Adrados, 1993). While the specific mechanisms by which this model functions are not known with certainty, it remains the basis for most research in the field.

This current study used the acculturative stress model, but also borrowed from the social-ecological risk and protective factor model, which allows for the influence of family, social and environmental characteristics. In this model, adolescents experience an increase in stress as they acculturate to life in the United States. Some of this stress may result from intergenerational conflict caused by the acquisition of U.S. normative behaviors (e.g., alcohol use, dating, and children challenging parents) deemed inappropriate in more traditional Latino families, (Gonzales, Deardorff, Formoso, Barr, & Barrera, 2006). In order to cope with the stress, adolescents may resort to negative behaviors such as alcohol or drug use, or they may suffer from feelings of isolation or depression. Adolescents may reduce their stress by utilizing family, school or community support systems to assist them. The myriad influences which may impact the manner by which acculturation affects risk of violence are displayed in Figure 2.1.

B.5. Measuring acculturation

There are more than three dozen acculturation scales created for research in the health and social sciences fields, at least 20 of which have been utilized with the Hispanic population (Zane & Mak, 2003). Current acculturation theory recommends a multi-dimensional scale wherein both level of influence of the individual's original culture and the influence of U.S. culture are measured concurrently (Berry, 2003). This allows for individuals to be bi-cultural, reflecting a high identification with both Hispanic and Anglo cultures, or marginalized, reflecting little identification with either culture. There have not been assessments of the correlation between unidimensional and

Figure 2.1. Acculturative stress framework for the association between acculturation and inter- and intrapersonal violence.



orthogonal measures to date (Caetano & Clark, 2003). Although they may be more comprehensive than unidimensional measures, the multi-dimensional, also known as orthogonal, scales do not yet enjoy widespread use among researchers.

The most widely used acculturation scales tend to be lengthy (e.g., the Acculturation Rating Scale for Mexican Americans (ARSMA), consists of 20 items; the revised, orthogonal version, the ARSMA-II, contains 48 items). The N-7, National Alcohol Survey (NAS) acculturation scale used for comparative analysis in this study is based on 12 items (Caetano, 1987a). Since survey time, and subsequently cost, increases with each survey item, longer surveys are not practical for use unless acculturation is a major focus of the data collection. They are also not feasible for use in secondary data analyses if the scales were not included in the original data collection.

A further limitation of existing scales is that many of them were designed for a single subpopulation (e.g., Mexican Americans). However, as noted in section B.3., the U.S. Hispanic/Latino population is heterogeneous, with individuals, families and groups arriving from diverse countries with unique national cultures and immigration histories (Hurtado, 1995). There is also evidence of ethnic variation among Hispanics in health patterns by acculturation status (Vega & Amaro, 1994; Zsembik & Fennell, 2005). Any measure of acculturation intended for use with the Hispanic population should ideally be validated not just in the overall population, but also among subpopulations of Hispanics who trace their heritage to different countries.

While not perfect, several acculturation-related variables were attractive for the purposes of this study because they are relatively good approximations of acculturation, and are routinely captured in numerous datasets. Language facility is the most frequently used proxy measure and is considered the most robust indicator of acculturation (Cuellar, Harris, & Jasso, 1980; Marin & Gamba, 1996). Proxy measures of acculturation have generally not been validated against accepted acculturation scales. One study combined an English language acculturation variable with a variable measuring time lived in the United States, and age of arrival, to create a more sensitive measure of acculturation (Evenson, Sarmiento, & Ayala, 2004). Other studies have examined associations

between acculturation-related variables (e.g., language spoken at home and time living in the United States) as exposures in their own right (Guilamo-Ramos, Jaccard, Johansson, & Tunisi, 2004).

This study examined two proxy acculturation scales (PAS), comprised of three (PAS3) or four (PAS4) acculturation-related variables available in the Add Health dataset. These variables included interview language (Spanish vs. English), language spoken at home (Spanish vs. English), proportion of life lived in the United States (years in the United States/age), and (in the PAS4 only) generation status (foreign-born, first generation, or second generation or higher). This measure was constructed and evaluated because it consists of variables that are known to approximate acculturation, that are available in many datasets, and that are simple to collect with low misclassification rates (Marin & Marin, 1991). This research therefore served to validate the use of a scale that is practical and easy to use when a formal acculturation scale is not available.

The PAS measures were validated against the 1984 National Alcohol Survey (NAS) acculturation scale (Alcohol Research Group, 1984). The NAS acculturation scale is a well-established measure developed by the Alcohol Research Group (Caetano, 1987a), and contains multiple domains representing acculturation to life in the United States (Zane & Mak, 2003). The first domain is language, the most frequently assessed in measures of acculturation. Additionally, the scale includes a social domain, examining whom the individual chooses to associate with in different situations, and a daily living domain, examining the media preferences of the individual. Lastly, the NAS acculturation scale includes elements regarding the respondent's attitudes toward Anglos and Anglo culture.

Caetano (1987a) reported that in the development of the NAS acculturation scale, a factor analysis was conducted to select those variables responsible for the variance within the construct. The scale's reliability was assessed with Cronbach's alpha and found to be high ($\alpha = 0.91$). The scale was found to be negatively correlated with being foreign-born, and positively correlated with years lived in the United States (Cherpitel & Borges, 2001). The NAS acculturation scale was chosen for this study because it has been used in nationally representative population surveys, with an over-

sampling of Hispanics, in the field of alcohol and injury research (Borges, Cherpitel, & Mittleman, 2004; Caetano, 1987a; Cherpitel, 1992, 1999; Cherpitel & Borges, 2001, 2002). Cherpitel & Borges (2001) examined Mexican Americans reporting to the emergency department in Santa Clara, California. Their analysis found that acculturation, measured by the NAS acculturation scale, was a significant predictor of injury in models in which usual drinking and drug use were not included. The study further indicated that those scoring high on the acculturation scale were more likely to report simultaneous drinking and drug use before an injury, and were more likely to report heavy drinking and drug use during the past year compared with those who scored lower.

The NAS acculturation scale was also used in a study examining drug use and injury among a probability sample of adult emergency department patients (Cherpitel & Borges, 2002). Those with violence-related injuries were more likely to report drug use (primarily cocaine, amphetamines and marijuana) in the 6-hour period prior to the injury and in the 12 months prior to the injury. Among Hispanics, those scoring high on the acculturation scale were also more likely to report drug use in the same two time periods.

C. Summary

Violence is a substantial public health problem. The young and rapidly growing U.S. Hispanic adolescent population is particularly vulnerable. There is some evidence that acculturation is associated with violence, but existing research has been limited by methodological problems. One limitation is in the measurement of acculturation. There are two main methods for measuring acculturation, 1) a single proxy measure or, 2) a comprehensive acculturation scale. The former (single-item) is likely prone to misclassification, and the latter is lengthy, costly, and often not feasible.

A simple, valid proxy acculturation scale, that improves on the validity of the single proxy measures, and is easier and more practical to employ than lengthy scales, would be of great use to the public health community. It would facilitate the ready determination of acculturation level for research and prevention purposes. Furthermore, quantifying the association between acculturation

and violence among Hispanic/Latino adolescents is an important step in providing the injury prevention community with information to 1) better understand the effects of acculturation, 2) develop appropriate policy, and 3) include the acculturation process in violence prevention programs for Hispanic/Latino youth.

Table 2.1. Number of homicide deaths and crude and age-adjusted death rates by racial/ethnic population of youths, ages 10 to 24, in the United States, 2005.

Race/Ethnicity	# of Deaths	Crude Death Rate*	Adjusted Death Rate†
White, Non-Hispanic	957	2.5	2.4
Black, Non-Hispanic	3,131	32.8	32.8
AI/AN, Non-Hispanic	77	11.6	11.3
Asian/PI, Non-Hispanic	143	5.2	4.9
Total Non-Hispanic	4,308	8.3	--
Hispanic	1,350	12.2	12.1

AI = American Indian; AN = Alaska Native; PI = Pacific Islander
* Rate per 100,000 population, based on US Census Bureau estimates
† Standard population is 2000

Source: National Center for Injury Prevention and Control (2005b).

Table 2.2. Number of suicide deaths and crude and age-adjusted death rates by racial/ethnic population of youth, ages 10 to 24, in the United States, 2005.

Race/Ethnicity	# of Deaths	Crude Death Rate*	Adjusted Death Rate†
White, Non-Hispanic	3,161	8.1	7.9
Black, Non-Hispanic	468	4.9	4.9
AI/AN, Non-Hispanic	134	20.2	19.8
Asian/PI, Non-Hispanic	114	4.1	3.9
Total Non-Hispanic	3,877	7.5	--
Hispanic	592	5.3	5.3

AI = American Indian; AN = Alaska Native; PI = Pacific Islander
* Rate per 100,000 population, based on US Census Bureau estimates
† Standard population is 2000

Source: Centers for Disease Control and Prevention, National Centers for Injury Prevention and Control (2005b).

Table 2.3. Select risk factors for interpersonal violence reported in the literature.

Risk Factors	Relevant Research
Substance abuse/use of alcohol and/or illicit drugs	Borowsky & Ireland, 2004 Resnick et al., 2004 Nestor, 2002 Christoffel & Gallagher, 1999 Saner & Ellickson, 1996 Rosenberg & Mercy, 1991
Mental health/personality disorders/depression	Cole & Glass, 2005 Borowsky & Ireland, 2004 Nestor, 2002 Rosenberg & Mercy, 1991
Previous aggressive/violent behavior	Borowsky & Ireland, 2004 Resnick, et al., 2004 Cheng, et al., 2003 Jemmott, et al., 2001
Poverty/Low socioeconomic status	Krueger, et al., 2004 Rosenberg & Mercy, 1991
History of previous abuse/violent behavior by parents	Widom, 2000 Rosenberg & Mercy, 1991
Poor academic performance	Orpinas, et al., 2000 Saner & Ellickson, 1996
Bad parental relationship	Orpinas, et al., 2000 Saner & Ellickson, 1996
History of delinquency	Saner & Ellickson, 1996
Household presence of a firearm	Cummings, et al, 1997
Witnessing a shooting	Cheng, et al., 2003
Single parent household	Krueger, et al., 2004

Table 2.4. Select protective factors for interpersonal violence reported in the literature.

Protective Factors	Relevant Research
Positive relationships with parents/ parent connectedness	Henrich, et al., 2005 Orpinas, et al., 2000 Resnick, et al., 2004
Involvement in a religious community	Herrenkohl, et al., 2005 Resnick, et al., 2004
Higher grade point average	Borowsky & Ireland, 2004 Resnick, et al., 2004
Commitment to school	Herrenkohl, et al., 2005 Resnick et al., 2004
Neighborhoods with high concentrations of foreign-born residents	Krueger et al., 2004

Table 2.5. Select risk factors for intrapersonal violence reported in the literature.

Risk Factors	Relevant Research
Alcohol use/alcoholism	Donald, et al., 2006 Borges, et al., 2004 Hallfors, et al., 2004 Borowsky, et al., 2001 Christoffel & Gallagher, 1999
Household presence of a firearm	Cummings, et al, 1997 Brent et al., 1993 Kellerman, et al., 1992; Brent, et al., 1991
Depression	Donald, et al., 2006 Hallfors, et al., 2004 Olvera, 2001
Poor parental relationship/low parental connectedness	Ackard, et al., 2006 Donald, et al., 2006
Problems with friends; social isolation	Donald, et al., 2006 Bearman & Moody, 2004
Mental health disorders/treatment	Cole & Glass, 2005 Borowsky, et al., 2001
Suicide attempt	Borowsky, et al., 2001 Christoffel & Gallagher, 1999
Illicit drug use	Hallfors, et al., 2004 Borowsky, et al., 2001
Friend attempting or completing suicide	Bearman & Moody, 2004 Borowsky, et al., 2001
Same sex romantic attraction	Skegg et al., 2003 Borowsky, et al., 2001
Family problems	Olvera, 2001
Family member attempting or completing suicide	Christoffel & Gallagher, 1999
Weapon carrying at school	Borowsky, et al., 2001

Table 2.6. Select protective factors for intrapersonal violence reported in the literature.

Protective Factors	Relevant Research
Social connectedness	Donald, et al., 2006
Parent and family connectedness	Borowsky, et al., 2001
Gun storage practices (gun unloaded & locked; ammunition locked & stored in a separate location)	Grossman, et al., 2005
High grade point average	Borowsky, et al., 2001

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III. Statement of Specific Aims

This research was driven by two primary questions: 1) Is the use of a brief, proxy acculturation scale, comprised of up to four acculturation-related variables, a valid measure of acculturation? and, 2) What is the association between acculturation level and risk for a) interpersonal, and b) intrapersonal violence among U.S. Hispanic/Latino adolescents. In order to answer these questions, this study focused on the following specific aims:

Specific Aim 1

To determine the validity of a short (4-item) proxy acculturation scale (PAS4) by a) calculating the internal reliability of the scale, and b) comparing the scale with an established acculturation measure.

Hypothesis – Specific Aim 1

The hypothesis for Aim 1 was that the PAS4 would have good internal reliability and that both continuous and dichotomous versions of the scale would perform well when compared with the 12-item National Alcohol Survey (NAS) Acculturation Scale. Additionally, the proxy scale would better approximate the NAS acculturation scale than any of its individual components.

Rationale – Specific Aim 1

Although acculturation is considered an important factor in understanding ethnic differences in health behavior and outcomes, there is no agreement in the research community regarding how to measure it. The majority of acculturation scales, including those most frequently employed, are lengthy and therefore time consuming and expensive to incorporate into surveys. Additionally, when conducting secondary data analyses, particularly on national datasets, the data needed to construct these scales are inevitably not available. As an alternative, researchers have typically used single proxy measures of acculturation, such as language spoken at home or generational status, without

validating those measures. Combining several proxy measures of acculturation that are readily available in large, public use datasets, and quantifying the reliability and validity of the scale with an established acculturation measure will provide researchers with a practical tool for assessing acculturation while also understanding its limitations.

Specific Aim 2

To examine the association between the acculturation level of Hispanic/Latino adolescents in the United States and their risk for interpersonal violence, specifically, involvement in a fight or experiencing a fight-related injury, either as a perpetrator or as a victim, appropriately controlling for confounding variables and investigating potential modifiers.

Hypothesis – Specific Aim 2

The hypothesis for Aim 2 was that a higher level of acculturation would be positively associated with interpersonal violence. Specifically, U.S. Hispanic/Latino adolescents with moderate-to-high acculturation would have increased odds of fighting and fight-related injury compared with U.S. Hispanic/Latino adolescents with low acculturation.

Specific Aim 3

To examine the association between the acculturation level of Hispanic/Latino youth in the United States and their risk for intrapersonal violence, specifically, suicidal ideation or attempted suicide, appropriately controlling for confounding variables and investigating potential effect modifiers.

Hypothesis – Specific Aim 3

The hypothesis for Aim 3 was that a higher level of acculturation would be positively associated with suicidal behavior. Specifically, U.S. Hispanic/Latino adolescents with moderate-to-high acculturation would have increased odds of suicidal ideation and suicide attempt compared with U.S. Hispanic/Latino adolescents with low acculturation

Rationale – Specific Aims 2 & 3

Hispanics comprise the largest minority population in the United States and are relatively young, compared with the general U.S. population. The U.S. Hispanic population is rapidly growing, with increases due to immigration as well as high birth rates. Hispanic/Latino adolescents have a prevalence of interpersonal violence higher than the non-Hispanic white population and similar to that of the non-Hispanic black population. Additionally, Hispanics, particularly Hispanic females, have the highest reported prevalence of suicidal behaviors, such as seriously considering suicide and attempting suicide, among major gender/ethnicity subgroups. As Hispanic/Latino adolescents acculturate to life in the United States, they are exposed to additional stressors not experienced by their non-Hispanic/Latino counterparts, and they are faced with different behavioral norms compared with those in Latin American countries. Acculturation research can provide information in order to better understand these ethnic disparities and to inform violence prevention programs focused on the U.S. Hispanic/Latino adolescent population.

IV. Methods

This research consisted of two main components, 1) a validation study of a proxy acculturation scale (PAS), and 2) a secondary data analysis using the validated scale to determine the association between acculturation level and the risk of inter- and intrapersonal violence. Different datasets, sample populations and analyses were used for these two objectives. They are detailed separately below.

A. Methods Addressing Specific Aim 1 – Validity of a Proxy Acculturation Scale

A.1. Data Source and Sample

The National Alcohol Survey (NAS) is conducted approximately every five years by the Alcohol Research Group (ARG; Emeryville, CA) and the public use data are stored by the Alcohol Epidemiologic Data System of the National Institute on Alcohol Abuse and Alcoholism. Data from the 1984 NAS were utilized in this study to validate a proxy acculturation scale (PAS). This survey was selected because it contained a large, nationally representative population of Hispanics with a sufficient number of respondents from Mexico, Puerto Rico and Cuba to allow for subgroup analyses. The NAS acculturation scale was developed for acculturation research involving alcohol use and abuse among Hispanics (Caetano, 1987). Caetano (1987) determined that the NAS acculturation scale had high internal consistency with a Cronbach's alpha of 0.91. Additionally, the scale is positively correlated with being foreign-born and with years living in the United States (Cherpitel & Borges, 2001). It has been used to study the relationships between acculturation and alcohol and drug use and abuse as well as between acculturation and injury (Borges, Cherpitel, & Mittleman, 2004; Cherpitel, 1992; Cherpitel & Borges, 2002). Although the NAS is conducted approximately every five years, the 1984 survey was selected for this analysis because it employed the entire acculturation

scale. Later surveys used a reduced scale format to save time and expense (Greenfield, 2005). While it is recognized that the NAS acculturation scale does have limitations and is not a perfect measure of acculturation, it was treated as the "gold standard" for the purposes of this research.

The 1984 NAS is a nationally representative, cross-sectional survey of U.S. adults, ages 18 or older. Respondents were drawn from a multi-stage probability sample of households in the 48 contiguous United States and Washington, D.C. from July through November 1984. The design included over-sampling of black and Hispanic populations. The complete details of the sampling design and selection strategy have been published previously (Santos, 1985). The final sample contained 100 primary sampling units (PSUs) based on general population U.S. Census data and 10 additional PSUs based on black and Hispanic population data. Six of the ten supplemental PSUs were included to increase precision among the Hispanic sample. These PSUs were selected from standard metropolitan statistical areas (SMSAs), since nearly 90% of Hispanics lived in SMSAs at the time. Secondary sampling units (SSUs) were created and stratified based on the percentage Hispanic and black populations residing within them. Hispanic strata were over-sampled by a factor of eight, resulting in 188 Hispanic SSUs, compared with 179 black SSUs, and 214 SSUs from the remaining strata. At the next stage, listing areas were selected from each SSU and then households were selected within each listing area. Hispanic households were over-sampled again at this stage. Within each eligible household, an adult was randomly selected to participate in the interview.

Trained interviewers conducted the survey in person, at the respondent's home, in a structured format lasting approximately one hour. The interview questions focused on alcohol-related topics including alcohol use, contexts, social acceptability and negative impacts. Interviewers also collected extensive demographic information, including data regarding Hispanic ethnicity. Those respondents who self-identified as Hispanic were asked 20 questions which were collapsed into the 12-item NAS acculturation scale (Table 4.1).

The NAS dataset includes 5,221 adult respondents of which 1,453 are Hispanic. Nearly three-quarters of the Hispanic respondents described their own ethnicity as Mexican/Mexican

American (n = 771), Puerto Rican (n = 207), or Cuban/Cuban American (n = 79). The remaining 26% comprised Hispanics reporting that the majority of their ancestors came from Central and South America (n = 112), the United States (n = 196), and other countries (n = 66). Nearly two-thirds of those in the latter category reported Spain as the country of ancestry (n = 41).

A.2. Measures

The variables of interest for this analysis included 1) those comprising the NAS acculturation scale, 2) those denoting ordinal acculturation levels as assigned by the ARG researchers conducting the primary data analysis, and 3) four acculturation-related variables (i.e., generational status, proportion of life lived in the United States, language spoken at home, and interview language) available in the dataset and used to create the PAS.

A.2.1. National Alcohol Survey Acculturation Scale – Continuous Measure

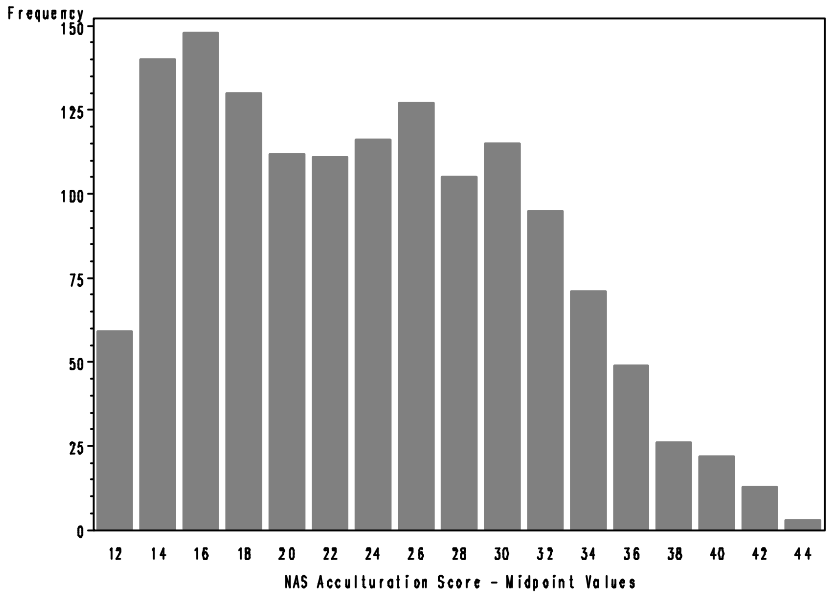
The 12-item NAS acculturation scale was a continuous scale which served as the "gold standard" against which to compare the PAS. The scale measures an individual's adaptation to U.S. culture across several domains (e.g., language, media, and social interaction). It contained ten questions regarding the respondent's use of, and preference for, Spanish versus English when speaking and reading. Three questions focused on preferences for Anglo versus Hispanic media (i.e., music, television, and radio). Five questions examined the proportion of Hispanics in the respondent's social environments and the comfort that the respondent had interacting with Anglos. The last question was aimed at measuring the value placed on maintaining Hispanic culture. Scores were summed and ranged on a continuous scale from 11 to 44. The NAS acculturation scale had a fairly normal distribution, although slightly right-skewed (Figure 4.1).

