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# The Association between Acculturation and the Utilization of Mental Health Services in Latinos with Type 2 Diabetes and Depression

THESIS

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## ABSTRACT OF THE THESIS

The Association between Acculturation and the Utilization of Mental Health Services in Latinos with Type 2 Diabetes and Depression

By

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Master of Science in Biomedical and Translational Science

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Professor John Billimek, Chair

Latinos represent one of the fastest growing populations in the United States, with distinct health behaviors and health outcomes compared to their non-Latino counterparts. This group also experiences more noted deteriorations in health as the time spent in the U.S. increases. In addition, Latino adults are diagnosed with chronic medical conditions such as diabetes at higher rates than any other ethnic group. Simultaneously, more Latino patients report symptoms of depression, however, they are less likely to receive any form of treatment despite studies indicating that pharmacotherapy and psychotherapy are effective in impacting the improvement of psychosocial outcomes and depressive symptoms. The purpose of this study was to investigate the role of acculturation in the low rates of utilization of mental health services in Latinos with type 2 diabetes and depressive symptoms at federally qualified health centers in Southern California. Specific aims addressed in this investigation included determining whether acculturation level was associated with individual reports of depressive symptoms after controlling for potential confounding variables and assessing whether levels of acculturation

were correlated with low rates of utilization of mental health services in Latinos with clinically meaningful levels of depressive symptoms.

This was a cross-sectional study using data from the Reducing Racial/Ethnic Disparities in Diabetes: The Coached Care (R2D2C2) Project. Participants were 749 individuals recruited from diverse outpatient clinics affiliated with an academic center in Southern California. Participants were Latino, mostly Mexican-American, adults with type 2 diabetes. A logistic regression analysis was used to examine the association between acculturation levels and reports of depressive symptomatology and mental health service utilization. Results demonstrated that, after controlling for socioeconomic status, individuals with lower acculturation were less likely to report depressive symptoms and, among those with depression, were less likely to report have seen a mental health provider. There was also no association, however, between acculturation and the documentation of diagnosis of depression/anxiety or the prescription of medications to treat those conditions. The effects of acculturation on reports of depressive symptoms and mental health utilization cannot be explained by socioeconomic factors alone. Therefore, the underlying causes for the lower level of depressive symptoms reported by less acculturated individuals with diabetes, and the discrepancy between provider recognition of depression and patient-reported mental health service utilization in these patients, warrants further investigation.

# CHAPTER 1: BACKGROUND & SIGNIFICANCE

## The Problem

Latinos in the United States face poorer health outcomes than many other demographic subgroups, particularly with respect to the prevalence of diabetes mellitus and its related complications and comorbidities[1,2]. These disparities extend to include mental health outcomes[3–5]. Depression, for example, which already frequently co-occurs with diabetes in the general population, occurs at an even higher rate among older Latino adults[6,7], and is less likely to be treated in Latino patients with diabetes compared to non-Hispanic Whites[8,9].

Our understanding of the contributors to these disparities is complicated by the fact that a significant portion of the Latino population is foreign-born. The health of foreign-born residents of the U.S. is often significantly different from native counterparts, and can change for better or for worse with longer time spent in the United States[10]. The Latino cultural and social experience often includes immigration, acculturation and aspects of acculturative stress, all features that may contribute to higher levels of depression[6]. However, there is little known about the relationship between levels of Latino acculturation and rates of treatment for depression. Therefore, this study investigated whether acculturation explains the low rates of utilization of mental health services in Latinos with type 2 diabetes and depressive symptoms at a federally qualified health center. Specific aims addressed in this investigation included determining whether acculturation level was associated with individual reports of depressive symptoms after controlling for potential confounding variables and assessing whether levels of acculturation were correlated with low rates of utilization of mental health services in Latinos with clinically meaningful levels of depressive symptoms.

The rationale for the study will be discussed in the remaining sections of this chapter, which includes (1) an introduction to the clinical presentation, management and disease burden associated with type 2 diabetes nationwide, (2) a brief overview of depression and its connection to diabetes, (3) an introduction to the Latino population in the United States, and the disproportionate burden from diabetes and depression that this population bears, (4) a review of the literature on how acculturation may impact health outcomes, particularly for Latino individuals, and (5) an overview of the contributions of this study, including its conceptual model linking acculturation, depressive symptoms and mental health service utilization in Latino adults with type 2 diabetes.