A.2.2. National Alcohol Survey Acculturation Scale – Ordinal Measure

ARG researchers constructed an ordinal acculturation measure by selecting cut-points on the continuous measure and dividing respondents into three, approximately equal, groups representing low (<18.86), medium (18.8601-27.94), and high (>27.9401) acculturation levels. In conducting

preliminary analyses for this study, it was determined that the PAS did not discriminate well between medium and high acculturation levels. For this reason, these two categories were collapsed creating a

Figure 4.1. Frequency distribution of the NAS acculturation scale, by midpoint.



dichotomous NAS acculturation scale variable. Approximately one third of the respondents were categorized as having a low acculturation level (n = 474) by the NAS acculturation scale and the remaining two-thirds were categorized as having a medium-to-high acculturation level (n = 963). This acculturation assignment was used as the "gold standard" by which to compare the dichotomous version of the PAS.

A.2.3. Proxy Acculturation Scale – Continuous Measure

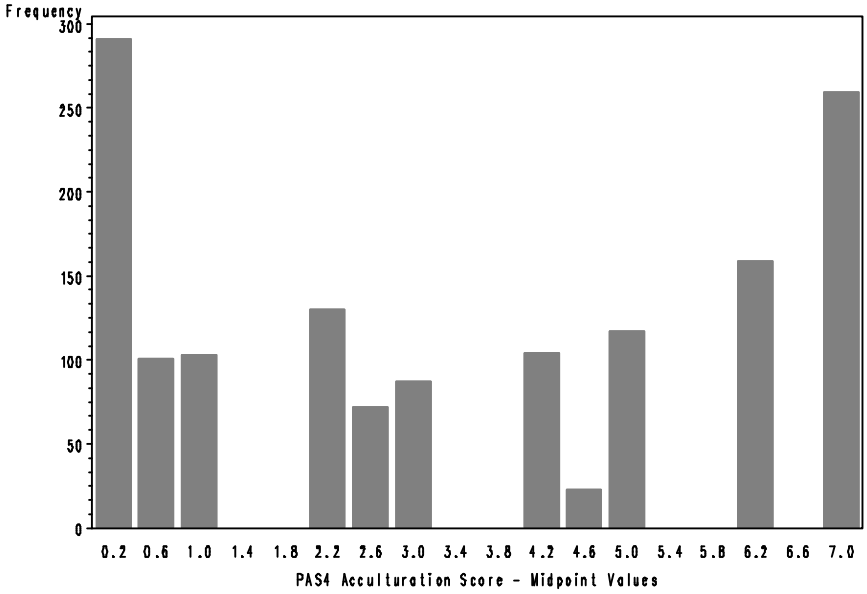
The PAS4 was comprised of four acculturation-related variables, two related to nativity and the other two based on language use and preference. The generational status of each respondent was categorized as foreign-born (born in a country other than the United States), first generation (born in the United States with one or both parents born in another country) or second generation or higher (respondent and both parents born in the United States). A variable for the proportion of life lived in the United States was created by dividing the number of years the respondent reported living in the United States by the reported age of the respondent. Although all respondents were in the United States at the time of the interview, as a result of rounding to the second decimal place, some were

assigned a score of 0. Due to the survey skip pattern, respondents were only asked to report the number of years living in the United States if they were born outside the United States and its territories. This skip pattern avoided the inadvertent recording of years lived outside the United States in the case of Americans serving abroad in the military or Foreign Service, or individuals choosing to live or study abroad for a period of time. This skip pattern did, however, impact the assignment of acculturation among respondents from Puerto Rico as immigrants born on the island of Puerto Rico, a U.S. territory, were not considered to have been born outside the United States. Consequently, respondents of Puerto Rican descent all received a score of 1 for proportion of life lived in the United States.

The two language components of the PAS4 were interview language and language spoken most often at home. The former was recorded by interviewers in the field based on ethnicity and language. The latter was based on a two-step process. Respondents who reported that they only spoke Spanish or, alternatively, that they only spoke English, were automatically assigned that language for the language spoken at home variable. Respondents who indicated some degree of proficiency with both languages were asked additional questions reflecting the language that the respondent used most often with his or her 1) spouse, 2) children, 3) siblings, and 4) parents. Responses ranged from 1 (mostly Spanish) to 3 (mostly English). The non-missing scores were averaged. The mid-point was chosen as the cut-point to differentiate those who spoke mostly English (≥ 2) from those who spoke mostly Spanish (<2) at home.

The survey questions, coding schemes and scoring for the PAS4 are shown in Table 4.2. The language items were more heavily weighted because language use and preference have been cited as being valid proxy measures with low rates of misclassification and responsible for the greatest proportion of variation in acculturation scales (Marin & Marin, 1991). Final scores for the PAS4 ranged on a continuous scale from 0 to 7. The distribution of the PAS4 measure was U-shaped with scores clustered around whole numbers (Figure 4.2).

Figure 4.2. Frequency distribution of the 4-item proxy acculturation scale scores, by midpoint.



Following preliminary analyses, in which the correlations between generational status and the NAS acculturation scale were lower than expected, generational status was removed from the scale. The resulting measure (PAS3) retained the other three variables (interview language, language used most often at home and proportion of life lived in the United States) which were scored the same as for the PAS4. The PAS3 scores ranged from 0 to 5.

A.2.4. Proxy Acculturation Scale – Ordinal and Dichotomous Measures

In order to compare the PAS4 with the ordinal version of the NAS acculturation scale used in previous research respondents were divided into three, approximately equal groups. Respondents were assigned a low (score ≤ 1), medium ($1 <$ score < 5), or high (score ≥ 5), level of acculturation. An initial comparison of the PAS4 and NAS acculturation scale groupings using a 3 x 3 table resulted in an overall percent agreement of 69.7%. The chance-corrected delta coefficient (Andres & Marzo, 2005) was only 0.23, meaning that only 23% of the agreement between the two scales was not due to chance. Further examination showed that the majority of misclassification occurred between the medium and high categories. Since the ordinal PAS4 did not discriminate well between these two levels they were combined so that individuals were dichotomized into either 'low-acculturation' or

‘medium/high acculturation’. Approximately one-third of respondents fell into the former category and two-thirds into the latter.

A similar process was followed for assignment of acculturation using the PAS3. Respondents were divided into low (score ≤ 1), medium (1 < score ≤ 3), or high (score > 3) acculturation levels. The percent agreement between the ordinal scales of the PAS3 and NAS acculturation scale was 66.7%, and the majority of misclassifications were in the medium and high categories. Because of the distribution of the PAS3, with a large cluster of individuals scoring 1 point, the dichotomized measure resulted in approximately 40% of respondents in the low acculturation group and the remaining 60% in the medium-to-high acculturation group.

A.2.5. Demographic Variables

Demographic variables used in this study included gender, age group, and country of ancestry (i.e., the country of origin of most of the respondent’s ancestors).

A.2.6. Missing Data

Of the 1,453 self-identified Hispanic respondents, 16 (1.1%) were missing data critical to the assignment of acculturation and were therefore excluded from our study. These included nine respondents that did not have sufficient data to obtain an acculturation score by the NAS acculturation scale. The remaining seven were missing data for at least one of the components of the PAS: interview language (n = 3), language at home (n = 1), generation (n = 1), age (n = 3), and years living in the United States (n = 3). Additionally, data on country of ancestry were missing for 20 respondents and they were subsequently dropped from the relevant subgroup analyses.

A.3. Statistical Analyses

Three strategies were employed to assess the validity of the PAS. First reliability was calculated to ensure that the scales had internal consistency. Second, the correlations between the continuous versions of the PAS and the NAS acculturation scale provided information on how well the proxy measures were able to approximate the “gold standard”. Lastly, measures of agreement

were used to assess the validity of the dichotomous versions of the PAS4 and PAS3 when compared with the NAS acculturation scale.

Analyses accounted for the complex survey design of the NAS by including weights, adjusted for the sampling fraction and non-response. All *n* reported in the tables are unweighted. As current survey software does not incorporate the necessary calculations for the validity measures, confidence intervals around the point estimates were computed using the sampling weights but without specifying the full details of the sampling design (e.g., clustering). The standard errors used in these confidence intervals were calculated as if all observations were independent. Therefore, they are potentially underestimated (i.e., smaller than if clustering were factored into the calculation).

A.3.1. Reliability of the PAS

In order for a measure to be valid it must first have a reasonable degree of reliability. The internal consistency of the PAS and the NAS acculturation scale were estimated using Cronbach's coefficient alpha. The larger the alpha coefficient is, the more internally consistent the measure. The coefficient alpha has a maximum value of 1, meaning all items are perfectly correlated. The coefficient is dependent on the average correlation of items within the measure as well as the number of items in the measure. A value of 0.70 is considered a guideline for acceptable reliability, although this varies by discipline as well as the purpose of the measure (Nunnally, 1978). Two separate analyses estimated Cronbach's coefficient alpha for the NAS acculturation scale as .88 and .91 (Greenfield, 2005; Caetano, 1987). Because the PAS has fewer items compared with the NAS acculturation scale, the PAS was expected to have a lower estimated alpha coefficient. Confidence intervals around Cronbach's alpha were computed with a SAS macro (Duhachek & Lacobucci, 2004).

A.3.2. Validity of the Continuous PAS

Inter-correlations were first calculated between each of the four proxy measures of acculturation (generational status, interview language, language used at home, and proportion of life lived in the United States). Correlations were then calculated separately for each of the four proxy measures of acculturation and the 1) NAS acculturation scale, 2) the PAS4, and the 3) PAS3. Lastly,

correlations were calculated between the derived proxy scales (PAS3 & PAS4) and the NAS acculturation scale. All correlations were estimated using the Pearson correlation coefficient.

Item remainder correlations were calculated separately (Table 4.3). Since the proxy acculturation measures have few items (either three or four), and each individual item will be 100% correlated with itself as a component of the scale, item-remainder correlations show how well an item correlates with a scale when that one item is removed (e.g., correlation between language at home and the PAS4, excluding language at home). The item-remainder correlations were reasonably high, ranging from 0.60 to 0.67.

A.3.3. Validity of the Dichotomous PAS

There were three main components to assessing the validity of the dichotomous versions of the proxy acculturation scales. First, the percent agreement between each of the proxy scales and the NAS acculturation scale was calculated. Because percent agreement does not correct for chance agreement, the Kappa coefficient was then calculated. The Kappa coefficient is a good estimate of overall agreement, beyond the level of chance, and an excellent assessment of validity when comparing a new 'test' with a "gold standard" (Chmura Kraemer, Periyakoil, & Noda, 2002). Lastly, in order to determine if the proxy scale was an improvement over single proxy measures of acculturation, the percent agreement and Kappa coefficients were computed between each of the four individual proxy items (generation, proportion of life lived in the United States, language used most often at home, and interview language) and the NAS acculturation scale.

A.3.4. Analyses among Subpopulations

The three main analyses described earlier in this chapter (assessment of reliability, continuous measure validity, and dichotomous measure validity) were repeated on subpopulations of the dataset. This was done to determine whether or not the measure performed differently based on gender, age group, or country of ancestry. There were sufficient data for assessing validity by country of ancestry among those reporting Mexican, Puerto Rican, and Cuban heritage. Individuals from other Latin American countries were grouped together because their numbers precluded separate analyses.

Lastly, validity of the PAS was assessed by excluding the respondents of Puerto Rican descent, to determine if there were any substantial changes in estimates due to the skip pattern employed by the NAS. The result of the skip pattern was that Puerto Rican Americans were documented as having lived their entire lives in the United States without differentiating between years lived on the island territory versus years lived on the mainland. As a consequence, they automatically received a score of 1 for the proportion of life lived in the United States.

B. Methods Addressing Specific Aims 2 & 3 – Association between Acculturation and Interpersonal and Intrapersonal Violence

In order to calculate the effect of acculturation on inter- and intrapersonal violence, a secondary data analysis of the first two waves of the National Longitudinal Survey of Adolescent Health (Add Health) was conducted.

B.1. Data Source and Sample

This study analyzed the contractual dataset from Waves I and II of the Add Health database. The dataset contains a school-based sample of adolescents in grades 7 through 12 at the time of the first survey. Schools were selected from a stratified random probability sample of all U.S. schools containing an 11th grade and at least 30 students. Clusters were stratified on region of the country, level of urbanization, school size, school type, racial composition, grade span, and curriculum. For each high school, a feeder middle school (i.e., a middle school containing a 7th grade which sent students to that high school) was also recruited. High schools encompassing 7th through 12th grades served as their own feeder schools. A total of 80 high schools and 52 middle schools were included in the sample.

A core random sample of 12,105 adolescents, stratified by grade and gender, and a special over-sample of adolescents from specific populations, (e.g., Cuban and Puerto Rican Americans) were selected for an in-home interview conducted between April and December 1995 (Wave I). A total of 20,745 adolescents (79% of those eligible), including 3,525 Hispanics completed the first interview. The interview was comprised of 40 sections with questions covering a variety of topics

related to the health and well-being of adolescents, and the social contexts in which the adolescents lived. The interviews were conducted in-person, usually at the adolescent's home, and took between 1 and 2 hours to complete. Data were collected via laptop computer. For potentially sensitive sections of the interview (e.g., drug use, suicidal behavior), audio computer assisted self-interviewing (ACASI) technology was provided. This technology allowed respondents to privately enter their responses into the computer without interviewer involvement. Bilingual interviewers were available and interviewers assisted respondents with the self-administered sections as needed. However, the questionnaire was never formally translated into any language other than English. Thus, there is the potential for some erosion of standardization of the questionnaire for the non-English speaking adolescents, since the on-site interpretations of the questions by the bilingual interviewers could vary between sites or between interviewers.

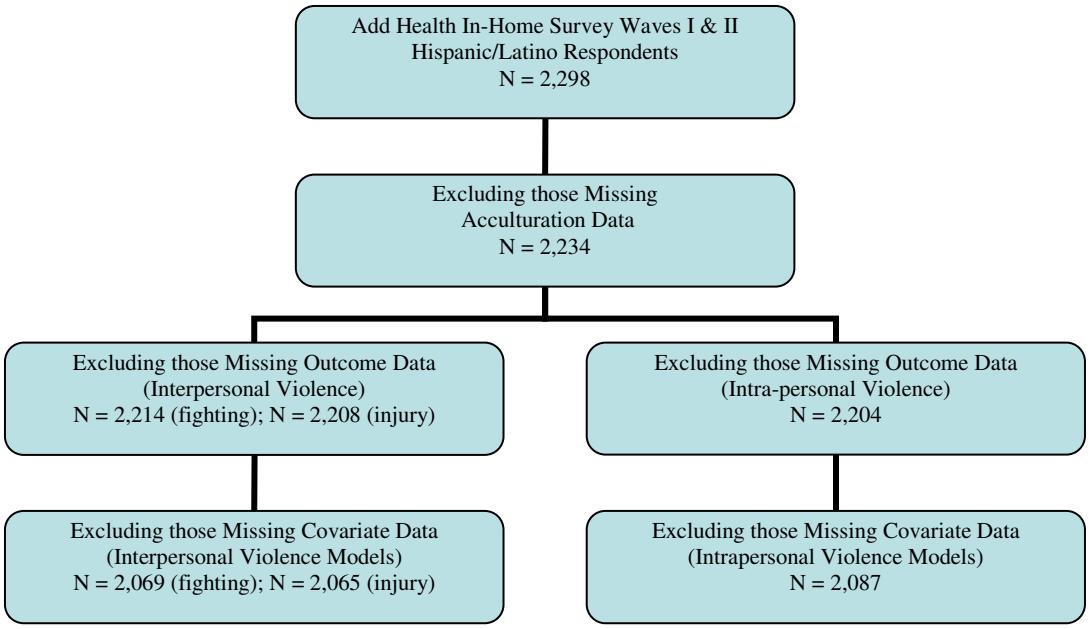
Several other instruments were administered during Wave I. These included a parent questionnaire which was administered, preferably, to the mother (or female head of household) of participating adolescents. If the respondent's mother did not reside in the home, another parental figure was interviewed.

Follow-up interviews (Wave II) were conducted from April through August 1996 with 14,738 adolescents (88% of those selected). Graduating seniors and the over-sample disabled students were not re-interviewed at Wave II. The interview questions and format were the same as for the Wave I in-home interviews, with some small exceptions not relevant to this study (e.g., questions on sun exposure were added). Complete information on the survey design and database are detailed elsewhere (Harris et al., 2003).

This study focused on the subset of 2,298 adolescents with valid responses at both time periods, and who responded affirmatively when asked if they were of Hispanic or Latino origin. The Hispanic/Latino sample was approximately evenly split by gender (51.1% male, 48.9% female) and ranged in age from 11 to 20 years. Due to missing or invalid acculturation data, 2.8% (n = 64) of the 2,298 Hispanic/Latino adolescents were excluded from the study. This included nine individuals who

self-identified as Hispanic or Latino but indicated a language other than English or Spanish was spoken in the home. Due to missing outcome data, additional individuals were eliminated from the analyses. This included 20 respondents with missing fight data, 26 with missing fight-related injury data, and 30 with missing data for both suicidal behavior outcomes. Lastly, 145 individuals were missing data for one or more of the 5 covariates in the final interpersonal violence models, and 117 individuals were missing covariate data for the final intrapersonal violence models. As a result, data from 90% of the Hispanic/Latino population participating in both Waves I & II were used in the final models. The study populations used to model each outcome are shown in Figure 4.3.

Figure 4.3. Hispanic/Latino study population, Add Health, Waves I & II, 1995 – 1996.



B.2. Measures

The independent variable of interest (PAS) and all covariates were measured at Wave I. The dependent (outcome) variables were all measured at Wave II.

B.2.1. Dependent Variables

This research examined two main outcomes of interest: interpersonal and intrapersonal violence. These outcomes were operationalized by measuring the responses to four questions at Wave II (Table 4.4). The four outcome variables were fighting, fight-related injury, suicidal ideation, and attempted suicide. The survey question regarding fight-related injury was asked only of respondents who had reported incidents of fighting. Likewise, respondents were only asked about suicide attempts if they had reported seriously thinking about suicide. Missing data for fight-related injury and suicide attempt due to legitimate skips were re-coded as 0 injuries and 0 attempts. Fighting, fight-related injury, and attempted suicide originally recorded multiple incidents. The vast majority of respondents reported no fighting (75.8%), or '1 or 2 times' (18.8%), and never being injured in a fight (93.9%), or being injured a single time (3.7%) in the past 12 months. Only 43 respondents (1.9%) reported more than 1 suicide attempt in the past 12 months, and of these 31 (72.0%) reported 2 attempts. These three variables were ostensibly continuous, but their highly skewed nature, with few respondents reporting more than one incident, resulted in their being re-coded as dichotomous variables with either '0' or '1or more' incidents occurring in the last 12 months.

B.2.1. Independent Variables

The main independent variable of interest was the level of acculturation, or the adaptation to American culture, among Hispanic adolescents living in the United States. Acculturation was measured through a proxy acculturation scale (PAS3) comprised of three acculturation-related variables (interview language, language spoken at home, and proportion of life lived in the United States). This measure was described in the first part of this chapter (Section A). The specific Add Health survey questions, coding schemes, and scoring of the PAS3 are contained in Table 4.5. Interview language and language spoken at home were coded dichotomously, English or Spanish. The proportion of life lived in the United States was calculated as a continuous variable ranging from 0 (very recent immigrants with less than 1 hundredth of their lives lived in the United States) to 1

(those living their entire lives in the United States). Age was calculated based on the month and year of the interview minus the month and year of the respondent's birth. Since the day of birth was not reported, for privacy considerations, the mid-point (15th of the month) was used. For those who could not remember the month that they came to the United States, but could remember the year, the mid-point (June) was used in the calculations. The PAS3 ranged from 0 to 5, with a higher score measuring greater acculturation to the United States. Although internal scale reliability was high when estimated with the NAS dataset (Cronbach's $\alpha = 0.79$; 95% CI: 0.77, 0.81), reliability with the Add Health population was lower (Cronbach's $\alpha = 0.62$; 95% CI: 0.60, 0.65).

The scale was dichotomized into low acculturation (PAS3 < 1) and moderate-to-high acculturation (PAS3 ≥ 1). While the intent was to use the lowest tertile to classify individuals, the clustering of this population, with a large number of respondents receiving one point on the scale, made it impractical to make this division, and the lowest quartile was used instead.

The Add Health dataset also provided a wealth of data on variables that could potentially confound, modify, or mediate the relationship between acculturation level and inter- or intrapersonal violence. Demographic measures included gender, age, race, ethnicity, parental education level, welfare status, employment status, and family structure. Age was collapsed into three groups (11 to 14, 15 to 17, and 18 to 21) due to the low number of individuals at the extremes of age. Race was determined by the respondents self-report of which one category (white, black or African American, American Indian or Native American, Asian or Pacific Islander, or Other) best described their racial background. Country of ancestry was coded based on the respondent's self-report of his or her Hispanic or Latino background. Available categories included Mexican/Mexican American, Chicano/Chicana, Cuban/Cuban American, Puerto Rican, Central/South American, and Other Hispanic. Respondents who self-identified as Chicano/Chicana were examined further to determine if place of birth of the adolescent or the adolescent's parents provided a country of origin.

Parental education level was assessed first by responses from the parent questionnaire (*How far did you go in school*?), as parents were considered more likely than the adolescents to know their

own level of educational attainment. Adolescent survey responses [*How far did (your resident mother/father) go in school*?] were used to supplement the parent questionnaire data when necessary (e.g., no parental questionnaire available). For analysis, this variable was dichotomized into 1) less than a high school education, and 2) high school education or equivalent and above. Welfare status was based on whether or not a resident parent received public assistance. Since students were in school full-time, employment was considered working more than five hours per week during the school year.

Family structure had two components: 1) *Did the respondent live in a two-parent household*? and, 2) *Did the respondent live with extended family members*? The latter was determined based on the relationships of up to 20 individuals reported in the household roster. Grandparents, aunts, uncles, cousins, nieces and nephews were considered extended family members.

Numerous known or suspected risk and protective factors for violence were available in the dataset. Table 4.6. contains the risk factors selected for analysis, the Add Health survey questions used to obtain them, and the coding schemes used to define them. Table 4.7. contains similar descriptions of the protective factors examined.

Five scales were used in this analysis. They included 1) a slightly modified version of the Center for Epidemiologic Studies Depression (CES-D) Scale, 2) a delinquency scale, 3) a family connectedness scale, 4) a school connectedness/teacher relationship scale, and 5) a school connectedness/belonging scale. The CES-D, developed by the National Institute of Mental Health, has been validated with adolescents, although the screening tool does generate false positives (Roberts, Lewinsohn, & Seeley, 1991). In this analysis the variable will be dichotomized as having depressive symptomology versus no depressive symptomology, using separate cut-points for males ($\geq$ 22) and females ($\geq$ 24) as recommended by Roberts and colleagues (1991). The scale has previously been validated for use among Hispanic adolescents (Crockett, Randall, Shen, Russell, & Driscoll, 2005).

The delinquency scale includes 15 delinquent behaviors. Respondents were considered high delinquents if they reported at least 1 incident of at least 5 of the 15 behaviors (Thompson, Ho, & Kingree, 2007). The family connectedness scale comprised 13 variables associated with parental love, caring, warmth, support, and communication (Resnick et al., 1997). Non-missing scores were averaged, and respondents scoring above the top quartile were designated as having strong family connectedness, a factor potentially protective against violence.

Lastly, three versions of the school connectedness scale were created and examined. The first summed across five school-related items and classified the lowest 20% as "highly socially connected" at school. Research by McNeely & Falci (2004), suggests that it is better to divide school connectedness into two subscales. The social belonging subscale focuses on being part of the school, being close to people at school, and being happy at school. The teacher relationship subscale includes the respondent's perception of teacher fairness, teacher caring, and being in trouble with teachers (McNeely & Falci, 2004). The top 20% of scores on each subscale were considered highly disconnected from school, the former socially and the latter with respect to teachers.

B.3. Statistical Analyses

The first step in analyzing the Add Health data for Specific Aims 2 & 3 was to obtain prevalence and incidence data. We obtained prevalence data for the independent variable of interest (acculturation level), and a variety of study population characteristics, at Wave I, as well as the incidence of each of the four outcome measures (fighting, fight-related injury, suicidal ideation, and suicide attempt) occurring between Waves I and II, and reported at Wave II.

Chi-square analyses were then conducted to estimate the strength of association between acculturation level and each of the outcomes. Bivariate analyses were also conducted to examine the association between acculturation and each of the risk factors, protective factors, and potential covariates under study. Similar calculations examined the association between each of the risk factors, protective factors, and covariates, and the outcome variables.

Two variables, gender and country of ancestry, were considered possible modifiers of the association between acculturation and violence. A preliminary assessment for effect modification on the odds ratio scale by gender and country of ancestry was conducted by creating contingency tables and calculating the risk for each combination of exposure and outcome (e.g., low acculturation females, low acculturation males, high acculturation females, and high acculturation males). The actual and expected risks of violence among the doubly exposed (e.g., high acculturation males) and doubly unexposed (e.g., low acculturation females) were compared. This initial assessment provided support to the hypothesis that modification did exist, and therefore should be further investigated.

To explore the potential for confounding of the acculturation-violence relationship by other covariates, odds ratios (ORs) were first calculated for the association between acculturation level and each of the population characteristics, and between each of the population characteristics and the four outcomes. Then each variable was examined individually to determine its effect on each of the four acculturation-violence associations. Variables were considered potential confounders if they resulted in a change in estimate of greater than 10% when comparing the absolute value of the natural log of the adjusted OR divided by the natural log of the unadjusted OR for each outcome (Rothman & Greenland, 1998). Substance use and abuse variables and the delinquency scale were not included as potential confounders because they are theorized to be mediators between acculturation and interpersonal violence. These negative behaviors are thought to lie on the causal pathway and they have been identified in the literature as outcomes of acculturation and acculturation stress, and they are risk factors for violent outcomes.

Lastly, multivariable logistic regression was used to model the association between acculturation level and each of the four dichotomous outcomes: fight, fight-related injury, suicidal ideation and suicide attempt. A forward model-building strategy was utilized, because of the large number of potential covariates for inclusion. A determination was made to run separate models for the two potential interaction terms (gender and country of ancestry) to avoid having too many parameters in a single model. Covariates identified by preliminary analyses as associated with the

exposure and the outcome, and that were not considered to be on the causal pathway, were eligible for inclusion in the models.

For consistency, and because including potential confounders on the basis of background knowledge is appropriate, the two interpersonal violence outcomes were modeled identically, as were the two suicidal behavior outcomes, and age group was included in all four models although it did not meet the change in estimate criterion. Although none of the potential confounders met the change in estimate criterion for the association between acculturation and fighting, there were ten variables that met the criterion for changing the association between acculturation and fight-related injury. These included parental education, welfare status, accessible firearm, low academic performance, knowing someone who committed suicide, perceiving other students as prejudiced, school connectedness, school disconnectedness, not socially belonging at school, and not getting along well with teachers. The last four of these were different ways of measuring school connectedness. Based on research by McNeely & Falci (2004), and based on the greater change in estimate, the last two variables were selected, along with the first six, for the forward selection, model-building process. After including the variable for not getting along with teachers in the fight-related models, the variables for low academic performance, perceiving other students as prejudiced, and not socially belonging at school did not impact the estimates. Likewise, after including welfare status in the model, parental education level did not have an effect. As a result, the final models used for the two interpersonal violence outcomes were:

Model (1) Logit (interpersonal violence) = $ß_0 + ß_1$ (PAS3) + $ß_2$ (age group) + $ß_3$ (welfare status) + $ß_4$ (poor teacher relationships) + $ß_5$ (firearm access) + $ß_6$ (knowing someone who committed suicide)

Four potential confounders (knowing someone who attempted suicide, knowing someone who committed suicide, having a serious argument with a parent, and parental education level) met the change in estimate criterion for the estimate of the associations between both acculturation and suicidal ideation, and acculturation and suicide attempt. An additional variable, poor teacher

relationships, was identified as a potential confounder of the acculturation-suicidal ideation relationship, and the percentage of the neighborhood that was foreign-born met the criterion for change in estimate of the acculturation-suicide attempt relationship. These six variables were therefore used in the forward selection, model building process for suicidal behaviors. As indicated previously, age group was included in all models based on subject matter knowledge. After inclusion of the other variables in the models, having a serious argument with a parent and living in a neighborhood that was greater than 10% foreign-born did not substantially affect the estimates and were therefore dropped. The final model used for both suicidal behaviors was therefore:

Model (2) Logit (suicidal behavior) = $ß_0 + ß_1$ (PAS3) + $ß_2$ (age group) + $ß_3$ (parental education level) + $ß_4$ (knowing someone who attempted suicide) + $ß_5$ (knowing someone who committed suicide) + $ß_6$ (negative teacher relationships)

The same models were then run separately for males, females, and those of Mexican, Puerto Rican and Cuban origin. Adjusted odds ratios, 95% confidence intervals, and confidence limit ratios (CLRs) were calculated and reported for each model.

A logistic model was selected in lieu of a binomial model for these analyses because it is a robust, stable model that rarely has difficulty with model convergence. Model convergence was of concern from the outset because of the large number of potential covariates being analyzed. The OR is generally considered a good estimate of the risk ratio (RR) when the outcome is rare, but becomes less so as the outcome becomes more common. In the cases of fight-related injury and suicide attempt, the outcomes were fairly rare (5.9% and 4.1%, respectively). Fighting and suicidal ideation were more common (23.5% and 10.6%, respectively). In order to determine how well the ORs estimated the RRs in this study, the unadjusted ratios were calculated and compared (Table 4.8). As expected, the estimated relationship between acculturation and fighting showed the greatest overestimate of the RR by the OR. This was not expected to substantially change the results or conclusions of the study, and therefore the OR was considered a reasonable estimate of the RR.

Although there were different potential ways to structure the measurements of acculturation and outcome (e.g., only including those with new incidents of the outcomes at Wave II or controlling for the outcome at Wave I), the decision was made to use exposure data at Wave I and outcome data at Wave II. Excluding those who experienced the outcomes at Wave I would have significantly reduced the dataset, and with it, a large proportion of information. For example, 70.4% of those who reported fighting at Wave II had previously reported fighting at Wave I. Furthermore, controlling for the outcomes at Wave I would have potentially indirectly adjusted for a portion of what we were trying to measure (the association between acculturation and violence). This is because one would expect acculturation, theoretically measured at a time zero, 12 months prior to Wave I, to be associated with the outcome at Wave I. Therefore, controlling for the outcome at Wave I would have potentially adjusted for a portion of the same relationship. Although this latter method was not selected for these analyses for this reason, the inclusion of the outcomes at Wave I, while reducing the estimates, would not have changed the conclusions (Table 4.9).

The decision was made not to include substance use and abuse variables (i.e., binge drinking, marijuana use, and other drug use) or the delinquency scale in the models as confounders of the acculturation-violence association due to their theoretical positions on the causal pathway. However, in the interest of investigating the potential effect on the estimates of including these four variables, they were added to the final models and are presented in Table 4.10. The variables do have some influence on the estimates, the most notable of which is the odds ratio for suicidal ideation which reduces to a nearly null effect.

SAS callable SUDAAN 9.0 survey software (Research Triangle Institute, 2004) was used to obtain regression coefficients and standard errors that correctly account for the complex clustering and stratification used in the Add Health design. Probability sampling weights were utilized for all analyses in order to adjust for non-response and sampling fractions. The results produced should therefore be reasonably representative, given sampling variability, of U.S. Hispanic/Latino adolescents in grades 7 through 12 during the 1995-1996 school years.

The Institutional Review Board of the University of North Carolina at Chapel Hill School of Public Health approved all research protocols for the original Add Health Study as well as for this research. As required by contract with Add Health, appropriate measures have been taken to maintain confidentiality and all results are reported as aggregate data with no personal identifiers.

Table 4.1. National Alcohol Survey Acculturation Scale, version N-7 (Alcohol Research Group, 1984).

Item	Response Categories
1. Do you speak English?	0=No; 1=Yes
2. What language do you speak with a) spouse, b) children, c) brothers and sisters, d) parents, e) other relatives, f) friends, g) neighbors, h) people at work?	1=Mostly Spanish; 2=Both about equally; 3=Mostly English
3. When you read a book, magazine or 'novella', do you prefer to read a Spanish language version rather than an English book, magazine or 'novella'?	1=Most of the time; 2=About half the time; 3=less than half the time; 4=rarely or never
4. When you watch TV, do you prefer to watch an Hispanic rather than an Anglo channel?	See item 3 categories
5. When you listen to the radio, do you prefer to listen to an [sic] Hispanic rather than an Anglo station?	See item 3 categories
6. When you listen to music, do you prefer to listen to Hispanic music?	See item 3 categories
7. Thinking of friends you usually see these days, what proportion are Hispanic?	1=Nearly all of them; 2=About half; 3=less than half; 4=few or none of them
8. Thinking of your current church congregation, what proportion is Hispanic?	See item 7 categories
9. Thinking of the parties you usually go to these days, would you say that the group of people who usually attend are…	1=Nearly all Hispanic; 2=About half Hispanic; 3=less than half Hispanic; 4=few or none are Hispanic
10. Thinking of the people in the neighborhood where you live now, are they:	See item 9 categories
11. Socially, I feel less at ease with Anglos than with Hispanics.	1=Strongly agree; 2=Agree; 3=Disagree 4=Strongly disagree
12. Is it better that Hispanics only marry other Hispanics?	See item 11 categories

NOTE: Item 2 is comprised of 8 questions. Non-missing responses were averaged and included as 1 item in the scale.

Table 4.2. Acculturation-related variables, coding schemes and scoring of the proxy acculturation scales derived from the National Alcohol Survey.

Variable	Survey item	Coding scheme	Score	PAS4 scale	PAS3 scale
Interview language	Respondent is Hispanic - interview was conducted in English Respondent is Hispanic - interview was conducted in Spanish	1 = English 2 = Spanish	0 if Spanish 2 if English	Yes	Yes
Language spoken at home	Do you speak mostly Spanish or English with (person) or do you use both about the same? 1. Your wife/husband/the person that you live with 2. Your children 3. Your brothers and sisters 4. Your parents	1 = Mostly Spanish 2 = both about the same 3 = Mostly English	0 if average of non-missing responses < 2 2 if average of non-missing responses ≥ 2	Yes	Yes
Proportion of life lived in the US[a]	In what month, day and year were you born? How many years have you lived in the United States?	The number of years lived in the United States divided by the respondent's age	Value ranging from 0 to 1	Yes	Yes
Generation	In what state, territory, or country was your father born? In what state, territory, or country was your mother born? In what state, territory, or country were you born?	Specific country codes used	0 if foreign-born 1 if 1st generation 2 if 2nd generation or higher	Yes	No
Overall scale				Simple sum of scores from the 4 variables – ranging from 0 to 7	Simple sum of scores from the first 3 variables - ranging from 0 to 5

[a]Respondents born on the island of Puerto Rico were considered U.S.-born as it is a U.S. territory. As a result, they were not asked how many years they had lived in the United States but were considered to have been in the United States since birth.

Table 4.3. Item remainder correlations between individual proxy measures of acculturation and the proxy acculturation scales, excluding each of the individual proxy measures.

	Derived proxy scales	
Variable	PAS4	PAS3
Generation	.67	.67
Interview language	.62	.64
Language at home	.74	.68
Proportion of life lived in the US	.67	.60

NOTE: PAS4 = 4-item proxy acculturation scale. PAS3 = 3-item proxy acculturation scale.

Table 4.4. Outcome measures, the Add Health interview questions from which they were derived and the coding schemes used in the analyses.

Dependent Variable	Interview question(s)	Coding Scheme	Dichotomous Re-code
Serious physical fight	*In the past 12 months, how often did you get into a serious physical fight?*	0 = Never 1 = 1 or 2 times 2 = 3 or 4 times 3 = 5 or more times	0 = Never 1 = 1 or more times
Fight-related injury	*In the past 12 months, how many times were you in a physical fight in which you were injured and had to be treated by a doctor or nurse?*	Count 0 to 333	0 = Never 1 = 1 or more times
Suicidal ideation	*During the past 12 months, did you ever seriously think about committing suicide?*	0 = No 1 = Yes	0 = No 1 = Yes
Attempted suicide	*During the past 12 months, how many times did you actually attempt suicide?*	0 = Never 1 = 1 time 2 = 2 or 3 times 3 = 4 or 5 or times 4 = 6 or more times	0 = Never 1 = 1 or more times

Table 4.5. Acculturation-related variables, coding schemes and scoring of the proxy acculturation scale (PAS3) used as the independent variable to analyze the Add Health Data.

Variable	Interview question(s)	Coding Scheme	Score
Interview language	*In what language was the interview conducted?*	1 = English 2 = Spanish 3 = Other 6 = Refused 8 = Don't know	0 = Spanish 2 = English
Language spoken at home	*What language is usually spoken in your home?*	1 = English 2 = Spanish 3 = Other 6 = Refused 8 = Don't know	0 = Spanish 2 = English
Proportion of life lived in the US	*Were you born in the United States?* If no… *What month and year did you first move to the US?* *What is your birth date? Month and Year?*	Time the respondent lived in the United States divided by calculated age	Continuous – ranging from 0 to 1
Proxy Acculturation Scale (PAS3)			Simple sum of previous 3 variables – ranging from 0 to 5

Table 4.6. Risk factors for interpersonal and intrapersonal violence, the Wave I Add Health interview questions they are derived from, and the coding schemes used in the analysis.

Variable	Interview question(s)	Coding Scheme
Mental health treatment	*In the past year have you received psychological or emotional counseling?*	0 = No 1 = Yes
Depressive symptomology [Determined from a 20 item, slightly modified Center for Epidemiologic Studies Depression Scale (CES-D)]	*How often was each of the following true during the last week?* *1. You were bothered by things that usually don't bother you* *2. You didn't feel like eating, your appetite was poor* *3. You felt that you could not shake off the blues, even with help from your family and your friends* *4. You felt that you were just as good as other people* *5. You had trouble keeping your mind on what you were doing* *6. You felt depressed* *7. You felt that you were too tired to do things* *8. You felt hopeful about the future* *9. You thought your life had been a failure* *10. You felt fearful* *11. You felt happy* *12. You talked less than usual* *13. You felt lonely* *14. People were unfriendly to you* *15. You enjoyed life* *16. You felt sad* *17. You felt that people disliked you* *18. It was hard to get started doing things* *In the past 12 months how often have you had* *19. trouble falling asleep or staying asleep?* *20. frequent crying?*	The first 18 items were scored: 0 = never 1 = sometimes 2 = a lot of the time 3 = almost all the time/all the time Items 4, 8, 11 & 15 were reverse scored. Items 19 & 20 were scored: 0 = never 1 = just a few times 2 = about once a week 3 = almost every day/every day Scores for the 20 items were summed. 0 = Scores < 22 for males; < 24 for females 1 = Scores ≥ 22 for males; ≥ 24 for females
Binge drinking	*In the past 12 months, how many days did you drink five or more drinks in a row?*	0 = Never 1 = 1 or more times
Marijuana use	*During the past 30 days, how many times did you use marijuana?*	0 = Never 1 = 1 or more times

Other illicit drug use	*During the past 30 days, how many times did you use any of these types of illegal drugs (cocaine, inhalants, LSD, PCP, ecstasy, mushrooms, speed, ice, heroin, or pills without a doctor's prescription)?*	0 = Never 1 = 1 or more times
Substance abuse treatment	*In the past year, have you attended a drug or alcohol treatment program?*	0 = No 1 = Yes
Delinquency scale	*In the past 12 months, how often did you…* 1. *paint graffiti or signs on someone else's property or in a public place?* 2. *deliberately damage property that didn't belong to you?* 3. *lie to your parents or guardians about where you had been or whom you were with?* 4. *take something from a store without paying for it?* 5. *get into a serious physical fight?* 6. *hurt someone badly enough to need bandages or care from a doctor or nurse?* 7. *run away from home?* 8. *drive a car without its owner's permission?* 9. *steal something worth more than $50?* 10. *go into a house or building to steal something?* 11. *use or threaten to use a weapon to get something from someone?* 12. *sell marijuana or other drugs?* 13. *steal something worth less than $50?* 14. *take part in a fight where a group of your friends was against another group?* 15. *act loud, rowdy, or unruly in a public place?*	0 = Never 1 = 1 or 2 times 2 = 3 or 4 times 3 = 5 or more times Re-coded so that the top quartile are considered delinquent with this scale: 0 = No (fewer than 5 items with 1 or more incidents) 1 = Yes (5 or more items with 1 or more incidents)
Academic performance	*At the most recent grading period, what was your grade in English or language arts?* *And what was your grade in mathematics?* *And what was your grade in history or social studies?* *And what was your grade in science?*	1 = D or lower 2 = C 3 = B 4 = A Scores averaging < 1.75 were considered low-performing
	Have you ever repeated a grade or been held back a grade?	0 = No 1 = Yes
Socially isolated	*First or only male friend* *First of only female friend*	0 = None listed 1 = 1 or more listed

Same sex attraction	*Have you ever had a romantic attraction to a male (female)?*	0 = No 1 = Yes
Serious argument with parent	*Which of the things listed on this card have you done with your mother (father) in the past 4 weeks?* *Had a serious argument about your behavior*	0 = No 1 = Yes
Suicide attempt by family member or friend	*Have any of your family members tried to kill themselves during the past 12 months?* *Have any of your friends tried to kill themselves during the past 12 months?*	0 = No 1 = Yes (to either question)
Suicide by family member or friend	*Have any of them succeeded?*	0 = No 1 = Yes
Prejudice	*Students at your school are prejudiced.*	0 = No 1 = Yes (agree or strongly agree)
	Teachers at your school treat students fairly.	0 = Yes 1 = No (disagree or strongly disagree)
School connectedness - Teacher relationships	*Teachers at your school treat students fairly*	1 = strongly agree 2 = agree 3 = neutral 4 = disagree 5 = strongly disagree
	Since school started this year, how often have you had trouble getting along with your teachers?	0 = never 1 = just a few times 2 = about once a week 3 = almost every day 4 = every day
School connectedness - Teacher relationships (cont'd)	*How much do you feel your teachers care about you?*	1 = not at all 2 = very little 3 = somewhat 4 = quite a bit 5 = very much

		The last was reverse coded. The 3 items were summed with higher scores indicating more negative relationships. The top 20% were categorized as having poor relationships with teachers.
School connectedness scale – social belonging	*How much do you agree or disagree with the following:* *1. You feel close to people at your school* *2. You feel like you are a part of your school* *3. You are happy to be at your school*	1 = strongly agree 2 = agree 3 = neutral 4 = disagree 5 = strongly disagree The scores for the 3 items were summed. The top 20% of scores were considered socially disconnected at school.
Access to a gun	*Is a gun easily available to you in your home?*	0 = No 1 = Yes
Neighborhood safety	*Do you usually feel safe in your neighborhood?*	0 = Yes 1 = No
Percentage foreign-born	Taken from the contextual database – proportion of the neighborhood that is foreign-born	0 = < 10% foreign-born 1 = ≥ 10% foreign-born
Urban	School was located in a central city as designated by the National Center for Education Statistics and recorded by Quality Education Data	0 = No 1 = Yes

Table 4.7. Protective factors for inter- and intrapersonal violence, the Wave I Add Health interview questions they are derived from, and the coding schemes used in the analysis.