**Diabetes: The Silent Killer**

Diabetes mellitus is a metabolic disorder in which the body's blood glucose levels remain elevated above normal levels. The development of this chronic medical condition continues to burden the United States and has been closely linked to obesity[11]. In the 1990's the epidemic of diabetes began to become recognized as a public health issue and its status as an epidemic has remained decades later despite it being a preventable disease[12]. In 2012, 1.7 million new cases were diagnosed and 9.3% of the population had diabetes in 2014[13]. It is projected that the number of people with diabetes will reach 29 million in 2050[11]. Diabetes management requires maintaining glycemic control and preventing associated comorbidities and disease complications through diet control, frequent physical activity, and hypoglycemic medications[14]. Diabetes therapy is focused on the maintenance of glycemic control through the use of measured glycosylated hemoglobin (A1C) where the goal is to remain in the range of an A1C less than

7.0% to 8.0% as recommended by the American Diabetes Association depending on patient characteristics[14].

There are currently three main classifications of diabetes mellitus. Type 1 described as *insulin-dependent* develops when the body's immune system destroys the pancreatic beta cells and cannot produce insulin, the hormone that controls blood glucose levels. Type 2, described as *non-insulin-dependent* develops when the body is resistant to the effects of insulin in controlling blood glucose levels. Gestational diabetes is diagnosed during pregnancy when the body is intolerant to glucose[15]. This analysis will focus on type 2 diabetes, as it comprises 90% to 95% of all diagnosed cases of diabetes[13] and all participants in the present study have type 2 diabetes.

**Depression in Latinos**

As mentioned above, depression disproportionately co-occurs with type 2 diabetes[13], particularly amongst Latinos[6,7]. This medical condition has been defined by the American Psychological Association as consisting of anhedonia that impairs with daily function as well as dysphoric symptoms that include feelings of sleepiness, loss of interest, guilt, lack of energy, difficulty concentrating, changes in appetite, psychomotor agitation or retardation, and suicidality[16,17]. These symptoms, if persistent and severe over time are considered clinically significant and an individual is considered to be clinically depressed[16]. A 1989 study on depressive symptomatology in Mexican Americans indicated a prevalence rate of 13.3% for high levels of depression in individuals surveyed via the Hispanic Health and Nutrition Examination Survey (HHANES), where as prevalence ranged from 26% to 41.5% with the use of other survey instruments[16]. Furthermore, recent studies have shown that increasingly, Mexican-American adults endorse persistent hopelessness, anhedonia, and self disparagement, particularly amongst

those with lower levels of acculturation[17]. The present study will therefore focus on Latino individuals with clinically meaningful depressive symptoms as established by the Center for Epidemiological Studies Depression Scale (CESD), a measure that will be discussed later.

**Association between Diabetes and Depression**

In order to establish the rationale for investigating depression within the context of type 2 diabetes, the association between both medical conditions was examined in the literature. When considering prevalence, depression occurs at twice the rate in individuals with diabetes compared to the general population[4,5], with a significantly higher prevalence in women[3]. Furthermore, effective treatment and management of diabetes includes the identification of concurrent conditions including depression and providing high-quality medical care particularly to those who are managed in the primary care setting[3–5], the setting characteristics of this study.

As studies such as Gross et al. (2005) have shown, patients of Latino origin specifically have both higher rates of depression prevalence and poor glycemic control[18]. Therefore, there is a significant association between depression severity and poor glycemic control amongst Latino patients with diabetes[18]. Specifically diabetes and depression outcomes are complicated by the fact that Latino patients with major depression are at a 3-fold increase of having poor glycemic control[18]. Further evidence suggests that there is a bidirectional relationship between diabetes and depression. Namely, a series of biological, psychological, and sociocultural pathways that influence glucose intolerance in diabetes in depressed patients[19]. The body responds in such a way during times of psychological stress by releasing counter-regulatory hormones which reduce the effects of insulin by increasing blood glucose levels. There is also a noted increase in glucose concentrations as a result of stress-induced release of glucocorticoids as well as alterations in

glucose transport and utilization[1]. The physiological mechanisms of insulin resistance as a result of depressive symptoms theoretically contribute to the increased risk of concurrent depression in type 2 diabetes[1].