Variable	Interview question(s)	Coding Scheme
Family connectedness scale	1. *How close do you feel to your mother (mother figure)?* 2. *How much do you think she cares about you?* 3. *How close do you feel to your father (father figure)?* 4. *How much do you think he cares about you?* 5. *Most of the time your mother is warm and loving toward you* 6. *You are satisfied with the way your mother and you communicate with each other* 7. *Overall, you are satisfied with your relationship with your mother* 8. *Most of the time your father is warm and loving toward you* 9. *You are satisfied with the way your father and you communicate with each other* 10. *Overall, you are satisfied with your relationship with your father* 11. *You feel loved and wanted* 12. *How much do you feel that your family pays attention to you?* 13. *How much do you feel that people in your family understand you?*	1 = not at all/strongly disagree 2 = very little/disagree 3 = somewhat/neutral 4 = quite a bit/agree 5 = very much/strongly agree Scores for the 13 items were averaged. Respondents in the top quartile were considered to have strong family connectedness. 0 = No (< 4.625) 1 = Yes (≥ 4.625))
School connectedness scale	*How much do you agree or disagree with the following:* 1. *You feel close to people at your school* 2. *You feel like you are a part of your school* 3. *You are happy to be at your school* 4. *The teachers at your school treat students fairly* 5. *You feel safe in your school*	1 = strongly agree 2 = agree 3 = neutral 4 = disagree 5 = strongly disagree The scores for the 5 items were summed. The lowest 20% were considered highly connected at school.
Religion	*How important is religion to you?* *In the past 12 months, how often do you attend religious services?*	0 = Fairly unimportant/ Not important 1 = Very important/ fairly important 0 = attended < 1 time/week 1 = attended at least 1 time/week

Table 4.8. Odds ratios (ORs) and Risk Ratios (RRs) for the unadjusted associations between acculturation and each of the four violence outcomes.

	Suicidal ideation*					
Outcome	Unadjusted OR	95%CI	CLR	Unadjusted RR	95%CI	CLR
Fighting	2.36	(1.56, 3.56)	2.28	1.96	(1.40, 2.74)	1.96
Fight-related injury	2.21	(0.91, 5.35)	5.88	2.12	(0.91, 4.97)	5.46
Suicidal ideation	1.98	(1.28, 3.06)	2.39	1.85	(1.24, 2.76)	2.23
Suicide attempt	2.72	(0.97, 7.59)	7.82	2.63	(0.96, 7.16)	7.46

OR = odds ratio; RR = risk ratio; CI = confidence interval; CLR = confidence limit ratio

Table 4.9. Odds ratios (ORs) for the associations between acculturation and each of the four outcomes, adjusted for confounding, and adjusted for the outcome at Wave I.

Outcome	Adjusted OR*	95%CI	CLR	Adjusted OR†	95%CI	CLR
Fighting	2.32	(1.50, 3.58)	2.39	1.84	(1.09, 3.12)	2.86
Fight-related injury	1.85	(0.88, 3.89)	4.42	1.80	(0.83, 3.93)	4.73
Suicidal ideation	1.34	(0.83, 2.19)	2.64	1.21	(0.67, 2.17)	3.24
Suicide attempt	2.12	(0.70, 6.44)	9.20	1.65	(0.60, 4.59)	7.65

OR = odds ratio; CI = confidence interval; CLR = confidence limit ratio.
* Interpersonal violence models are adjusted for age group, parental welfare status, having access to a firearm, having poor relationships with teachers and knowing someone who committed suicide; intrapersonal violence models are adjusted for age group, parental education level, poor relationships with teachers, knowing someone who attempted suicide and knowing someone who committed suicide.
† Adjusted for the outcome at Wave I in addition to the above variables.

Table 4.10. Odds ratios (ORs) for the associations between acculturation and each of the four outcomes, adjusted for confounding, and adjusted for the four potential mediators.

Outcome	Adjusted OR*	95%CI	CLR	Adjusted OR†	95%CI	CLR
Fighting	2.32	(1.50, 3.58)	2.39	1.86	(1.18, 2.93)	2.48
Fight-related injury	1.85	(0.88, 3.89)	4.42	2.02	(0.77, 5.34)	6.94
Suicidal ideation	1.34	(0.83, 2.19)	2.64	1.18	(0.72, 1.95)	2.71
Suicide attempt	2.12	(0.70, 6.44)	9.20	1.75	(0.58, 5.31)	9.16

OR = odds ratio; CI = confidence interval; CLR = confidence limit ratio.
* Interpersonal violence models are adjusted for age group, parental welfare status, having access to a firearm, having poor relationships with teachers and knowing someone who committed suicide; intrapersonal violence models are adjusted for age group, parental education level, poor relationships with teachers, knowing someone who attempted suicide and knowing someone who committed suicide.
† Adjusted for binge drinking, marijuana use, other drug use, and delinquency, in addition to the above variables.

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V. Results – The Validity of a Proxy Acculturation Scale among U.S. Hispanics[1]

A. Introduction

Acculturation is a complex process, defined as the changes that groups and individuals undergo when they come into contact with another culture (Williams & Berry, 1991). Although there is general agreement that acculturation is an important topic of research, there is little agreement on how to conceptualize and measure it (Arcia, Skinner, Bailey, & Correa, 2001; Berry, 2003). The growth of the Hispanic population and a desire to understand the link between culture and health behaviors (Sam, 2006) has heightened interest in the study of acculturation among epidemiologists and other public health researchers over the past two decades. As interest in understanding how acculturation affects health behaviors and outcomes grows, it is important to have a valid, practical method for measuring it.

A.1. Existing Acculturation Scales

More than three dozen acculturation scales have been created for research. Current theory suggests that acculturation is multi-dimensional. Researchers have proposed separate scales to capture the degree to which an individual maintains one's own culture and the degree to which they participate in another culture (Berry, 2003). However, the majority of scales currently in use are uni-dimensional, solely measuring the respondents' participation in the new culture at the expense of the original culture (Zane & Mak, 2003).

At least 20 scales have been used with the Hispanic population (Lara, Gamboa, Kahramanian, Morales, & Bautista, 2005; Zane & Mak, 2003). The scales range in length from 4 to 69 items (Zane & Mak, 2003). The more widely used scales tend to be more comprehensive and therefore, longer

[1] The results in this chapter have been accepted for publication in the November 2008 issue of the Hispanic Journal of Behavioral Sciences. Authors include some of the committee members listed on the title page.

(e.g., the Acculturation Rating Scale for Mexican Americans (ARSMA), consists of 20 items; the revised, bi-dimensional version, the ARSMA-II, contains 48 items in two separate scales). The N-7, National Alcohol Survey (NAS) acculturation scale used in this study is a uni-dimensional scale based on 12 items (Caetano, 1987a, Table 4.1). The lengthy nature of most acculturation scales makes them time-consuming and costly to administer. As a result, acculturation scales are not currently incorporated in routinely collected national health surveys such as the National Health Interview Survey (NHIS), the Youth Risk Behavior Survey (YRBS) or the National Health and Nutrition Examination Survey (NHANES).

A further limitation of existing scales is that many of them were designed for a single population (e.g., Mexican Americans). However, the U.S. Hispanic population is heterogeneous, with individuals, families and groups arriving from diverse countries with unique national cultures and immigration histories (Hurtado, 1995). The three largest groups of Hispanics in the United States are of Mexican, Puerto Rican and Cuban heritage and patterns of immigration to the United States differ dramatically among these groups (Ortiz, 1995). There is also evidence of ethnic variation among Hispanics in health patterns by acculturation status (Vega & Amaro, 1994; Zsembik & Fennell, 2005). For example, Zsembik and Fennell (2005) reported that while some Mexican immigrant health advantages decline with acculturation, Puerto Rican and Cuban immigrants have more medical conditions than their U.S. mainland-born counterparts. Any measure of acculturation intended for use with the Hispanic population should ideally be validated for use not just in the overall population, but also among subpopulations of Hispanics who trace their heritage to different countries.

A.2. Single-item Proxy Measures

Health researchers who use large, routinely-collected datasets (such as NHIS, YRBS, or NHANES) frequently rely on a single proxy variable to represent acculturation. Typical examples of single proxy acculturation measures include place of birth, generational status, years (or proportion) of life lived in the United States, language spoken at home, or interview language (Abraido-Lanza, Chao, & Florez, 2005; Arcia, Skinner, Bailey, & Correa, 2001; Cabassa, 2003; Lara, Gamboa,

Kahramanian, Morales, & Bautista, 2005). Language use/preference is the most frequently used and strongest single indicator of acculturation (Arcia, Skinner, Bailey, & Correa, 2001; Arends-Toth & van de Vijver, 2006; Borges, Cherpitel, & Mittleman, 2004; Cuellar, Harris, & Jasso, 1980; G Marin, Sabogal, Marin, Otero-Sabogal, & Perez-Stable E, 1987; Norris, Ford, & Bova, 1996). Generational status/nativity and length of time residing in the United States are also standard markers of acculturation (Abraido-Lanza, Chao, & Florez, 2005; Singh & Hiatt, 2006). The advantage of using these variables is that they are easy to assess and they are regularly collected in large health surveys. However, it is questionable whether single items can adequately capture the acculturation process (Arcia, Skinner, Bailey, & Correa, 2001; De La Rosa, 2002; Felix-Ortiz, Newcomb, & Myers, 1994; Lara, Gamboa, Kahramanian, Morales, & Bautista, 2005). The use of single proxy measures that have low validity results in misclassification and bias in epidemiologic studies.

A. 3. Proxy Acculturation Scale (PAS)

The purpose of this paper is to explore the potential for creating a new scale combining several routinely collected acculturation-related variables. Specifically, we examine the validity of a short, 4-item, proxy acculturation scale (PAS4) that incorporates language preferences (i.e., language spoken at home and interview language) and indicators of exposure to the United States (i.e., generational status and proportion of life lived in the United States). We hypothesized that the PAS4 would a) have high internal consistency b) have high correlation with an established acculturation scale (the NAS acculturation scale) c) provide a more sensitive measure of acculturation than the proxy variables taken individually and, d) have similar correlations among subpopulations by country of ancestry. We also investigated a 3-item scale (PAS3) based on language spoken at home, interview language, and proportion of life lived in the United States.

B. Methods

B.1. Data Source

We validated our 4-item, proxy acculturation scale using data from the 1984 NAS, a nationally representative, cross-sectional survey of U.S. adults, which included 5,221 respondents

with an over-sampling of Hispanics (27.8%). A detailed description of the sampling design has been published previously (Santos, 1985). In brief, NAS respondents were sampled using a multi-stage probability sample of households in the 48 contiguous states and Washington, D.C. Study participants were randomly selected from adults, ages 18 years and older, residing in the selected household. The survey was conducted between July 1984 and November 1984 by trained interviewers using a structured questionnaire. The survey was completed in-person at the respondent's residence and lasted approximately one hour. Respondents were given the option of completing the interview in English or Spanish and bilingual interviewers were used when appropriate. The overall response rate was 74.2%; among Hispanics it was 72.2%.

The sample eligible for this study were the 1,453 self-identified Hispanic respondents in the NAS. The majority of these respondents (54.1%) were foreign-born and nearly three-quarters specified that their ancestors were from one of three Latin American countries: Mexico (53.9%), Puerto Rico (14.4%), or Cuba (5.5%). Nearly 60 percent of the respondents were female. Of the 1,453 Hispanic respondents, 7 were missing at least one variable critical to the assignment of acculturation level by the PAS4 measure, and 9 did not provide responses to all of the items in the NAS acculturation scale. These 16 individuals (1.1%) were excluded from our study.

B.2. Proxy Acculturation Scale (PAS)

The NAS dataset included variables for the number of years the respondent had lived in the United States (if not U.S. born), the language in which the interview was conducted, and the generational status of the respondent. The survey also included a question on whether the respondent spoke 'mostly Spanish', 'mostly English' or 'both about the same'. This question was asked separately for conversation between the respondent and his/her spouse, children, brothers and sisters, and parents. Each response ranged from 1 (mostly Spanish) to 3 (mostly English). Valid responses for these four responses were averaged and values less than 2 were coded as mostly Spanish while values of 2 or more were coded as mostly English. Respondents who reported that they only spoke Spanish or, alternatively, that they only spoke English, were automatically given scores of 1 or 3, respectively,

for language spoken at home. Both a 4-item Proxy Acculturation Scale (PAS4) and a 3-item Proxy Acculturation Scale (PAS3) were derived from these proxy acculturation measures. The variables, coding and scores assigned to responses are displayed in Table 5.1. Greater emphasis was placed on the two language variables, with English receiving a score of 2, because language is considered the strongest single indicator of acculturation (Arcia, Skinner, Bailey, & Correa, 2001; G. Marin & Gamba, 1996; Rogler, Cortes, & Malgady, 1991). The proportion of life lived in the United States ranged from 0 to 1 and generational status was scored on an ordinal scale ranging from 0 to 2. The PAS4 scores ranged from 0 to 7 while the PAS3 scores ranged from 0 to 5.

Dichotomized versions of the PAS4 and PAS3 were also created in order to compare them with some of the individual proxy measures used in the literature (e.g., foreign-born) as well as the ordinal version of the NAS acculturation scale used in previous research. Respondents were initially divided into three approximately equal groups based on natural breaks in the distributions, and were then coded as having a low, medium or high level of acculturation. However, an initial assessment of these groupings showed that the PAS measures did not discriminate well between medium and high acculturation levels. These two groupings were therefore combined for analysis. Individuals were then dichotomized by the PAS acculturation scales into either 'low-acculturation' or 'medium/high acculturation'. Using the PAS4, approximately one-third of respondents fell into the former category and two-thirds into the latter. The PAS3 categorized the acculturation level as low for 40 percent of respondents and medium/high for the remaining 60 percent of respondents.

B.3. National Alcohol Survey (NAS) Acculturation Scale

The NAS acculturation scale was used as the "gold standard" against which the PAS was validated. The NAS is a 12-item acculturation scale assessing language ability and usage, preferences for media and entertainment, and social interaction with Anglos compared with Hispanics (Chapter 4, Table 4.1). Item 2 is assigned the average score from a series of 8 questions regarding the respondent's use of English and Spanish with a variety of individuals. Values from each of the 12 items were summed, providing each participant with an acculturation score which ranged from 11 to

44. Researchers at the Alcohol Research Group then selected cut-points, dividing respondents into three approximately equal groups representing low (<18.86), medium (18.86 to 27.94), and high (>27.94) acculturation levels. For this study, the medium and high categories were further combined, creating a dichotomous variable. As a result, approximately one third of the respondents were categorized as having a low acculturation level (n = 474) using the NAS and the remaining two-thirds were categorized as having a medium/high acculturation level (n = 963).

The NAS acculturation scale was a logical comparison choice for use in this analysis for several reasons. First, it is an established measure used previously in the study of the U.S. Hispanic population (Caetano, 1987b; Cherpitel & Borges, 2001). It has high internal reliability (Chronbach's α = .91) and measures acculturation in several domains (i.e., language use, media preferences, interpersonal relationships, beliefs). The 12 items included in the measure were selected through a factor analysis. The scale was found to be positively correlated with generational status (r = .58) and the number of years living in the United States (r = .22; Caetano, 1987a). The scale was also negatively correlated with the age of arrival to the United States (r = - .38). These correlations provide some construct validity for the measure. Second, it was used to measure acculturation in a nationally representative, probability sample of U.S. adults with an over-sampling of Hispanics. Third, there were sufficient numbers of Hispanics in the study population to examine subpopulations by country of ancestry. Although the National Alcohol Survey is conducted approximately every 5 years, the 1984 version was selected for this analysis because of the over-sampling of Hispanics and the use of the full acculturation scale. The 1995 and 2000 surveys used abbreviated versions of the acculturation scale, comprised of 11 and 5 items, respectively, to reduce the length of the survey (Greenfield, 2005). As with the original scale, item 2 on both of the abbreviated scales was assigned the average score from 8 questions regarding language use.

B.4. Demographic Variables

Demographic variables used in this study included gender, age group, and country of ancestry (i.e., the country of origin of most of the respondent's ancestors; Table 5.2). Data on country of ancestry were missing for 20 respondents.

B.5. Data Analyses

Three assessments were conducted to determine the reliability and validity of the PAS. First internal consistency (reliability) was assessed by examining inter-correlations between components of the PAS4 and by computing Cronbach's alpha. Second, validity for the continuous measure was assessed with the Pearson correlation between the PAS4, which ranged from 0 to 7, and the NAS acculturation score, which ranged from 11 to 44. Validity for the dichotomous PAS4 measure was then assessed by examining the crude percent agreement and the Kappa coefficient between the PAS4 and the dichotomized NAS acculturation scale. To determine whether or not the PAS4 was an improvement over each of the single proxy measures, the crude percent agreement and Kappa coefficient, representing agreement between each dichotomous proxy measure and the NAS acculturation scale, were calculated.

Separate correlations were conducted by age group, gender, and by country of ancestry where there were sufficient numbers of respondents ($n \geq 40$). Lastly, correlations were examined after excluding respondents of Puerto Rican ancestry to determine whether the coding of place of birth in this population had an effect on the correlations. Since Puerto Rico is a U.S. territory, the original data collection mechanism automatically coded those born on the island of Puerto Rico as U.S.-born and they subsequently received a score of 1 for the proportion of life lived in the United States.

Initially, we investigated only the PAS4. However, in the course of the analysis, we found a lower than expected correlation between generational status and the NAS acculturation scale (r = .46). We therefore assessed the PAS3 (equivalent to the PAS4, but without generational status). Assessments of reliability and validity were then conducted comparing the PAS3 (interview language,

language spoken at home and proportion of time the respondent lived in the United States) to the NAS acculturation scale.

Analyses account for the complex survey design of the NAS, which included an over-sampling of Hispanics. The NAS sample weights, adjusted for non-response, were used for all analyses. All *n* reported in the tables are unweighted. Confidence intervals around Cronbach's alpha were computed using a SAS macro (Duhachek & Lacobucci, 2004). As current survey software does not incorporate the necessary calculations, confidence intervals around the point estimates were computed using the sampling weights but without specifying the full details of the sampling design (e.g., clustering). The standard errors used in these confidence intervals are potentially underestimated (i.e., smaller than they would be if clustering were factored into the calculation). This study was approved by the Institutional Review Board of the University of North Carolina at Chapel Hill School of Public Health.

C. Results

Among the 1,437 Hispanics included in this study, 54.1% were foreign-born, 21.1% were born in the United States with one or both parents being foreign-born, and 24.7% were born in the United States to U.S.-born parents. The proportion of life lived in the United States among Hispanics ranged from .02 to 1. The majority, 57.9%, chose to conduct the interview in English; 42.1% chose Spanish. Nearly two-thirds, 63.5%, of Hispanics interviewed spoke mostly Spanish at home while 36.5% spoke mostly English. Scores for the PAS4 ranged from .2 to 7 with a mean of 3.34 and a standard deviation of 2.56. PAS3 scores ranged from .2 to 5 with a mean of 2.62 and a standard deviation of 1.93.

C.1. Reliability

Cronbach's alpha for the PAS4 was .84 (95% CI: .83, .85). Each of the scale's components was positively correlated with the other components as well as with the overall PAS4 and the NAS acculturation scale (Table 5.3). Although some of these variables are ordinal, Spearman's non-parametric rank correlation coefficient (computed without using sample weights) provided nearly

identical results to the Pearson correlation coefficient. Generation was the variable with the lowest overall correlation with the NAS acculturation scale. When generation status was removed from the scale (PAS3), Cronbach's alpha remained at an acceptable level (α = .79; 95% CI: .77, .81).

C.2. Validity

Validity of the continuous version of the PAS4 was examined by calculating the Pearson correlation coefficient between the PAS4 and the NAS acculturation scale. A positive correlation was found between the two measures (r = .75; 95% CI: .72, .77; Table 5.3). The dichotomized versions of the two measures were also in accord. The percent agreement between the PAS4 and the dichotomized NAS acculturation scale was .89 and the Kappa coefficient between the two measures was .71 (95% CI: .67, .76). When generational status was removed from the measure (yielding the PAS3), the Pearson correlation coefficient increased (r = .80; 95% CI: .78, .81; Table 5.3), and the percent agreement (.90) and Kappa coefficient (κ = .73; 95% CI: .69, .77) were slightly higher, although not significantly.

Agreement between the dichotomized PAS and NAS acculturation scales was substantially higher than agreement between three of the individual proxy measures and the NAS acculturation scale (Table 5.4). Agreement between interview language and the NAS acculturation scale was similar to agreement between the PAS measures and the NAS acculturation scale.

C.3. Subpopulations

The validity of the continuous and dichotomous versions of the PAS4 and PAS3 was assessed for different countries of ancestry (Table 5.5). While correlations between the two proxy acculturation scales and the NAS acculturation scale remained high among respondents reporting Mexico, Puerto Rico and Cuba as their countries of ancestry, correlations were substantially lower for individuals reporting other Latin American countries of ancestry. There was no meaningful change when those of Puerto Rican ancestry, who automatically received a score of 1 for proportion of life lived in the United States since the island is a U.S. territory, were excluded from the analyses.

Validity was similar for women and men. Correlations among those of differing age groups showed some variation, but remained substantial (Table 5.6). Validity generally increased in each age group when the population was restricted to those of Mexican, Puerto Rican and Cuban heritage, although the confidence intervals overlapped. Values for the PAS4 were very similar to those of the PAS3 across the various age groups.

D. Discussion

The purpose of this paper was to assess the validity of a proxy acculturation scale based on measures that are routinely collected in large health databases. We compared a proxy scale (PAS4) comprised of four variables: language used at home, survey language, proportion of life lived in the United States and generational status, with an established acculturation scale ("gold standard") using a national probability sample of Hispanic adults in the United States. We also examined a 3-item proxy scale (PAS3) and found that the elimination of generational status from the proxy acculturation scale improved validity. The PAS3, comprised of language used at home, interview language and proportion of life lived in the United States, produced a Cronbach's coefficient ($\alpha = .79$; 95% CI: .77, .81) falling in the range of 'respectable to very good' scale reliability (Nunnally, 1978). It was lower than the coefficient obtained by the PAS4 ($\alpha = .84$; 95% CI: .83, .85) and the NAS acculturation scale ($\alpha = .92$; 95% CI: .91, .93), but this is to be expected as the PAS3 contains fewer items.

We recommend the PAS3 over the PAS4 because the former's higher correlation coefficient with the NAS indicates superior validity. The overall positive correlation between the PAS3 and the NAS was reflective of a high degree of correlation between the two measures (Cohen, 1977; Franzblau, 1958). Each of the two language variables explained approximately 50 percent of the variation in the NAS acculturation scale; the proportion of life lived in the United States explained 29 percent of the variation. Combining the three variables increased the r-square value to .64 indicating that the PAS3 is a better tool for determining acculturation than any of the three included proxy measures alone.

Use of the Kappa statistic is considered an excellent assessment of validity when comparing a new 'test' with a "gold standard" (Chmura Kraemer, Periyakoil, & Noda, 2002). The Kappa statistic for the dichotomous versions of the PAS3 and the NAS acculturation scale demonstrated a 'substantial' (Landis & Koch, 1977) degree of agreement beyond that expected by chance. PAS3 was also robust when employed with major subpopulations. There was little difference in correlations between the PAS measure and the NAS scale by gender, age group or country of ancestry for the three countries most often cited by respondents: Mexico, Puerto Rico and Cuba. Data for respondents reporting other Latin American countries of ancestry were analyzed together because there were insufficient numbers to report on individual countries with certainty. The PAS measures did not perform as well among this group of respondents. The reasons for this are not known but may reflect differences in motivation for migration (e.g., seeking higher education, political asylum) or settlement locations (e.g., community with bilingual services, community with few immigrants).

The dichotomous PAS3 measure greatly out-performed three of the four single proxy acculturation measures with regard to agreement with the NAS acculturation scale. However, interview language alone showed substantial agreement with the NAS acculturation scale, and the level of agreement was similar to that of the PAS3 measure. The reasons for the high level of agreement between the dichotomized versions of interview language and the NAS acculturation scale are unknown but may be related to factors associated with the survey format (e.g., face-to-face interview with a bilingual interviewer) or the way the survey was implemented (e.g., interview at the respondent's residence). It is not known whether this level of agreement would carry over to other survey methodologies.

The greatest limitation of the PAS3 is that it is not able to incorporate the complexity of the acculturation process. The PAS3 does not capture group level effects (e.g., immigration policy), immigration context (e.g., voluntariness), or the extent to which individuals maintain their original culture as they acculturate to U.S. culture. The PAS3 can be used to establish an association, but it cannot explain the mechanism behind any relationship between acculturation and health behaviors or

outcomes. To some extent, this shortcoming could be ameliorated by examining the relationship between the PAS3 and other variables, such as socio-economic status, education, people living in the household, participation in formal religion, employment outside the home (among females this may indicate a change in traditional gender roles), and neighborhood immigrant density.

There are also limits to the ability of existing acculturation scales to capture the complexity of the acculturation process (Cabassa, 2003), and, as with any survey, respondents may misunderstand a question, skip over items, or misrepresent the truth, perhaps for social desirability reasons. One advantage of the PAS3 in this regard is that its component items are relatively easy to recall, concrete in nature and unlikely to be misinterpreted or omitted by a respondent.

In general, full-length, multi-dimensional acculturation scales, when available and practical, are the preferred method of measuring acculturation. Use of the PAS3 will introduce more measurement error and potential bias into a study than the use of a more comprehensive acculturation scale. Thus, the PAS3 should be reserved for settings where a more thorough assessment of acculturation is either unavailable (e.g., in conducting a secondary data analysis), impractical or impossible to include.

This study compared two proxy acculturation scales with only one of the many established measures of acculturation. It is not known how the PAS measures would perform when compared with any of the dozens of other existing scales. There is no consensus regarding which, if any, of the existing measures of acculturation best captures this complex process (Cabassa, 2003; Lara, Gamboa, Kahramanian, Morales, & Bautista, 2005). The field of acculturation research continues to evolve, as do the theories describing the mechanisms underlying acculturation and the best way to quantify the construct. Although existing acculturation scales have been used for decades, the environment in which individuals are acculturating has changed over time which may affect the acculturation process. Therefore, we recommend replicating this research using more recent data and selecting another acculturation scale as the "gold standard" to determine how well the PAS3 performs over time and compared with different measures.

Table 5.1. Acculturation-related variables, coding schemes and scoring of the proxy acculturation scales derived from the National Alcohol Survey.

Variable	Survey item	Coding scheme	Score	PAS4 scale	PAS3 scale
Interview language	Respondent is Hispanic and interview was conducted in English Respondent is Hispanic and interview was conducted in Spanish	1 = English 2 = Spanish	0 if Spanish 2 if English	Yes	Yes
Language spoken at home	Do you speak mostly Spanish or English with (person) or do you use both about the same? 1. Your wife/husband/the person that you live with 2. Your children 3. Your brothers and sisters 4. Your parents	1 = Mostly Spanish 2 = both about the same 3 = Mostly English	0 if average of valid responses < 2 2 if average of valid responses ≥ 2	Yes	Yes
Proportion of life lived in the US[a]	In what month, day and year were you born? How many years have you lived in the United States?	The number of years lived in the United States divided by the respondent's age	Value ranging from 0 to 1	Yes	Yes
Generation	In what state, territory, or country was your father born? In what state, territory, or country was your mother born? In what state, territory, or country were you born?	Specific country codes used	0 if foreign-born 1 if 1st generation (at least one parent foreign-born) 2 if respondent and both parents were U.S.-born	Yes	No
Overall scale				Simple sum of scores from the 4 variables – ranging from 0 to 7	Simple sum of scores from the first 3 variables - ranging from 0 to 5

[a]Respondents born on the island of Puerto Rico were considered U.S.-born as it is a U.S. territory. As a result, they were not asked how many years they had lived in the United States but were considered to have been in the United States since birth.

Table 5.2. National Alcohol Survey respondents by gender, age group and country of ancestry.

		Mexico		Puerto Rico		Cuba		Other Latin America[a]		Other Country[b]		Total	
Gender	Age group	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%
Female	18 to 24	80	18.8	22	16.1	8	18.2	14	18.7	22	15.1	146	17.6
	25 to 34	133	31.2	43	31.4	4	9.1	27	36.0	52	35.6	259	31.3
	35 to 44	84	19.7	27	19.7	10	22.7	16	21.3	34	23.3	171	20.7
	45 to 54	49	11.5	13	9.5	6	13.6	9	12.0	16	11.0	93	11.2
	55 to 64	43	10.1	16	11.7	7	15.9	4	5.3	11	7.5	81	9.8
	65+	37	8.7	16	11.7	9	20.5	5	6.7	11	7.5	78	9.4
	Total	426	100	137	100	44	100	75	100	146	100	828	100
Male	18 to 24	61	18.0	6	9.0	1	2.9	4	10.8	16	14.2	88	14.9
	25 to 34	125	37.0	19	28.4	8	23.5	18	48.6	36	31.9	206	35.0
	35 to 44	55	16.3	15	22.4	8	23.5	8	21.6	29	25.7	115	19.5
	45 to 54	44	13.0	10	14.9	6	17.6	5	13.5	14	12.4	79	13.4
	55 to 64	26	7.7	7	10.4	7	20.6	1	2.7	8	7.1	49	8.3
	65+	27	8.0	10	14.9	4	11.8	1	2.7	10	8.8	52	8.8
	Total	338	100	67	100	34	100	37	100	113	100	589	100

NOTE: All counts and percentages are unweighted data.

[a]Includes countries in Central America, South America and the Caribbean, excluding Puerto Rico and Cuba.

[b]Includes the United States, Spain and other countries reported by Hispanic respondents as the one country from which most of their ancestors came.

Table 5.3. Pearson correlations between individual proxy measures, the proxy acculturation scales (PAS4 and PAS3), and the National Alcohol Survey acculturation scale.

	Individual proxy items (reliability)				Derived proxy scales (reliability)		"Gold standard" (validity)
Variable	Generation	Interview language	Language at home	Proportion of life lived in the U.S.	PAS4	PAS3	NAS acculturation scale
Generation	—	.48	.63	.65	.83	.67	.46
Interview language		—	.62	.49	.82	.87	.71
Language at home			—	.58	.89	.91	.72
Proportion of life lived in the US				—	.74	.70	.54
PAS4					—	.97	.75
PAS3						—	.80
NAS acculturation scale							—

NOTE: PAS4 = 4-item proxy acculturation scale. PAS3 = 3-item proxy acculturation scale.
$p < .01$ for all cells in the table.

Table 5.4. Acculturation level criteria, percent agreement, and Kappa coefficients showing agreement between the proxy measures and the dichotomized National Alcohol Survey (NAS) acculturation scale.

	Dichotomized acculturation level criteria		Agreement with dichotomous NAS acculturation measure	
Variable	Low acculturation (n[a])	Medium/high acculturation (n[a])	Percent agreement	Kappa coefficient (95% CI)
Individual proxy items				
Generation	Foreign-born (775)	U.S.-born (662)	.69	.37 (.33, .41)
Proportion of life lived in the U.S.	< 0.5 (604)	≥ 0.5 (833)	.77	.41 (.36, .46)
Language spoken at home	Mostly Spanish (913)	Mostly English (524)	.74	.48 (.44, .52)
Interview language	Spanish (469)	English (968)	.89	.71 (.67, .75)
Derived proxy scales				
PAS4	≤ 1 (492)	> 1 (945)	.89	.71 (.67, .76)
PAS3	≤ 1 (575)	> 1 (862)	.90	.73 (.69, .77)

NOTE: PAS4 = 4-item proxy acculturation scale. PAS3 = 3-item proxy acculturation scale.
[a]The number of respondents is unweighted.

Table 5.5. Correlations and agreements between the proxy acculturation scales (PAS4 and PAS3) and the National Alcohol Survey (NAS) acculturation scale among Hispanic respondents by country of ancestry and gender.

	Country of ancestry				Gender		Total
Measure	Mexico	Puerto Rico	Cuba	Other Latin America[a]	Men	Women	All Hispanics
PAS4							
Pearson correlation coefficient (95% CI)	.73 (.70, .76)	.87 (.83, .90)	.83 (.75, .89)	.59 (.45, .70)	.70 (.66, .74)	.78 (.76, .81)	.75 (.72, .77)
Percent agreement[b]	.90	.91	.88	.71	.90	.88	.89
Kappa coefficient[b] (95% CI)	.75 (.69, .80)	.78 (.69, .87)	.76 (.63, .89)	.44 (.29, .60)	.70 (.63, .77)	.72 (.66, .77)	.71 (.67, .76)
PAS3							
Pearson correlation coefficient (95% CI)	.79 (.76, .82)	.85 (.81, .89)	.83 (.74, .89)	.60 (.46, .70)	.77 (.74, .80)	.81 (.79, .83)	.80 (.78, .81)
Percent agreement[b]	.91	.91	.88	.70	.90	.89	.90
Kappa coefficient[b] (95% CI)	.78 (.72, .83)	.78 (.70, .87)	.76 (.63, .89)	.42 (.27, .58)	.71 (.64, .77)	.74 (.69, .80)	.73 (.69, .77)
n[c]	764	204	78	112	596	841	1437

[a]Includes countries from Central and South America and Spanish-speaking countries of the Caribbean, excluding Puerto Rico and Cuba.
[b]Calculated for the dichotomized versions of the acculturation scales.
[c]The number of respondents is unweighted.
$p < .01$ for all Pearson correlation coefficients.

Table 5.6. Correlations and agreements between the proxy acculturation scale (PAS3) and the National Alcohol Survey (NAS) acculturation scale among Hispanic respondents by age group.

Measure	Ages 18-24	Ages 25-34	Ages 35-44	Ages 45-54	Ages 55-64	Ages 65+	All ages
All Hispanics							
Pearson correlation coefficient (95% CI)	.75 (.68, .80)	.84 (.81, .86)	.72 (.65, .77)	.79 (.73, .84)	.61 (.49, .71)	.85 (.79, .89)	.80 (.78, .81)
Percent agreement[a]	.94	.92	.86	.86	.84	.88	.90
Kappa coefficient[a] (95% CI)	.65 (.52, .78)	.76 (.69, .84)	.65 (.54, .75)	.70 (.60, .81)	.68 (.53, .83)	.76 (.64, .89)	.73 (.69, .77)
n [b]	237	471	291	174	132	132	1437
Hispanics of Mexican, Puerto Rican and Cuban ancestry only							
Pearson correlation coefficient (95% CI)	.78 (.71, .83)	.86 (.82, .88)	.71 (.63, .77)	.74 (.65, .81)	.70 (.59, .79)	.89 (.83, .92)	.81 (.79, .83)
Percent agreement[a]	.94	.93	.88	.87	.85	.91	.91
Kappa coefficient[a] (95% CI)	.72 (.59, .86)	.80 (.72, .88)	.70 (.59, .81)	.74 (.63, .86)	.70 (.53, .87)	.83 (.70, .95)	.78 (.74, .82)
n [b]	178	332	199	128	106	103	1046

[a]Calculated for the dichotomized versions of the acculturation scales.
[b]The number of respondents is unweighted.
$p < .01$ for all Pearson correlation coefficients.

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VI. Results – The Association between Acculturation and Interpersonal Violence among Hispanic/Latino Adolescents in the United States[2]

A. Introduction

Violence among Hispanic/Latino adolescents in the United States is of particular concern because Hispanics are the largest and fastest growing minority group in the United States, comprising 14.8% of the U.S. household population in 2006, (U.S. Census Bureau, 2006) and they are relatively young (34.3% under the age of 18, compared with 25.5% of the population overall; Suro et al., 2007). The burden of intentional injury on the Hispanic population is substantial. Homicide is the second leading cause of death among Hispanics ages 15 to 24 (Singh & Siahpush, 2001). In 2005 the homicide death rate per 100,000 U.S. Hispanics ages 10 to 24 was 12.2, five times the rate among non-Hispanic whites (2.5), although less than half that among non-Hispanic blacks (32.8; NCIPC, 2005). The rate for Hispanic males (20.9) was 8.4 times the rate for Hispanic females (2.5). The rate was highest among Hispanics ages 15 to 19 (15.7) and 20 to 24 (20.3) years. The CDC estimates that nearly 90,000 Hispanic adolescents were treated for assault-related injuries in U.S. emergency departments in 2006.

Youth Risk Behavior Surveillance System data (2007) indicate that the prevalence of fighting is higher among Hispanic (40.4%) and black (44.7%) high school students compared with white (31.7%) high school students (Centers for Disease Control and Prevention, 2008). The prevalence of injury due to a physical fight follows a similar pattern, with Hispanic (6.3%) and black (5.3%) adolescents experiencing a greater proportion of injuries compared with white adolescents (3.0%).

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[2] The results in this chapter will be submitted for publication in the peer-reviewed literature. Authors will include committee members listed on the title page.

Although Hispanics have higher rates of homicide compared with non-Hispanic whites, U.S.-born Hispanics have higher age-adjusted homicide rates compared with foreign-born Hispanics (Singh & Hiatt, 2006). As fatality rates differ based on nativity (a proxy for acculturation) we theorized that the risk of non-fatal interpersonal violence would differ within the Hispanic/Latino population by acculturation level. Acculturation is defined as the changes that occur in culture patterns when groups of individuals having different cultures come into continuous contact (Berry, 2003; Redfield, Linton, & Herskovits, 1936). In this paper we are specifically referring to the changes that occur among Hispanic/Latino adolescents as they adapt to life in the United States.

The theory of acculturative stress asserts that the process of acculturation leads to increased stress which can overwhelm the individual's resources for coping, resulting in the adoption of negative behaviors (Rogler, Cortes, & Malgady, 1991; Vega, Zimmerman, Gil, Warheit, & Apospori, 1993). Although new immigrants experience significant stress related to migration, adaptation, and language acquisition, they may also feel safe, hopeful, and optimistic (Balls Organista, Organista, & Kurasaki, 2003). As they acculturate, stress may be caused by marginalization, recognition of institutional racism, discrimination, separation from a traditional way of life, or intergenerational conflict (Viruell-Fuentes, 2007; Williams & Berry, 1991). Acculturation may also result in the acquisition of behaviors that are normative in the United States but are deemed inappropriate in traditional Latino families, such as children challenging parents (Gonzales, Deardorff, Formoso, Barr, & Barrera, 2006).

Prior studies have found that increasing acculturation is associated with several health behaviors that are predictive of violence. The most studied and consistent relationship is that between higher acculturation and increased alcohol use among women (Zemore, 2007). This association is robust to changes in acculturation measure and study population; the relationship among men is unclear. Higher levels of acculturation have also been significantly related to illicit drug use (Cherpitel & Borges, 2002; Ebin et al., 2001; Epstein, Botvin, & Diaz, 2001), delinquency

(Samaniego & Gonzales, 1999), aggression (Smokowski & Bacallao, 2006), and conduct problems (Gonzales, Deardorff, Formoso, Barr, & Barrera, 2006). Additionally, one of the most consistent risk factors for violence is lower socioeconomic status (Cubbin, LeClere, & Smith, 2000). Persons of low education and those who are unemployed are at significantly increased risk of death from homicide (Cubbin, LeClere, & Smith, 2000).

More recently, research has identified several variables that serve to buffer Hispanic/Latino adolescents from violence in U.S. society. Neighborhoods with large immigrant populations are associated with reduced homicide (Krueger, Bond Huie, Rogers, & Hummer, 2004), and higher levels of familism, a traditional Latino cultural attribute, has a negative association with acculturation stress (Gil, Wagner, & Vega, 2000) and aggressive behavior (Smokowski & Bacallao, 2006).

The literature has also emphasized the heterogeneity among Hispanic subgroups (Vega & Amaro, 1994). Hispanics from different countries of origin differ by median age, median income, and education level (Suro et al., 2007). They also differ in other factors that influence the process of acculturation including the reason for immigration (e.g., political, employment), characteristics of the host community (e.g., attitude toward immigrants, bilingual services), and U.S. policies toward immigrants from differing countries (e.g., early Cuban immigrants were provided relocation assistance; Berry, 2003; Caetano & Clark, 2003). Because of their U.S. citizenship, those of Puerto Rican heritage tend to be more acculturated to U.S. society in general. They score higher on English language proficiency, have relatively more access to U.S. culture, and are free to travel between the U.S. mainland and the island of Puerto Rico (Arcia, Skinner, Bailey, & Correa, 2001; Bettes, Dusenbury, Kerner, James-Ortiz, & Botvin, 1990). Puerto Rican Americans also have a history of colonization and subsequent conflict with the U.S. mainland, which influences their acculturation experience (Balls Organista, Organista, & Kurasaki, 2003). Mexican Americans have a migration history that includes labor exploitation and discrimination, which impact the acculturation process. These differing experiences may influence how individuals respond to acculturation and acculturation stress, and therefore it is important to examine associations separately by country of ancestry.

Prior research has also identified gender as a modifier of the association between acculturation and risk factors for violence, such as alcohol (Zemore, 2007) and illicit drug use (Amaro, Whitaker, Coffman, & Heeren, 1990), with females experiencing a greater effect. As females acculturate to life in the United States they tend to replace traditional gender roles with the adoption of U.S. norms (Rogler, Cortes, & Malgady, 1991). These changes among acculturating female adolescents may foster acculturation-related stress and conflict with parents who expect them to adhere to traditional gender roles and to put family expectations and needs first (Zayas, Lester, Cabassa, & Fortuna, 2005).

The purpose of this research is to examine the association between acculturation and interpersonal violence among Hispanic/Latino adolescents in the United States. This study used a prospective analysis of a nationally representative sample of U.S. Hispanic/Latino adolescents. We hypothesized that Hispanic/Latino adolescents of moderate-to-high acculturation would be more likely to fight and sustain a fight-related injury compared with those of low acculturation. We also hypothesized that the acculturation-fighting relationship would be modified by country of origin and gender.

B. Methods

B.1. Sample

The data for this study come from the National Longitudinal Study of Adolescent Health (Add Health). The first wave of the study enrolled 20,745 adolescents in grades 7 through 12 in the 1994-95 school year. Of these, 13,570 also completed the second wave. Students were recruited from a clustered probability sample of 80 high schools and 52 middle schools that sent graduates to those high schools. The high schools were drawn from a random sample of all U.S. high schools, stratified by region, urbanicity, school size, school type, and racial composition (Harris et al., 2003). Several populations were over-sampled, including those of Cuban and Puerto Rican heritage.

A total of 2,298 self-identified Hispanic/Latino adolescents reported data at both time points and are the focus of our analyses. These adolescents comprise 17% of the total number of respondents

with available data for Waves I and II. The Hispanic/Latino sample is 51.1% male and ranges in age from 11 to 20 years at baseline. Of the 2,298 Hispanic/Latino adolescents available for study, 64 were missing one or more variables used to determine acculturation level. These adolescents included nine individuals who self-identified as Hispanic or Latino but indicated a language other than English or Spanish was spoken in the home. Another 20 respondents failed to report outcome data for fighting, and 26 failed to report outcome data for fighting resulting in an injury. Lastly, 145 individuals were missing data for one of the 5 covariates used in our final models. As a result, a total of 2,069 respondents (90%) were included in the model for fighting and 2,065 were included in the model for fight-related injury.

B.2. Procedures

Wave I interviews were conducted between April and December 1995, and Wave II interviews were conducted during the same months in 1996. The interview questions encompassed a broad range of issues including general health, academics, family structure, friendship networks, romantic relationships and neighborhood characteristics. Additional sections encompassed risky behaviors, including alcohol and drug use, delinquency, sexual relationships, violence, and suicide. The interviews were conducted in-person, usually at the adolescent's home, and took between one and two hours to complete. Data were collected via laptop computer. For potentially sensitive sections of the interview, audio computer assisted self-interviewing (ACASI) technology was provided, allowing respondents to listen to questions through earphones and enter their responses directly into the computer. Interviewers assisted respondents as necessary.