Depression in the context of diabetes has also been described as a reciprocal relationship. In some individuals, diabetes was a major contributor to the development of depression due to the burden of disease and reduction in functioning with a chronic medical illness[20]. However, other proposed mechanisms outlined the extent to which diabetes introduced somatic symptoms related to depression[19]. Additional report focus on the interference that depression presents in the management of diabetes[4]. Despite the unclear relationship that diabetes and depression have on each other, it is clear that type 2 diabetes and glycemic control is affected by depressive symptoms and vice versa[1,4,5,19].

**Latinos in the United States**

Now that the relation between diabetes and depression and the rational for studying this specific set of diseases has been discussed, the following sections will provide an introduction to the Latino population in the United States.

There are currently 55 million Latinos residing in the U.S., constituting 17% of the total population. Latinos, additionally, comprise the fastest growing ethnic group in this nation; which has increased in size by 2.1% from 2013 to 2014 alone[21]. In 2013, 35.2% of the Latino population was foreign-born. With respect to California, there are currently 15 million Latinos, representing the largest ethnic group in the state[21] . Despite their large numbers, Latinos in the U.S. face poorer health outcomes than many other ethnic subgroups, the focus of the following discussion[1,2].

## Health Disparities in Latinos

The U.S Office of Disease Prevention and Health Promotion defines health disparities as when "an outcome is seen to a greater or lesser extent between populations"[22]. Latinos experience a wide array of disparities, often explained by social determinants that produce unequal health outcomes. Most notably, socioeconomic status, employment, social stressors, living environment, and autonomy affect health status and mortality[2]. Adverse exposures and social position have been found to have effects on hormonal and metabolic dysregulation, consequently resulting in increased rates of obesity, metabolic syndrome, and mortality[2]. These patterns are especially salient when considering the cause of the greatest burden of mortality disparities; diabetes mellitus[1,2]. With respect to the prevalence of diabetes and its related complications and comorbidities, Latinos continue to experience disparities[1,2]. Furthermore, these disparities affecting Latinos extend to include mental health outcomes and treatment for depression[3–5,8,9].

## The Disparities in Diabetes

The epidemic of diabetes, while burdening the general U.S. population, disproportionately affects racial and ethnic minority populations[1–3,11–13]. There are considerable racial/ethnic disparities in diabetes with respect to prevalence, health outcomes, and quality of care. Specifically, Latinos are at greater risk of developing diabetes[2] and Latino adults are diagnosed with diabetes at higher rates than any other group[1,2,13]. From 2010-2012, of those diagnosed with diabetes, 12.8% were Hispanics and 13.2% were Non-Hispanic Blacks compared to 7.6% Non-Hispanic Whites. Specifically, there are higher rates of type 2 diabetes mellitus amongst Non-Hispanic Blacks and Hispanics compared to Whites[13]. There is considerable

heterogeneity in diabetes prevalence among subgroups of the Latino population residing within the U.S., with 8.5% of Central and South Americans, 9.3% of Cuban Americans, 13.9% Mexican Americans, and 14.8% Puerto Ricans affected[13]. Individuals with this medical condition are disproportionately burdened by other comorbidities as well; including but not limited to hypertension, dyslipidemia, heart disease, and depression[13]. In terms of mortality, diabetes ranks fifth in leading cause of death for Latinos[23].

**Disparities in Depression and Its Treatment**

Racial and ethnic health disparities also extend into the domain of mental health. As previously mentioned, studies have shown that Latinos have a higher prevalence of developing persistent depressive symptoms when compared to non-Latino counterparts [16,17]. In addition, this prevalence is greater when Latinos have not adapted to American society[17]. Furthermore, Latinos are less likely than non-Hispanic whites to receive access to any form of medical treatment in general, which impacts the access to depression treatment[8,9,20,24,25]. A 2008 study on the disparity in depression treatment among racial and ethnic minority groups in the U.S. indicated that 63.7% of depressive Latinos did not access mental health treatment[24]. For Latinos, some cited reasons for differences in diagnosis and treatment in particular, have to do with the under-detection of depression in individuals, differing symptom presentations in mental health disorders, the somatization of psychiatric distress, cultural identifications of distress, stigma from mental illnesses, losing pay from work, or mistreatment by health professionals[24]. In Sorkin, et. al. (2011), more Latino patients reported symptoms of depression compared to their non-Hispanic White counterparts and significant differences existed in the diagnosis and treatment of depression[8].