For this study, measures of the exposure and all covariates were taken from Wave I, and the outcome data (fighting and fight-related injury) were taken from Wave II. In addition to the in-home questionnaire, the parent questionnaire was used to supplement parental education data provided by the adolescents. A contextual file containing aggregate data at the state, county, census tract and block group levels was used to obtain the proportion of foreign-born individuals living in each

respondent's block group. Data from the two in-home questionnaires, the parental questionnaire, and the contextual file were merged through linked identifiers.

B.3. Measures

A great strength of the Add Health dataset is the rich spectrum of measures available. In examining the relationship between acculturation and interpersonal violence, we considered as confounders, or modifiers, a range of demographic, mental health, academic performance, personal relationship, school connectedness, and community factors.

Dependent Variable. Interpersonal violence was the dependent variable in our analyses. It was measured based on responses to two questions: "During the past 12 months, how often did you get in a serious physical fight?" and "During the past 12 months, how many times were you in a physical fight in which you were injured and had to be treated by a doctor or nurse?" Responses were dichotomized because the results were highly right-skewed with few individuals reporting more than one incident.

Independent variables. Acculturation level was the main independent variable of interest. The 3-item proxy acculturation scale (PAS3) described in Chapter 5 was used to measure acculturation. Two items focused on language and included: "What language is usually spoken in your home?", and, "In what language was the interview conducted?" The latter was reported by the interviewer based on the need for on-site translation. The last component of the scale, the proportion of the respondent's life lived in the United States, was derived from the respondent's birth month and year and the month and year that the respondent moved to the United States, if not U.S.-born. Greater emphasis was placed on the two language variables, with English receiving a score of 2, because language is considered the strongest single indicator of acculturation (Arcia, Skinner, Bailey, & Correa, 2001; Marin & Gamba, 1996; Rogler, Cortes, & Malgady, 1991). The proportion of life lived in the United States ranged from 0 to 1. The simple sum of the scores for the 3 items resulted in PAS3 scores ranging from 0 to 5.

The scale was dichotomized and respondents below the lowest quartile were assigned to the low acculturation level. The remaining respondents were assigned to the moderate-to-high acculturation level. The PAS3 separated respondents by tertiles in the validation study in Chapter 5. However, the clustering of this population, with a large number of respondents receiving three points on the scale, made it impractical to make this division, so the lowest quartile was used instead. Internal scale reliability was high ($\alpha = 0.79$; 95% CI: 0.77, 0.81; Chapter 5). Reliability in the Add Health study population was lower, but considered acceptable ($\alpha = 0.62$; 95% CI: 0.60, 0.65).

An additional 35 variables were examined during the analyses (Table 4.1). Full covariate descriptions are available in Chapter 4, section B.2.1, and in Tables 4.6 and 4.7.

B. 4. Statistical Analysis

Bivariate analyses were conducted to establish the unadjusted associations between acculturation level at Wave I and the two measures of interpersonal violence at Wave II. To explore the potential for confounding, odds ratios (OR) were calculated for the association between acculturation level and each of the population characteristics, and between each of the population characteristics and the two outcomes. Variables were considered potential confounders if they resulted in a change in estimate of greater than 10% when comparing the absolute value of the natural log of the adjusted OR divided by the natural log of the unadjusted OR for either outcome (Rothman & Greenland, 1998). Age was collapsed into three groups, 11 to 14, 15 to 17, and 18 and older, because there were few respondents at the extremes of age. Substance use and abuse variables and the delinquency scale, while of interest, were not examined as potential confounders because they are theorized to lie on the causal pathway between acculturation and interpersonal violence.

Multivariable logistic regression was used to model the odds of 1) fighting, and 2) fight-related injury, by acculturation level. Based on background knowledge, age group was included in the models. An additional four variables were associated with both the exposure and the outcomes and met the change in estimate criterion (10%) for either outcome. These included welfare status (i.e., either resident parent receiving public assistance), access to a firearm (i.e., gun readily accessible in

the home), poor relationships with teachers (a measure of school connectedness), and knowing someone who had committed suicide. To accommodate potential modification, models were applied separately by gender, and by each of the three most commonly reported countries of ancestry.

SUDAAN 9.0 survey software (Research Triangle Institute, 2004) was used to obtain regression coefficients and standard errors that correctly account for the complex clustering and stratification used in the Add Health design. Probability sampling weights were utilized for all analyses in order to adjust for non-response and sampling fractions. The results produced should therefore be representative, given sampling variability, of U.S. Hispanic/Latino adolescents in grades 7 through 12 in the 1994-95 school year.

C. Results

The study population was divided approximately equally by gender, and the mean age was 15.6 years. The vast majority of Hispanic/Latino respondents reported that their ancestors were from one of three countries: Mexico, Puerto Rico, or Cuba (Table 6.1). Based on PAS3 scores, which ranged from .05 to 5, with a mean of 3.74, 76.2% of respondents were assigned a moderate-to-high acculturation level.

Persons involved in fighting were more often male, and were disproportionately from households receiving public assistance, with extended family in residence, and with access to firearms (Table 6.1). Violent outcomes were also disproportionately high among respondents with mental health issues, substance abuse problems, poor school performance, and high delinquency scores. A history of same sex attraction, a serious argument with a parent, poor relationships with teachers, disconnection from school, and knowing someone who had attempted or committed suicide also were associated with an increase in the proportion of students reporting fighting and fight-related injury. Several variables had a decreased proportion of respondents reporting violent outcomes. These included living in a two-parent household, attending weekly religious services, feeling religion is very important, living in a neighborhood that is at least 10% foreign-born, and living in an urban area.

The odds of a violent outcome were approximately twice as high among those of moderate-to-high acculturation compared with those of low acculturation (Table 6.2). This was true for both fighting and fight-related injury. The results for the latter were less precise. The elevated association between acculturation and violence persisted after adjusting for demographic and other confounding variables (Table 6.2).

The final model was run separately for those of Mexican, Puerto Rican and Cuban heritage as well as for males and females (Table 6.3). The association between acculturation level and violence was consistent across subgroups, with an increase in violent outcomes associated with increased acculturation. The association between acculturation and fighting appeared to be stronger among females than among males, but the confidence intervals for the two estimates overlapped substantially. Similarly, moderate-to-high acculturation appeared to be more strongly associated with increased violence among those of Mexican and Puerto Rican ancestry compared with those of Cuban ancestry although the estimates are imprecise.

D. Discussion

Moderately-to-highly acculturated Hispanic/Latino adolescents were more likely to report violent outcomes than their less acculturated counterparts. Respondents scoring 1 or more points on the PAS3 were approximately twice as likely to be involved in fighting or to be injured in a fight compared with respondents scoring less than 1 points.

These findings are consistent with research on immigrant mortality due to violence indicating that foreign-born (a proxy for low acculturation) Hispanics have a lower risk of homicide compared with U.S.-born Hispanics, after controlling for demographic and socioeconomic variables (Singh & Siahpush, 2001). They are also in agreement with findings linking higher acculturation with alcohol use, (Ebin et al., 2001) delinquency, (Samaniego & Gonzales, 1999; Vega, Gil, Warheit, Zimmerman, & Apospori, 1993) and aggression among adolescents (Smokowski & Bacallao, 2006).

We conducted separate analyses by gender and country of origin, two variables that have demonstrated modification in other studies of acculturation. Results were suggestive of modification,

but lacked precision. The association between acculturation and interpersonal violence appeared stronger among females than males. This is consistent with research indicating that females show a greater effect of acculturation on health behaviors, such as alcohol use, (Zemore, 2007) which, in turn, is predictive of violence. Gender differences in acculturation research have been attributed to the greater differential in gender roles and traditionally accepted behaviors for females in Latin America compared with the United States (Hurtado, 1995; Rogler, Cortes, & Malgady, 1991). Acculturation to U.S. society appears to diminish the gender role differential between males and females.

The literature has been equivocal regarding modification by country of origin. The overall odds ratios reported in this study are driven largely by the data for respondents of Mexican heritage, which comprised more than half of the study population. The estimates presented for the Cuban population were not consistent with these overall estimates, but are based on very small numbers and are therefore unstable.

The Add Health data provided an extensive set of variables to examine for potential confounding. All of the variables analyzed, with the exception of urban living, were associated with the outcome as expected based on previous research. Generally, living in an urban environment is predictive of interpersonal violence (Branas, Nance, Elliott, Richmond, & Schwab, 2004). However, our data showed that Hispanic/Latino adolescents living in a central city had a decreased prevalence of violent outcomes compared with those not living in a central city. Several factors may have influenced this result. First, large cities are more likely to provide established immigrant communities which have been shown to be protective (Krueger, Bond Huie, Rogers, & Hummer, 2004). Second, Hispanic/Latino adolescents may feel more connected to their friends, neighborhood and school if they are in an environment that supports their ethnic heritage. Lastly, urban environments may provide greater access to mental health treatment and bilingual services for those who are having difficulty with the acculturation process.

We selected the covariates included in multivariable models based on background knowledge and the change in estimate criterion. In addition to age group and welfare status, the final models

included access to a firearm in the home, poor teacher relationships, and knowing someone who had committed suicide. We were intrigued by the latter, and found references in the literature to other instances where aspects of inter- and intra-personal violence, such as depression and violence, were associated (Borowsky & Ireland, 2004). The authors theorized that while depression is considered an internalizing behavior and violence is considered externalizing, there may be crossover in how these are manifested. Although the literature has identified race among Hispanics as a separate factor in health outcomes, (Borrell & Crawford, 2006) it was not incorporated in this analysis because there were only nine Hispanic respondents who self-identified as black and scored low on the acculturation scale, none of whom reported either outcome of interest.

This research has implications for violence prevention efforts among Hispanic/Latino adolescents in the United States. Violence prevention programs tailored for Latino adolescents and their families should address acculturation and the potential conflicts it may engender. Cultural differences should be accounted for in the design and implementation of services. Research has shown that family oriented, targeted interventions reduce emotional and behavioral problems and improve family interactions (Szapocznik & Williams, 2000), but mental health services have historically been insufficiently available, accessible, and culturally acceptable to ethnic minority communities in need (Berry, 2003).

Our results must be interpreted with some caution because of recognized limitations. The results are not generalizable to out of school youth, who may be more likely to experience violent outcomes. However, previous research has shown that because of low high-school drop-out rates, population-wide estimates are not significantly biased by the use of school-based surveys (Udry & Chantala, 2003). Furthermore, weighting was used in the analysis stage to adjust for non-response. Additionally, whenever information is self-reported, there is potential for measurement error. Bias may exist due to under-reporting of negative behaviors for social desirability reasons. Computer-assisted technology was utilized to provide adolescents with a measure of privacy for more intrusive sections (Miller-Johnson, Sullivan, & Simon, 2004), however, those needing translation may have

been more reluctant to report sensitive behaviors. Reporting bias may also be in the form of over-reporting, although the impact of this should be minimized since most variables were dichotomized.

The study was also limited in terms of its ability to assess the complex process of acculturation. Although there is no agreement on the best way to measure acculturation, a multi-dimensional scale, if available, would have provided a better estimate of this complex process (Cabassa, 2003). There were also a variety of outcome measures available in the Add Health dataset. We chose to use generic terms for experiencing violence. Future research may analyze data separately for perpetrators versus victims of violence. Finally, the field would also benefit from mediation analyses elucidating more proximal causes of violence and discerning the mechanisms behind the association between acculturation and violence.

Table 6.1. Population characteristics, overall and by reported fighting, among Hispanic adolescents in middle and high school in the United States.

	Overall sample	No fighting	Fighting	Fighting with injury*
	No. (%)	No. (%)	No. (%)	No. (%)
Total	2298 (100)	1742 (100)	536 (100)	134 (100)
Independent variable of interest				
Moderate-to-high acculturation level	1687 (76.2)	1,232 (72.8)	440 (86.3)	110 (87.3)
Low acculturation level	547 (23.8)	457 (27.2)	85 (13.7)	18 (12.7)
Individual demographics				
Gender				
Male	1147 (51.1)	776 (46.5)	360 (64.0)	90 (59.2)
Female	1151 (48.9)	966 (53.5)	176 (36.0)	44 (40.8)
Age (years)				
11-14	545 (37.6)	385 (35.8)	154 (41.6)	40 (35.3)
15-17	1505 (52.5)	1,166 (54.0)	326 (49.5)	80 (55.2)
18-21	246 (9.8)	189 (10.2)	56 (8.9)	14 (9.5)
Country of heritage				
Mexico	1135 (56.8)	843 (53.8)	282 (58.7)	64 (54.4)
Puerto Rico	446 (14.1)	317 (12.4)	123 (17.4)	33 (16.9)
Cuba	347 (6.4)	280 (6.2)	66 (6.4)	14 (6.0)
Other - Central or South America	250 (13.1)	211 (14.8)	37 (6.4)	10 (7.2)
Other	215 (12.7)	167 (12.7)	47 (11.1)	13 (15.6)
Family/household characteristics				
Parental education – at least one parent is at least a high school graduate	1401 (61.4)	1,049 (60.6)	342 (64.1)	84 (66.0)
At least one resident-parent receives public assistance (welfare)	412 (19.5)	296 (17.6)	111 (25.0)	27 (26.3)
Two-parent household	1540 (66.3)	1,188 (67.8)	341 (61.9)	85 (64.3)
Extended family living in the home	585 (24.9)	444 (23.9)	133 (27.6)	28 (22.2)
Gun accessible in the home	257 (10.9)	180 (9.4)	76 (15.1)	26 (15.5)
Religion				
Attends weekly religious services	871 (39.8)	695 (41.8)	169 (33.9)	40 (33.4)
Religion is very important	926 (40.1)	738 (42.5)	180 (33.9)	48 (37.3)
Personal characteristics				
Mental health counseling in last 12 mos.	274 (13.1)	179 (11.7)	88 (16.8)	23 (18.3)
Symptoms of major depressive disorder (modified CES-D)	309 (12.7)	200 (9.8)	107 (20.7)	36 (32.0)
Ever used marijuana	631 (26.4)	395 (20.7)	230 (43.4)	68 (49.3)
Ever used other illicit drugs	281 (11.9)	177 (8.6)	103 (21.7)	29 (17.9)
Alcohol or drug treatment in last 12 mos.	71 (4.1)	45 (3.4)	26 (6.2)	7 (5.4)
Binge drinking in last 12 mos.	617 (26.0)	391 (21.0)	222 (40.6)	59 (42.6)
High delinquency score	652 (28.2)	356 (19.3)	290 (53.8)	78 (57.3)
Ever repeated a grade	629 (29.4)	449 (27.2)	171 (34.8)	44 (38.5)

Low grade point average (<1.75) in core courses (English, science, math, history)	308 (11.1)	207 (10.1)	99 (14.0)	28 (13.4)
Worked >5 hrs/wk during school year	754 (30.9)	561 (31.0)	186 (31.3)	53 (31.2)
Personal relationships				
Socially isolated – no friends reported	62 (4.0)	52 (4.5)	9 (2.3)	4 (7.8)
History of same sex attraction	162 (7.8)	122 (7.2)	39 (8.8)	15 (16.9)
Serious argument with a parent over adolescent's behavior in last 4 weeks	894 (38.7)	647 (36.8)	238 (44.2)	66 (49.8)
Strong family connectedness	552 (25.3)	429 (25.2)	118 (26.0)	23 (13.2)
Poor relationships with teachers	468 (21.2)	295 (17.9)	170 (31.4)	53 (40.1)
Knows someone who attempted suicide	476 (22.2)	323 (19.9)	150 (29.3)	37 (27.6)
Knows someone who committed suicide	81 (4.0)	41 (2.4)	38 (8.6)	15 (12.9)
School and community				
Students at school are prejudiced	855 (36.0)	650 (36.8)	200 (33.5)	45 (39.2)
Teachers do not treat students fairly	393 (17.1)	268 (15.9)	121 (20.9)	30 (23.2)
Disconnected from school	434 (19.4)	299 (17.1)	133 (21.6)	36 (29.1)
Taught conflict resolution in school	1695 (75.8)	1,284 (74.9)	395 (78.9)	99 (80.0)
Taught suicide prevention in school	1487 (61.8)	1,132 (61.4)	339 (62.6)	87 (60.1)
Feels unsafe in neighborhood	434 (17.5)	305 (16.0)	129 (22.2)	32 (21.1)
Urban – central city	1225 (59.8)	930 (73.6)	295 (61.3)	73 (62.8)
Neighborhood is ≥10% foreign-born†	1590 (57.9)	1,226 (59.4)	352 (54.1)	85 (55.7)

NOTE: Counts are unweighted. Percentages are weighted. Counts may not add to total due to missing data.
*Fighting with injury is a subset of fighting.
†Neighborhood data at the block-group level were derived from the U.S. Bureau of the Census.

Table 6.2. ORs for fighting and fight-related injury among moderate-to-high-acculturation Hispanic adolescents compared with low-acculturation Hispanic adolescents in middle and high school in the United States, 1996.*

	Unadjusted			Adjusted		
Outcome	OR	95%CI	CLR	OR†	95%CI	CLR
Fighting	2.36	(1.56, 3.56)	2.28	2.32	(1.50, 3.58)	2.39
Fighting with injury	2.21	(0.91, 5.35)	5.88	1.85	(0.88, 3.89)	4.42

OR = odds ratio; CI = confidence interval; CLR = confidence limit ratio
*Independent variable and covariates are measured at Wave I and outcomes are measured at Wave II.
†Adjusted for age group, parental welfare status, having access to a firearm, having poor relationships with teachers and knowing someone who committed suicide.

Table 6.3. ORs for fighting and fight-related injury, among select subpopulations of moderate-to-high-acculturation Hispanic adolescents compared with low-acculturation Hispanic adolescents in middle and high school in the United States, 1996.*

	Fighting					
	Unadjusted			Adjusted		
Subpopulation	OR	95%CI	CLR	OR†	95%CI	CLR
Males	1.89	(1.09, 3.26)	2.99	1.92	(1.10, 3.33)	3.03
Females	3.61	(1.83, 7.15)	3.91	2.99	(1.45, 6.19)	4.27
Mexican ancestry	2.37	(1.36, 4.14)	3.04	2.21	(1.30, 3.75)	2.88
Cuban ancestry	1.08	(0.43, 2.71)	6.30	1.54	(0.27, 8.82)	32.67
Puerto Rican ancestry	4.93	(1.71, 14.25)	8.33	3.38	(1.41, 8.09)	5.74
	Fighting with Injury					
Males	2.18	(0.83, 5.75)	6.93	2.08	(0.70, 6.15)	8.79
Females	2.19	(0.66, 7.29)	11.05	1.57	(0.42, 5.89)	14.02
Mexican ancestry	1.62	(0.39, 6.72)	17.23	1.50	(0.43, 5.19)	12.07
Cuban ancestry	1.15	(0.20, 6.57)	32.85	4.42	(1.16, 16.86)	14.53
Puerto Rican ancestry	3.14	(0.58, 17.01)	29.33	1.94	(0.54, 6.97)	12.91

OR = odds ratio; CI = confidence interval; CLR = confidence limit ratio
*Independent variable and covariates are measured at Wave I and outcomes are measured at Wave II.
†Adjusted for age group, parental welfare status, having access to a firearm, having poor relationships with teachers and knowing someone who committed suicide.

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VII. Results – The Association between Acculturation and Intrapersonal Violence among Hispanic/Latino Adolescents in the United States[3]

A. Introduction

Suicide is the third leading cause of death among Hispanics ages 15 to 24 and the fifth leading cause of death among Hispanics ages 10 to 14 (NCIPC, 2005). In 2005, the age adjusted suicide death rate among Hispanic youths (ages 10 to 24) in the U.S. was 5.3 per 100,000. This is lower than the rate among whites (7.9), and similar to the rate among blacks (4.9), in this age group (NCIPC, 2005). The rate for Hispanic males (8.2) was four times the rate for Hispanic females (2.0).

Among adolescents, although the suicide completion rates are highest among whites, the prevalence of non-lethal suicidal behaviors are highest among Hispanics, particularly females. Youth Risk Behavior Surveillance data from 2007 indicate that the prevalence of seriously considering suicide during the past 12 months was higher among Hispanic high school students (15.9%) compared with their white (14.0%), and black (13.2%) counterparts, and was highest among Hispanic females (21.1%). Overall, 10.2% of Hispanic students attempted suicide compared with 5.6% of white students, and 7.7% of black students. The highest reported prevalence of suicide attempt was among Hispanic females at 14.0% (Centers for Disease Control and Prevention, 2008). Previous analyses of the National Longitudinal Study of Adolescent Health (Add Health) dataset have also shown an increased risk of suicidal feelings and behaviors among Hispanic girls (Borowsky, Ireland, & Resnick, 2001).

According to data reported to the World Health Organization, rates of suicide among adolescents are, for the most part, higher in the United States than in Latin America (Wasserman,

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[3] The results in this chapter will be submitted for publication in the peer-reviewed literature. Authors will include committee members listed on the title page.

Cheng, & Jiang, 2005). This is true in two of the three countries from which the majority of Hispanics/Latinos in the United States trace their ancestry: Mexico and Puerto Rico. In Cuba, the suicide rate among adolescent males is lower than among adolescent males in the United States, but the rate among adolescent females is approximately five times the rate among U.S. adolescent females. Research has further indicated that adolescents in Mexico report fewer depressive symptoms and lower rates of suicidal ideation compared with adolescents of Mexican origin living in the United States (Sorenson & Shen, 1996; Swanson, Linskey, Quintero-Salinas, Pumariega, & Holzer, 1992).

Acculturation research can further our understanding of ethnic differences in health behaviors and outcomes. Acculturation is defined as the changes that occur in culture patterns when groups of individuals having different cultures come into continuous contact (Berry, 2003; Redfield, Linton, & Herskovits, 1936). Previous studies have found a positive relationship between acculturation or acculturation stress and predictors of suicidal behavior such as depression, (Hovey, 2000a; Rivera, 2007) alcohol use, (Zemore, 2007) illicit drug use, (Amaro, Whitaker, Coffman, & Heeren, 1990; Cherpitel & Borges, 2002; Epstein, Botvin, & Diaz, 2001) conduct problems, (Gonzales, Deardorff, Formoso, Barr, & Barrera, 2006) and discrimination (Gil, Wagner, & Vega, 2000). Acculturative stress has also been negatively associated with social and family support, (Vega, Zimmerman, Warheit, & Gil, 2003) and family conflict and lack of support have been shown to mediate the effect between acculturation and negative behaviors among Hispanics/Latinos (Gonzales, Deardorff, Formoso, Barr, & Barrera, 2006; Rivera, 2007). Acculturation among Hispanic/Latino adolescents is accompanied by increases in perceived discrimination, (Berry, Phinney, Sam, & Vedder, 2006; Viruell-Fuentes, 2007) increases in parent-child conflict, and lower levels of family support (Gil & Vega, 1996; Vega, Zimmerman, Warheit, & Gil, 2003). Family closeness, social support, and school connectedness have been reported as protective against suicidal behaviors (Borowsky, Ireland, & Resnick, 2001; O'Donnell, O'Donnell, Wardlaw, & Stueve, 2004).

When studying acculturation among Hispanics/Latinos, it is important to recognize the heterogeneity of the population and to conduct separate analyses by country of origin (Vega &

Amaro, 1994). Reasons for immigration, voluntariness of migration, characteristics of the settlement community, and U.S. policies toward immigrants from differing countries all play a role in the acculturation experience (Balls Organista, Organista, & Kurasaki, 2003; Berry, 2003; Caetano & Clark, 2003). Culture also has an impact on perceptions of mental health and mental illness as well as the expression of symptoms (Crockett, Randall, Shen, Russell, & Driscoll, 2005). Unfortunately, most research on the effects of acculturation on health behaviors has focused on a single subpopulation or has aggregated the data, precluding the analysis of subgroup differences.

Differences by gender have also been reported in studies examining the relationship between acculturation and risk factors for suicidal behavior such as alcohol (Zemore, 2007) and illicit drug use (Amaro, Whitaker, Coffman, & Heeren, 1990). This has been attributed to the erosion of traditional gender roles as females acculturate and adopt U.S. norms (Rogler, Cortes, & Malgady, 1991). Among female adolescents acculturation-related conflicts can occur when the desire to adopt U.S behavioral norms conflicts with parental expectations of traditional cultural and gender roles (Zayas, Lester, Cabassa, & Fortuna, 2005). Suicide attempts among Hispanic females are frequently precipitated by arguments with parents regarding appropriate sexual behavior and increased autonomy (Razin et al., 1991; Zayas, Kaplan, Turner, Romano, & Gonzalez-Ramos, 2000).

The few studies of acculturation and suicidal behavior that have been conducted report a positive relationship between acculturation or acculturation stress and suicidal behavior (Hovey, 2000a, 2000b; Hovey & King, 1996; Vega, Gil, Zimmerman, & Warheit, 1993). These studies have methodological limitations including cross-sectional design, small sample size, failure to examine potential confounding or modifying factors, and limited generalizability.

The purpose of this research is to prospectively study the association between acculturation and suicidal behavior among a large, nationally representative population of Hispanic/Latino adolescents in the United States, controlling for important confounding variables. The secondary purpose is to determine whether the association differs by gender or country of origin. We hypothesized that 1) moderate-to-high acculturation would be associated with an increased risk of

suicidal behavior, 2) females would experience a greater association compared with males, and 3) estimates would vary among those of Mexican, Puerto Rican and Cuban heritage.

B. Methods

B.1. Sample

Data for this study came from Waves I and II of the National Longitudinal Study of Adolescent Health (Add Health). Respondents were recruited from a clustered random probability sample of 80 high schools, and 52 middle schools that sent graduates to those high schools in the 1994-1995 school year. The sample was stratified on region, urbanicity, school size, school type, and racial composition (Harris et al., 2003). A total of 13,570 students in grades 7 through 12 completed surveys for both time periods. Several populations were over-sampled, including those of Cuban and Puerto Rican heritage.

Adolescents who completed questionnaires for both time periods, and self-identified as Hispanic or Latino, were eligible for analysis (n = 2,298). Hispanic/Latino adolescents comprised 17% of the total number of respondents with available data for Waves I and II. The Hispanic/Latino sample was 51.1% male and ranged in age from 11 to 20 years. Acculturation data were missing for 64 individuals, outcome data were missing for another 30, and 117 individuals were missing data for one or more of the 5 covariates used in our final models. As a result of missing data, 2,087 respondents were included in the multivariable analyses, representing 91% of the eligible Hispanic/Latino subpopulation.

B.2. Procedures

In-person interviews were conducted with adolescents, usually in their homes, between April and December 1995, and were repeated one year later. Data were collected via laptop computer. For potentially sensitive sections of the interview, audio computer assisted self-interviewing (ACASI) technology was used, allowing respondents to listen to questions through earphones and enter their responses directly into the computer. The interviewer assisted the respondent as needed. Details of the survey administration have been published previously (Harris et al., 2003).

Responses from Wave I were used for acculturation and covariate data while responses from Wave II were used to measure outcome data. Data from a parent questionnaire, most often completed by the respondent's mother, were used to supplement parental education information, and a contextual file containing aggregate census data at the block group level was used to obtain the proportion of foreign-born individuals living in each respondent's block group. These four datasets were merged through linked identifiers for analysis.

B.3. Measures

Dependent Variable. Suicidal ideation and suicide attempt were the dependent variables examined in our analyses. The former was based on responses to the question "During the past 12 months, did you ever seriously think about committing suicide?" Those responding affirmatively were then asked "During the past 12 months, how many times did you actually attempt suicide?" Responses to the latter were dichotomized because the results were highly right-skewed with few individuals reporting more than one attempt.

Independent Variables. The main exposure of interest was acculturation level measured using a 3-item proxy acculturation scale (PAS3). The measure included 1) the language most often spoken at home, as reported by the adolescent, 2) the language of the interview, as reported by the interviewer, and 3) the proportion of life lived in the United States calculated from the month and year of the respondent's birth and the month and year that the respondent arrived in the United States. Since language preference and usage are considered the strongest proxy measures of acculturation, (Arcia, Skinner, Bailey, & Correa, 2001; Marin & Gamba, 1996; Rogler, Cortes, & Malgady, 1991) each of the two language variables was weighted more strongly (English=2, Spanish=0) than the proportion of life lived in the United States (range = 0 to 1). The simple sum of the scores for the 3 items resulted in a PAS3 value ranging from 0 to 5.

Respondents in the lowest quartile were assigned to the low acculturation level. The remaining respondents were assigned to the moderate-to-high acculturation level. The validation study described in Chapter 5 separated respondents by tertiles, but the cluster pattern of scores among

the Add Health study population precluded this, and the lowest quartile was used instead. Internal scale reliability in Chapter 5 was high ($\alpha = 0.79$; 95% CI: 0.77, 0.81). Scale reliability in the Add Health study population was lower but still acceptable ($\alpha = 0.62$; 95% CI: 0.60, 0.65).

An additional 35 variables were analyzed to calculate their prevalence in the study population (Table 7.1) and to determine their associations with both the exposure and the outcome. These included sociodemographic variables, personal characteristics, relationship data, school information and community factors. The five covariates that were included in our final models are detailed below. A complete description of the remaining variables used in the analyses is provided in Chapter 4, section B.2.1, and in Tables 4.6 and 4.7.

Two demographic measures were included in our models. Age was collapsed into three groups (11 to 14, 15 to 17, and 18 to 21) due to low numbers at the extremes of age. Parental education level was assessed by responses to the parent questionnaire supplemented with responses to the adolescent survey regarding the highest level of education attained by either resident parent. For analysis, this variable was dichotomized into 1) less than a high school education, and 2) high school education (or equivalent) and above.

The respondent's relationship with teachers was assessed with three items reporting the respondent's perception of teacher fairness, teacher caring, and how often the respondent had trouble getting along with teachers. The three items were combined to obtain a school connectedness subscale focusing on teacher relationships. Scores ranged from 2 to 14 with higher scores indicating more negative relationships (McNeely & Falci, 2004). The top 20% were categorized as having poor relationships with teachers.

Finally, four items were used to assess whether or not the respondents knew anyone who had attempted or committed suicide. First respondents were asked "Have any of your friends tried to kill themselves during the past 12 months?" The question was repeated, substituting "family members". Respondents answering in the affirmative to either question were categorized as knowing someone who had attempted suicide, and were subsequently asked "Have any of them succeeded." The

respondent would be categorized as knowing someone who committed suicide if the follow-up question elicited a positive response.

B.4. Statistical Analyses

Bivariate analyses were calculated to establish the unadjusted associations between acculturation level at Wave I and the two measures of suicidal behavior at Wave II. Bivariate analyses were also conducted to determine which covariates, measured at Wave I, were most strongly associated with acculturation level, and which were predictive of suicidal behavior. Change in estimate criterion (>10%) were used to identify likely confounders of the effect of acculturation (Rothman & Greenland, 1998). Drug and alcohol use variables and the delinquency scale were examined at the univariate and bivariate levels but were not included as potential confounders because they were theorized to lie on the causal pathway between acculturation and suicidal behavior.

Multivariable logistic regression was used to model the odds of 1) suicidal ideation, and 2) suicide attempt, by acculturation level. Age group and parental education were included in all models because age and indicators of socioeconomic status, such as education level, are known to be associated with acculturation and predictive of the outcome. Additionally, three covariates (poor relationship with teachers, knowing someone who attempted suicide, and knowing someone who committed suicide) met the change in estimate criterion for either outcome and were therefore included. Gender and country of ancestry were considered potential modifiers, and models were run separately for these subgroups.

All analyses used sampling weights to adjust for non-response and sampling fractions. Analyses were conducted using SUDAAN 9.0 survey software (Research Triangle Institute, 2004) to appropriately calculate regression coefficients and standard errors that accounted for the complex survey design.

C. Results

Males and females were approximately equally represented, and the mean age was 15.6 years. The majority of the population traced their heritage to Mexico, followed by Puerto Rico and

Cuba (Table 7.1). Respondents were most often from two-parent households where at least one parent had graduated from high school. Twenty-percent of the population lived in households receiving public assistance, and a quarter had extended family living in the home.

C.1 Prevalence of Suicidal Behaviors

Reported suicidal ideation was 2.6 times as prevalent as reported suicide attempts. Respondents reporting suicidal behavior were disproportionately female, of Puerto Rican ancestry, and from a household receiving public assistance (Table 7.1). As expected, measures of depression, mental health treatment, and substance abuse were associated with a higher prevalence of the outcomes. The proportion of respondents reporting suicidal behaviors was higher among those who reported serious arguments with parents, poor relationships with teachers, disconnection from school, a history of same sex attraction, and knowing someone who attempted or committed suicide. A smaller proportion of students with suicidal behaviors were seen among those reporting strong family connectedness and those being educated about suicide in school. Additionally, residing outside a central city and residing in a neighborhood with greater than 10% of the population being foreign-born were associated with a lower proportion of reported suicidal behaviors.

C.2. Acculturation & Suicide

Approximately three-quarters of respondents were assigned a moderate-to-high acculturation level based on PAS3 scores, which ranged from .05 to 5, with a mean of 3.74. Moderate-to-high acculturation level respondents were more likely to report suicidal ideation and suicide attempts (Table 7.1). The odds of suicidal ideation among those of moderate-to-high acculturation was approximately twice the odds of suicidal ideation among those of low acculturation (Table 7.2). This estimate was reduced substantially after adjusting for age group, parental education, poor relationships with teachers, and knowing someone who had attempted or committed suicide. However, the unadjusted and adjusted odds ratios for attempted suicide were higher than for suicidal ideation. The estimates for attempted suicide were less precise due to the low number of incidents in

the low acculturation group. Adjustment for depression had no effect on either estimate and was therefore not included in the final model.

Further analyses suggested modification of the association between acculturation and suicidal behavior by gender and country of origin (Table 7.3). Females with moderate-to-high acculturation had an adjusted odds ratio for suicidal ideation 2.2 times that of females with low acculturation. No association between acculturation and suicidal ideation was observed among males. The same pattern was seen for attempted suicide by gender, although the low number of reported attempts resulted in imprecise estimates.

Moderate-to-high acculturation was positively associated with suicidal behavior among those of Mexican ancestry whereas it appeared to be negatively associated with suicidal behavior among those of Cuban ancestry (Table 7.3). This pattern was unaffected by adjustment for age group, parental education, having poor relationships with teachers, and knowing someone who attempted or committed suicide. Data for adolescents of Puerto Rican heritage were not included in the table because there were only two reports of suicidal ideation, and no reports of suicide attempts, among those with low acculturation.

D. Discussion

Hispanic adolescents of moderate-to-high acculturation have an increased risk of suicidal ideation and suicide attempt compared with Hispanic adolescents of low acculturation. This is consistent with existing data on suicide and suicidal behavior. Suicide rates among U.S. born Hispanics are reportedly higher than among their immigrant counterparts (SAMHSA, 2003; Sorenson & Golding, 1988; Sorenson & Shen, 1996), and an increase in acculturation or acculturation stress has been associated with increased suicidal behaviors in several small studies (Hovey, 2000a, 2000b; Hovey & King, 1996; Vega, Gil, Zimmerman, & Warheit, 1993). The increased risk was concentrated almost exclusively among females. This may be due to the greater amount of acculturation conflict and stress experienced by girls of higher acculturation when their parents of lower acculturation disagree with them regarding appropriate behavior, especially around issues of

socializing, dating, and sexuality (Razin et al., 1991; Zayas, Kaplan, Turner, Romano, & Gonzalez-Ramos, 2000). Suicidal behaviors among Hispanic females are frequently impulsive and brought on by such conflict with their parents (Zayas, Kaplan, Turner, Romano, & Gonzalez-Ramos, 2000).

In addition, while imprecise, our results also suggest modification by country of origin. Low acculturation adolescents of Cuban heritage had a higher prevalence of suicidal ideation and suicide attempt compared with low acculturation adolescents of Mexican and Puerto Rican heritage. This mirrors the rates of suicide seen in the countries of origin (Wasserman, Cheng, & Jiang, 2005). As the Cuban American adolescents acculturated, they were less likely to exhibit suicidal behaviors. The opposite relationship was observed in the Mexican and Puerto Rican subpopulations. This may reflect several differences in the immigration histories and experiences of Cuban-Americans compared with Mexican Americans and Puerto Ricans. It may also be that the well-established community of Cuban Americans in south Florida provides a greater support system for adolescents, resulting in less alienation, acculturation stress and perceived discrimination. Lastly, it may reflect higher levels of stress, anxiety and depression experienced in Cuba, and that acculturating to life in the United States alleviates these stressors. However, results for the population of Cuban ancestry must be interpreted with caution as they were based on low numbers and are therefore unstable.

In our final models, we adjusted for age group, parental education level, poor relationships with teachers (a measure of school connectedness), knowing someone who attempted suicide, and knowing someone who committed suicide. Although race, depressive symptomology, and welfare status were examined as potential confounding factors they were not included in the multivariable models. Nearly half of the respondents self-identified as ‘other’ race, and only two respondents who identified as black were of low acculturation and reported suicidal behavior. While the CES-D depression scale was strongly associated with the outcomes in bivariate analyses, inclusion in the models did not have any impact on the estimates, and it was therefore dropped. Welfare status was also associated with the outcome, but did not result in a change in estimate after inclusion of parental education level in the model.

These results have implications for suicide prevention efforts in the United States. They suggest that moderate-to-high acculturation should be considered as a risk factor of suicidal behavior among Hispanic/Latino adolescents, particularly females. Focusing solely on new immigrants and English language instruction is not sufficient for a positive adjustment to life in the United States. Additionally, the efforts of health providers, researchers and the violence prevention community should be informed by the specific populations that they are working with, understanding that the Cuban American population, in particular, may experience the opposite effect as they acculturate. Prevention and treatment programs should account for cultural differences as well as the process of acculturation and the conflicts and stressors that often accompany adaptation to a new culture. On the community and institutional levels, efforts should be made to ensure that mental health services are available and accessible to acculturating adolescents, and barriers to treatment, such as a lack of health insurance, and a lack of Spanish-speaking and Latino providers, need to be addressed.

There are several limitations to this research. While the PAS3 was validated in Chapter 5, and its components have a low misclassification rate, (Marin & Marin, 1991) it is limited in its ability to measure the complex process of acculturation. An orthogonal scale, separately measuring adoption of U.S. culture and adherence to the culture of origin, and including a variety of domains would potentially provide a better estimate of acculturation (Cabassa, 2003). Non-response and reporting bias may also exist. Efforts to minimize non-response bias included incorporating a non-response adjustment when assigning weights. Additionally, previous research has shown that, because of low high-school drop-out rates, population-wide estimates are not significantly biased by the use of school-based surveys (Udry & Chantala, 2003). Therefore, although dropouts are significantly different from those who stay in school, non-response due to dropping out should not have a large impact on population estimates. Reporting bias may also result due to the sensitive nature of the questions regarding suicide and negative health behaviors such as substance abuse. Computer-assisted technology was utilized to provide adolescents with a measure of privacy for these more intrusive sections (Miller-Johnson, Sullivan, & Simon, 2004). However, bias may have been more likely

among adolescents needing on-site translation of the survey since they would theoretically need assistance from the interviewers to complete the sensitive questions as well. Reporting bias may also be in the form of over-reporting, although the effect of this should be minimized since most variables were dichotomized.

Future research should focus on replicating the results of this study through use of other research designs (e.g., case control studies). In these efforts, researchers need to understand the heterogeneity of the Hispanic population, and should separate data by country of origin when conducting acculturation-related research. Efforts should be made to identify the core factors within the acculturation process that are responsible for the reduction in suicidal behavior among Cubans. Likewise, it is important to determine the specific environmental and behavioral factors that may serve to protect those of Mexican and Puerto Rican heritage, and which are lost as they acculturate, placing them at greater risk of intrapersonal violence.

Table 7.1. Population characteristics, overall and by reported suicidal ideation and suicide attempt, among Hispanic adolescents in middle and high school in the United States.

	Overall sample	No suicidal behaviors	Suicidal ideation	Suicide attempt*
	No. (%)	No. (%)	No. (%)	No. (%)
Total	2298 (100)	2026 (100)	241 (100)	94 (100)
Independent variable of interest				
Moderate-to-high acculturation level	1687 (76.2)	1468 (75.1)	196 (85.6)	78 (89.4)
Low acculturation level	547 (23.8)	499 (24.9)	41 (14.4)	13 (10.6)
Individual demographics				
Gender				
Male	1147 (51.1)	1033 (52.4)	96 (38.3)	32 (38.4)
Female	1151 (48.9)	993 (47.6)	145 (61.7)	62 (61.6)
Age (years)				
11-14	545 (37.6)	477 (37.2)	60 (41.2)	27 (45.4)
15-17	1505 (52.5)	1327 (52.7)	157 (50.5)	57 (47.3)
18-21	246 (9.8)	220 (10.2)	24 (8.3)	10 (7.3)
Country of heritage				
Mexico	1135 (56.8)	1008 (56.9)	108 (54.1)	39 (55.7)
Puerto Rico	446 (14.1)	386 (13.9)	54 (16.9)	25 (19.9)
Cuba	347 (6.4)	310 (6.5)	36 (6.9)	13 (5.7)
Other - Central or South America	250 (13.1)	222 (13.4)	26 (11.7)	8 (6.0)
Other	215 (12.7)	190 (12.6)	21 (12.4)	10 (16.0)
Family/household characteristics				
Parental education – at least one parent is at least a high school graduate	1401 (61.4)	1223 (61.0)	163 (65.7)	61 (69.8)
At least one resident-parent receives public assistance (welfare)	412 (19.5)	353 (18.9)	54 (24.0)	28 (36.8)
Two-parent household	1540 (66.3)	1369 (66.2)	152 (66.0)	58 (58.6)
Extended family living in the home	585 (24.9)	512 (25.0)	64 (25.6)	30 (31.0)
Gun accessible in the home	257 (10.9)	217 (10.2)	37 (14.4)	13 (9.9)
Religion				
Attends weekly religious services	871 (39.8)	784 (40.5)	74 (32.4)	33 (38.5)
Religion is very important	926 (40.1)	819 (40.4)	93 (37.2)	34 (38.9)
Personal characteristics				
Mental health counseling in last 12 mos.	274 (13.1)	209 (12.1)	56 (20.4)	31 (30.1)
Symptoms of major depressive disorder (modified CES-D)	309 (12.7)	226 (10.7)	78 (27.3)	41 (34.1)
Ever used marijuana	631 (26.4)	521 (24.8)	102 (41.4)	43 (50.0)
Ever used other illicit drugs	281 (11.9)	215 (10.1)	62 (26.6)	26 (30.8)
Alcohol or drug treatment in last 12 mos.	71 (4.1)	59 (3.9)	11 (5.2)	6 (4.9)
Binge drinking in last 12 mos.	617 (26.0)	513 (24.6)	97 (38.8)	48 (49.5)
High delinquency score	652 (28.2)	540 (26.2)	104 (44.1)	46 (43.1)
Ever repeated a grade	629 (29.4)	541 (28.6)	77 (35.4)	33 (35.9)

Low grade point average (<1.75) in core courses (English, science, math, history)	308 (11.1)	252 (10.3)	52 (16.9)	21 (12.0)
Worked >5 hrs/wk during school year	754 (30.9)	677 (31.9)	71 (27.2)	36 (34.4)
Personal relationships				
Socially isolated – no friends reported	62 (4.0)	53 (3.6)	5 (3.0)	2 (6.6)
History of same sex attraction	162 (7.8)	133 (7.1)	27 (9.9)	13 (11.7)
Serious argument with a parent over adolescent's behavior in last 4 weeks	894 (38.7)	750 (36.9)	131 (55.1)	56 (60.7)
Strong family connectedness	552 (25.3)	515 (26.8)	31(15.6)	12 (18.1)
Poor relationships with teachers	468 (21.2)	387 (19.7)	77 (32.8)	29 (27.4)
Knows someone who attempted suicide	476 (22.2)	382 (21.0)	92 (34.7)	46 (36.4)
Knows someone who committed suicide	81 (4.0)	52 (2.7)	27 (14.2)	13 (7.90)
School and community				
Students at school are prejudiced	855 (36.0)	753 (35.8)	95 (38.6)	33 (38.8)
Teachers do not treat students fairly	393 (17.1)	329 (15.4)	57 (27.7)	23 (26.3)
Disconnected from school	434 (19.4)	358 (15.5)	71 (27.9)	30 (32.6)
Taught conflict resolution in school	1695 (75.8)	1501 (76.2)	172 (74.8)	63 (72.4)
Taught suicide prevention in school	1487 (61.8)	1320 (63.2)	148 (54.0)	55 (39.9)
Feels unsafe in neighborhood	434 (17.5)	373 (16.6)	58 (24.9)	21 (23.3)
Urban – central city	1225 (59.8)	1099 (61.2)	121 (51.5)	46 (50.7)
Neighborhood is ≥10% foreign-born†	1590 (57.9)	1404 (59.0)	168 (53.8)	65 (48.3)

NOTE: Counts are unweighted. Percentages are weighted. Counts may not add to total due to missing data.
*Suicide attempt is a subset of suicidal ideation.
†Neighborhood data at the block-group level were derived from the U.S. Bureau of the Census.