The prescribing pattern of antidepressants also reveals a racial/ethnic disparity in the demographics of those who are prescribed pharmacotherapy, with Latino utilization of an antidepressant less than half the rate for non-Hispanic Whites as determined in the National Ambulatory Medical Care Survey in 1992-93 and 1994-95[26]. Antidepressants are first-line pharmacotherapy for depressive disorders, and despite the increase of antidepressant prescriptions, Latinos are less likely to be treated for depression[8,9,20,24–26]. The inappropriate use of antidepressants constitutes a missed opportunity to improve the health of a population that has historically been marginalized. In fact, beyond the pharmaceutical intervention, Latinos were less than half as likely than non-Hispanic Whites to receive depression care that met standard guidelines[25]. Therefore, the issues of access and quality of care remain critical issues to consider when working with ethnic minority communities and it is imperative to recognize that ethnicity has an independent effect on accessing depression treatment[24].

**Health of the Foreign-born**

Although disparities are often characterized broadly within large racial/ethnic group categories, such as Latinos, health behaviors, healthcare utilization and health outcomes may vary considerably within these large groups[2,6,10]. One example of this heterogeneity of experiences can be found in comparing the health of foreign-born versus native-born individuals in the United States[10]. Approximately one-third of the total U.S. population was born outside of the U.S.[21]. Foreign-born individuals often display different health behaviors and are accompanied by factors of acculturation that lead to diverse health outcomes when compared to their native-born counterparts[2,6,10]. However, there is a notable paradox that exists with respect to mortality rates. Namely, mortality rates for those foreign-born tend to be lower than in native-

born individuals[10]. Specifically, life expectancy is estimated to be an average of 2.9 years greater in migrants when compared to U.S. born Non-Hispanic Whites, and even greater when compared with U.S. born individuals belonging to the same ethnic group [10]. The mortality advantage is even more robust if the sole focus is in Latinos, particularly Mexicans [2,10].

Trends have increasingly recognized that lower all-cause mortality amongst Latinos presents a paradox known as the *epidemiologic paradox* [27,28]. Explanations of this paradox suggest a "healthy migrant effect" in which only the healthiest Latino individuals migrate to the U.S. Data to support this hypothesis lies in the fact that foreign-born individuals have better health than their U.S.-born counterparts[27–29]. In addition, recently arrived Latino immigrants are healthier when compared to those immigrants that have resided in the U.S. for longer periods of time, information that is critical to understanding the health trends of Latinos in the U.S. [27,30].

An alternative hypothesis to explain the *epidemiologic paradox* is the "salmon bias" which suggests that many Latino immigrants return to their country of origin after becoming ill and finish out their life in their country of origin[27]. Given the difficulty trending mortality internationally, it is unclear whether the U.S. Latino mortality rates are truly accurate, however, what is clear is that explanations of lower Latino mortality are multi-factorial in nature. The Latino health advantage only exists for mortality rates of cardiovascular disease, all-cause cancer, as well as lung, colon, breast, and prostate cancer. This is hypothesized to be due to differences in health behaviors, which worsen with increased levels of acculturation[27,30]. Despite the health advantage that the Latino mortality paradox provides, similar trends are not evident in other diseases, particularly in diabetes mellitus[27].

The two hypothesis to explain the Latino paradox have been largely refuted in the literature, however, recent meta-analyses have shown that Latinos continue to have lower

mortality rates, comprising a 17.5% lower mortality rate when compared to non-Latinos[29]. Similar trends continue to be noted with respect to susceptibility to certain medical conditions and disease progression, resulting in greater longevity[29].