Table 7.2. ORs for the occurrence of suicidal ideation and suicide attempt among moderate-to-high-acculturation Hispanic adolescents compared with low-acculturation Hispanic adolescents in middle and high school in the United States, 1996.

	Unadjusted			Adjusted		
Outcome*	OR	95%CI	CLR	OR†	95%CI	CLR
Suicidal ideation	1.98	(1.28, 3.06)	2.39	1.34	(0.83, 2.19)	2.64
Attempted suicide	2.72	(0.97, 7.59)	7.82	2.12	(0.70, 6.44)	9.20

OR = odds ratio; CI = confidence interval; CLR = confidence limit ratio
*Reported at Wave II (other variables reported at Wave I). †Adjusted for age group, parental education, having poor relationships with teachers, knowing someone who attempted suicide and knowing someone who committed suicide.

Table 7.3. ORs for the occurrence of suicidal ideation and suicide attempt, among select subpopulations of moderate-to-high-acculturation Hispanic adolescents compared with low-acculturation Hispanic adolescents in middle and high school in the United States, 1996.

	Suicidal ideation*					
	Unadjusted			Adjusted		
Subpopulation	OR	95%CI	CLR	OR†	95%CI	CLR
Males	1.15	(0.62, 2.11)	3.40	0.77	(0.40, 1.50)	3.75
Females	3.20	(1.49, 6.86)	4.60	2.21	(0.91, 5.32)	5.85
Mexican ancestry	2.88	(1.23, 6.72)	5.46	1.95	(0.92, 4.15)	4.51
Cuban ancestry	0.56	(0.12, 2.71)	22.58	0.23	(0.03, 1.72)	57.33
	Attempted suicide*‡					
Males	1.19	(0.35, 4.04)	11.54	0.91	(0.23, 3.56)	15.48
Females	6.93	(1.88, 25.52)	13.57	5.60	(1.25, 25.15)	20.12
Mexican ancestry	3.29	(0.48, 22.57)	47.02	2.47	(0.36, 16.88)	46.89
Cuban ancestry	0.64	(0.39, 1.06)	2.72	0.32	(0.14, 0.78)	5.57

OR = odds ratio; CI = confidence interval; CLR = confidence limit ratio
*Reported at Wave II (other variables reported at Wave I). †Adjusted for age group, parental education, having poor relationships with teachers, knowing someone who attempted suicide and knowing someone who committed suicide. ‡No attempted suicides were reported among low-acculturation Hispanics of Puerto Rican ancestry.

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VIII. Discussion

A. Overview of Findings

The main objectives of this research were 1) to investigate the validity of a proxy acculturation scale among the U.S. Hispanic population and, 2) assuming the scale had good validity, to apply the scale to existing data to quantify the association between acculturation level and violence, both interpersonal and intrapersonal, among U.S. Hispanic/Latino adolescents.

To address objective 1, a 3-item proxy acculturation scale (PAS3) was developed. It proved to be a reliable and valid measure of acculturation using the N-7, National Alcohol Survey (NAS) acculturation scale as the gold standard. The PAS3 was particularly good at approximating the NAS scale among Hispanics from Mexico ($\kappa = 0.78$; 95% CI: 0.72, 0.83), Puerto Rico ($\kappa = 0.78$; 95% CI: 0.70, 0.87), and Cuba ($\kappa = 0.76$; 95% CI: 0.63, 0.89), the three countries from which most (77.2%) of U.S. Hispanics/Latinos trace their heritage. However, the PAS3 proved limited in its ability to approximate the NAS among Hispanics from other Latin American countries ($\kappa = 0.42$; 95% CI: 0.27, 0.58).

To address objective 2, the PAS3 was used to compare violence in U.S. Hispanic/Latino adolescents with low acculturation to violence in U.S. Hispanic/Latino adolescents with moderate-to-high acculturation in the National Longitudinal Study for Adolescent Health (Add Health). We determined that higher acculturation was prospectively associated with fighting, fight-related injury, suicidal ideation, and suicide attempts. Odds ratios for these associations ranged from 1.98 (95% CI: 1.28, 3.06) for suicidal ideation, to 2.72 (95% CI: 0.97, 7.59) for suicide attempts. These associations persisted after adjusting for covariates that were associated with both acculturation and violence. Precision was good for the analyses of fighting and suicidal ideation but was poor for the analyses of fight-related injury and suicide attempts, due to the small numbers of these events.

The final models for interpersonal and intrapersonal violence, although developed separately, were similar. The assault models controlled for age group, welfare status, poor relationships with teachers, access to a gun in the home, and knowing someone who had committed suicide. The suicidal behavior models controlled for age group, parental education, poor relationships with teachers, and knowing someone who had attempted or committed suicide. While studies of and prevention programs addressing inter- and intrapersonal violence are generally conducted separately, there is evidence that the two types of violence are linked. In Chapter 2, Tables 2.3 – 2.6, show that inter- and intrapersonal violence share many of the same risk and protective factors. Responses to feelings of anger, conflict, stress, or isolation may be manifested outward (assault) or inward (suicidal behavior).

Alcohol abuse, drug use, and delinquency were not included in these models since they were theorized to be on the causal pathway between acculturation and violence. Likewise, measures of violence at Wave I (the same time at which acculturation was measured) were not included in the models, due to concern about indirectly adjusting for a portion of the acculturation-violence association that we were trying to measure. These decisions are complex and open to some debate. However, the inclusion of these variables would not have dramatically altered the study's conclusions.

Except for fight-related injury, associations of acculturation with violence appeared to be stronger among females than among males. This difference is consistent with previous studies reporting that acculturation tends to have a stronger impact on females compared with males (Lopez-Gonzales, Aravena, & Hummer, 2005; Zemore, 2007). The gender difference is potentially attributable to the greater discrepancy between the more traditional roles of girls and women in Latin America compared with the United States around issues such as working outside the home, drinking alcohol, and dating.

The acculturation-violence relationship was also possibly modified by country of origin. Specifically, adolescents identifying as Cuban or Cuban American showed a pattern of association

that differed from the pattern among adolescents identifying as Mexican/Mexican American, or Puerto Rican. In the model for fighting, the association with acculturation was weaker among Cuban/Cuban American adolescents. In the suicidal behavior models, the association with acculturation among Cuban/ Cuban Americans was in the opposite direction to that in Mexican/Mexican Americans and Puerto Ricans (i.e., instead of increasing risk, higher acculturation was protective against suicide-related behavior among Cuban/Cuban Americans). While this finding is potentially spurious (due to low precision), there are several reasons why the patterns may be different among the Cuban/Cuban American population. Cuban Americans have a distinct history and profile compared with other U.S. Hispanics. Hispanics from Cuba have higher median incomes and higher median educational attainment compared with Hispanics/Latinos tracing their heritage to Mexico or Puerto Rico. We attempted to control for socioeconomic differences in the data by including welfare status and parental education in the interpersonal and intrapersonal models, respectively, but adjustment for these variables in a model would be ineffective if the relationship between acculturation, welfare status/parental education, and violence was much stronger or weaker in the Cuban Americans relative to the other country-of-origin subgroups. Additionally, most Cubans immigrated to the United States for political reasons and were supported in their relocation efforts by the United States government. Cuban Americans have since established a strong social and political community in south Florida which may help mitigate acculturation-related stress.

Finally, it is interesting to note that adolescent suicide rates are higher in Cuba (9.2 per 100,000) than in Mexico (3.7 per 100,000), Puerto Rico (4.2 per 100,000) or the United States (8.0 per 100,000; Wasserman, Cheng, & Jiang, 2005). In particular, the reported rates among adolescent females were substantially higher in Cuba (12.5 per 100,000) compared with Mexico (2.3 per 100,000), or the United States (2.7 per 100,000; Wasserman, Cheng, & Jiang, 2005). In Puerto Rico, the suicide rate among all females was low (1.8 per 100,000; World Health Organization, 2007); among adolescent females it was negligible. The prevalence of suicidal behavior was also higher among low acculturation adolescents of Cuban heritage than among low acculturation adolescents of

Mexican and Puerto Rican heritage. Speculatively, it may be that immigrating to the United States reduces stressors in this population, and that the receptive and supportive community in the United States helps to buffer any negative effects of acculturation among Cuban immigrants.

B. Implications for Public Health and Injury Prevention

The validation of a proxy acculturation scale comprised of three easily obtainable, rarely misclassified acculturation-related variables will likely benefit health researchers and providers interested in secondary analysis of data sources that do not already include acculturation scales. Since the PAS3 has high validity among the U.S. Hispanic/Latino population, particularly among those of Mexican, Puerto Rican and Cuban heritage, the measure can be used with some confidence when conducting acculturation research.

The results of the associational analyses emphasize the importance of understanding the heterogeneity of the U.S. Hispanic/Latino population when designing research or programs. Violence prevention programs and policies should incorporate cultural awareness and an understanding of the process of acculturation and the potential ramifications of acculturation-related stress. Injury prevention professionals should advocate for the inclusion of acculturation issues, such as intergenerational conflict, in violence prevention programming developed for U.S. Hispanic/Latino adolescents.

This work also suggests some societal changes that could reduce violence in the U.S. Hispanic/Latino adolescent population. U.S. Hispanic/Latino adolescents should have access to health care, especially to mental health treatment with providers who are sensitive to the cultural differences in this population.

C. Strengths

The National Alcohol Survey (NAS) and the National Longitudinal Study of Adolescent Health (Add Health) were selected for this research because they each incorporated large, nationally representative study populations with an over-sampling of Hispanics/Latinos. They also contained a wealth of data useful for the measurement of acculturation, and in the case of Add Health, violent

outcomes, and numerous potential confounding and modifying variables. Both surveys were conducted in person and lasted one to two hours.

The NAS is a cross-sectional survey of U.S. adults, conducted approximately every five years by the Alcohol Research Group. The 1984 version (N-7) included a 12-item acculturation scale, used as the gold standard in the validation study. In addition, the survey collected the single-item proxy acculturation measures of interest for this research.

The Add Health data used in the associational analyses were collected in two waves (in 1995 and 1996) from a probability sample of U.S. high schools and middle schools. Add Health used a prospective cohort design, a strength in comparison to much of the acculturation literature, which has generally used cross-sectional designs. The extensive and detailed data collected in Add Health also allowed for adjustment for a wide range of covariates, including socioeconomic status, which is critical in, yet often absent from, analyses of acculturation. The over-sampling of Hispanics in both surveys allowed for the validation of the PAS3 by country of origin, and for subgroup analyses of the acculturation-violence relationship, although precision was very poor for some of these subgroup estimates.

Validating and using the PAS3 was an innovation that provided for improved measurement of acculturation compared with several single-item proxy measures frequently used in the literature. This research tool should prove helpful when conducting studies where use of a lengthy acculturation scale is not feasible or practical, as with secondary data analyses where the original investigators did not include an acculturation scale.

D. Limitations of the Exposure Measure

The PAS3 does have several limitations. First, although it demonstrated good reliability and validity, we stress that it is a proxy measure, and we acknowledge that it does not capture all of the nuances of the acculturation process. The utility of the PAS is that it can readily be retrospectively applied to existing data and it has greater validity than any of the single-item acculturation measures (e.g., language spoken at home) that comprise the PAS3. However, it is a complement to, rather than

a substitute for detailed, multi-item acculturation scales. It should not be seen as a "first choice" for an acculturation instrument when designing a study. On the other hand, none of the existing measures of acculturation are thought to completely measure this complex construct (Cabassa, 2003). Ideally, an orthogonal measure with multiple domains would be used, but the one most often cited (the Acculturation Rating Scale for Mexican Americans-II) has its own disadvantages. As the name suggests, it was created specifically for the Mexican American population, and it contains 48 items, which makes it prohibitively long for use in many studies, especially if acculturation is only one component of a larger instrument.

The second limitation to the PAS3 is the potential for misclassification. Our coding the PAS3 as a dichotomous measure may entail a loss of information. However, since the measure was not able to discriminate well between moderate and high acculturation, this potential loss of information was deemed preferable to knowingly misclassifying a significant proportion of individuals (38% of the total sample in the NAS study). Even with this reduction to a binary measure, there undoubtedly remains some degree of misclassification. If the misclassification is non-differential with regard to the outcomes, it would tend, on average, to bias the results toward the null. If, however, the misclassification was differential, the estimates could be biased in either direction. Using the NAS data as the gold standard, the proportion of the total population that was misclassified was 10%, suggesting that bias due to misclassification is probably minor, especially if non-differential with regard to the outcomes. However, the proportion of individuals who are misclassified may vary by population.

A third problem with the PAS3 is that the validity analysis showed that it did not perform as well for those of 'Other' countries of heritage. While more than three-quarters of U.S. Hispanics/ Latinos in the general population are of Mexican, Puerto Rican or Cuban descent, there remains a significant portion of the U.S. Hispanic/Latino population that has a higher risk of misclassification using the PAS3. It is not known why this heterogeneous group is more likely to be misclassified, but it may reflect cultural differences or reasons for immigration (e.g., asylum, university education) that

impact their acculturation process. While cognizant of the greater possibility for misclassification among those of "Other" Latin heritage, we chose to keep all of the respondents in the analyses so as to avoid losing information.

A fourth concern with the PAS3, was the potential for recall bias in the measurement of the exposure. A small number of the students had difficulty recalling the month and year in which they moved to the United States, which was used for calculation of the proportion of time the respondent had lived in the United States. Data from the parent questionnaires were used to supplement the information in cases where the respondent answered "don't know" or for whom the data were otherwise missing.

Fifth, the instruments used in Add Health were never translated into any language other than English. Instead, bilingual interviewers assisted respondents by translating the survey upon request at the time of the interview. The study made available bilingual interviewers whenever possible. Thus, the determination of interview language was made by the interviewer in the field based on the on-site translation needs of the respondent and does not reflect administration of a translated version of the instrument. If respondents needed but did not request assistance, this variable would be misclassified. The variable coding the language in which the questionnaire was taken (i.e., whether language assistance was provided) is one of the components of the PAS3.

Finally, the reliability of the PAS3, while high in the validation (NAS) study population, had a lower than anticipated reliability, as measured by Cronbach's alpha, in the Add Health study population. This suggests that the 3-items in the scale are not measuring acculturation as well in this population. It may be that acculturation level is more difficult to pinpoint among adolescents, or that other domains, such as ethnic identity, may be more salient to the identification of acculturation level in this population. It could also be a result of on-site translation needs. Hispanic adolescents, who would have preferred to have taken the survey in Spanish, had there been a Spanish-language version available on the computer, may have completed the survey in English rather than ask for assistance from the interviewer. This decision may be reflected in the reliability of the measure.

E. Other Limitations

In addition to these limitations of the acculturation measure (PAS3), there is also (as with any survey), concern about the self-reported nature of the data because of the potential for under-reporting or over-reporting of the dependent variables of interest. This could be due to recall bias, bravado, social desirability, or a fear of repercussions if illegal activities are reported. Recall bias was minimized by having fixed, relatively short time periods within which to confine responses. These varied from the past two weeks to the past 12 months, depending on the question. Since outcomes were dichotomized in our analyses, respondents would be correctly coded in our analysis if they recalled any incident of violence, which is more reliable than trying to recall an exact number of incidents. Although dichotomization of the outcomes results in some loss of information (Weinberg, 1995) it is advantageous in that the outliers with low face validity (e.g., one respondent reported 70 incidents of medical treatment for a fight-related injury in the past 12 months) could not unduly influence the results.

Under-reporting due to social desirability or fear of repercussions was addressed by emphasizing the confidentiality of the information, and by allowing respondents to enter sensitive information directly into the computer without involvement of the interviewer. Unfortunately, as mentioned previously in this chapter, the survey was not provided in any language other than English. Instead, bilingual interviewers assisted respondents upon request at the time of the interview. There was no standardization between interviewers regarding translation of materials. Translating on site, as needed, is cheaper and less costly than having the survey translated and back translated. However, this implies that the strategy for reducing under-reporting of sensitive issues (e.g., entering the data into the computer privately) would not have applied equally to those students needing translation as to those not needing translation. Students needing translation may not have fully understood the questions or they may have been more reluctant to respond truthfully if they had to do so through the interviewer. This may have increased the likelihood of under-reporting of the outcome and sensitive covariates in this portion of the study population.

The greatest potential threat to the validity of our study findings from this would be in the scenario in which the misclassification of the variable coding "language in which the questionnaire was taken" was differential with regard to the reporting of the outcome and/or sensitive covariates. This could have occurred if, for example, less acculturated subjects with a high level of violence were less likely to accurately report the outcome data because of the need to use translation assistance than more acculturated subjects with a high level of violence. In this scenario, substantial bias could exist in our study findings.

In addition to concerns about self-report, non-response may also have biased these results. Those who are not attending school, in general, differ from those who stay in school with regard to the outcomes. One example is the impact of suicide. Suicide rates among males are higher in part because they more often choose a more lethal method (i.e., firearms). On average, this would remove more males, who would otherwise report suicidal behavior, from the study population. In the same way, very violent students may have been expelled from school or sent to juvenile detention, again removing them from the study population. Because the proportion of students in these categories is small, the impact on the population estimates would be expected to be minimal.

Although race, within the Hispanic population, is considered an important determinant of health outcomes (Borrell & Crawford, 2006) we were limited in our ability to analyze race data. First, nearly half of the individuals in the Add Health dataset self-identified as "Other" race. This is an issue in general among the U.S. Hispanic/Latino population because in Latin American race is often thought of as a continuum, not as limited, very specific categories. Furthermore, there were insufficient data to compare the specific race categories that were selected (e.g., only nine black Hispanics were classified as having low acculturation as measured by the PAS3). Since race was considered a socio-cultural construct in this research, as opposed to biological, other variables were examined in this analysis for which race would serve as a proxy (e.g., SES, discrimination).

F. Directions for Future Research

The field of acculturation research would benefit from additional validation studies of proxy measures of acculturation. Specifically, replicating the validation of the PAS3 using different study populations, and against different acculturation scales, would serve to establish the robustness of the measure. Additionally, a sensitivity analysis could quantify the effect of misclassification due to the imperfect measure of acculturation, or potential misclassification of the component variables.

The outcome could also be measured in other ways. For example, the relationship between acculturation and interpersonal violence perpetration may differ from the relationship between acculturation and interpersonal violence victimization. In the current study, violent outcomes were neutral regarding blame. A violent outcome occurred if the respondent experienced a fight or fight-related injury. Other variables are available for analysis in the Add Health dataset, including violence perpetration scales.

This study focused on establishing the association between acculturation and violence while controlling for confounding variables and ascertaining the potential for modification of the association by gender and country of origin. Future research should focus on replicating the association between acculturation level and violent outcomes using additional study designs and populations. The model further posited that acculturation indirectly affected violence through the adoption of negative coping behaviors such as substance abuse and delinquency. A mediational analysis would help determine the direct effects of acculturation and the indirect effects of acculturation through substance use and abuse and delinquent behaviors, and would further clarify the model.

The results of this study were suggestive of modification of the acculturation-violence relationship but lacked sufficient power to be more conclusive. The Add Health database contained more than 2,000 Hispanics, and over-sampled Puerto Rican and Cuban American respondents. However, stratification by gender or country of origin, combined with the limited number of low acculturation individuals with the outcomes, limited our ability to detect a difference in the

association by the modifying factors. The field would benefit from additional research into effect modification using larger subpopulations, especially of Cuban American and Puerto Rican respondents.

It would also be of interest to replicate this research with new data to determine whether the association between acculturation level and violence is changing over time. It may be that the impact of factors (e.g., recent anti-immigration policies) has had a deleterious effect on the acculturation process, increasing stress and subsequently, increasing negative coping mechanisms and outcomes among Hispanic/Latino adolescents. Tracking these trends over time would help to better elucidate the mechanisms by which acculturation is associated with inter- and intrapersonal violence.

Lastly, the violence prevention community would benefit from more rigorous evaluation of prevention programs, especially those with large Hispanic populations. It is not known how well the violence prevention programs currently in use serve Hispanic/Latino adolescents compared with non-Hispanic Anglo and African American adolescents. In addition, future research should evaluate programs that integrate cultural awareness, an understanding of the acculturation process, and mechanisms for coping with acculturation related stress to determine the efficacy of these components in reducing interpersonal and intrapersonal violence among Hispanic/Latino adolescents.

G. Conclusions

The PAS3 is an improvement over single-item, proxy measures of acculturation and can readily be retrospectively applied to existing data, assuming the components of the PAS3 were collected. Using the PAS3, we identified positive associations between acculturation level and four separate violent outcomes: fighting, fight-related injury, suicidal ideation, and suicide attempt. After adjusting for covariates, the associations were reduced, but remained elevated. Modification by gender and country of origin were suggested. The results highlight the importance of incorporating the heterogeneity of the Hispanic population with regard to acculturation in research studies and violence prevention programs targeting this population.

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