While foreign-born Latinos exhibit a health advantage, studies have indicated that health outcomes begin to deteriorate with higher levels of acculturation, or higher degrees of assimilation into the mainstream U.S. culture, an experience that is very unique to many Latino immigrants[28–31]. Acculturation is multidimensional in nature, and is defined as the phenomenon that occurs when one deviates from their culture of origin after continuous interaction with a new culture and begins adopts those cultural patterns of the host society[31,32]. A unidirectional model of acculturation assumes that the acculturation experience is "all or none", and that it falls along a continuum of not acculturated to completely acculturated into the dominant culture while losing the culture of one's country of origin[31]. Where as a bidirectional model of acculturation assumes that an individual acquires characteristics of the dominant culture while preserving their original culture[31]. Regardless of the models of acculturation, the literature has shown that there is a negative effect of acculturation in that more acculturated Latinos, who have increased exposure to the U.S tend to engage in more negative behaviors such as substance abuse and dietary practices[28,31,32]. Higher levels of acculturation are also associated with more adverse health outcomes when compared to those who are less acculturated[31,32]. The exception lies in that more acculturated individuals may also use preventative services and have a better self-perception of health; thus proving that acculturation has bidimensional and protective effects[31]. The discussion on measures of acculturation and its relationship to mental health will follow.

**Acculturation and Depression**

A critically important factor that was considered in context of depressive symptoms is that the Latino cultural and social experience often includes immigration, acculturation and aspects of acculturative stress, all features that may contribute to higher levels of depression[6,32,33]. Acculturation has also been linked to additional health related outcomes such as obesity, diabetes, and cardiovascular disease[6]. Furthermore, recent studies have shown that the association between acculturation and the risk of developing depression is highest in those individuals who are less acculturated or foreign-born, when compared to higher acculturated individuals or those born in the U.S[6]. To date, there is little known about the relationship between levels of Latino acculturation and rates of treatment for depression. Therefore, this study will focus on the association between acculturation and the utilization of mental health services in Latinos with type 2 diabetes and depression. The focus of the study will be within the context of the disproportionate disparity of undertreated depression in Latinos[8].

The literature shows that Latinos who experience acculturation and have to adapt to new cultures and languages as a result of being immigrants are at increased risks of developing psychopathology[32,34]. The adaptation to American culture serves as a source of stress, therefore Latinos who are foreign born increasingly have greater mental health disorders, including major depression[32]. This pattern is often explained by the *immigration paradox*, which suggests that with increased time spent in the U.S. the risk of experiencing mental health disorders and depression increases as well[32]. Therefore, individuals who are foreign-born immigrants will exhibit greater levels of depression. In a study by Cabassa et.al. (2006), acculturation was measured in order to categorize depressed participants and results showed that higher acculturated individuals generally identified more depression[35]. However, additional studies have

reported inconsistent findings on the association between acculturation and mental health but this may be due to the wide array of instruments and methods to measure acculturation[32]. Thus, given the discrepancy in study outcomes it is unclear whether acculturation truly has an association with depression.

Nevertheless, what is known from the literature is that Latino immigrants have unique experiences that often contributes to increased levels of stress and depressive symptomatology. These experiences may contribute to what is known as *acculturative stress*, an individuals response to events in their life that stems from their intercultural contact interaction between cultures[32]. Acculturative stress is manifested as a result of navigating and adapting to different cultures, and recent studies have shown that exposure to U.S. culture can impair psychological well being[32]. Stressors can include the pressure to attain English fluency while maintaining Spanish fluency and the preservation of Latino culture while adapting to American culture; all factors that increase the risk of poor mental health outcomes[36,37]. Psychological functioning is therefore affected by the acculturating process with elevated levels of stress causing an increase in levels of anxiety and depression[36].

Further experiences that affect the perception of depression include Latino beliefs and attitudes about mental health and services. These perspectives influence depression and treatment as there is often a stigma associated with recognizing mental disorders and addressing them with any health care providers [35,38,39]. It may or may not be acculturation alone that influences mental health service utilization, but what is known is that there are multi-factorial influences. Another component to consider in the Latino societal and culture experience and which affects the way depression is perceived include beliefs about familism. Familism is defined as a "strong identification and attachment of individuals with their families"[40]. It is often an important factor

in the level of acculturation an individual attains once in the U.S. The Latino family has been described as an emotional support system with a cohesive group of relatives that often protect one's members from external stressors, such as those leading to depressive symptoms[40].

Familism as a factor made up of two components: attitudinal and behavioral, can be influenced by an individuals level of acculturation[37,40]. Sabogal et.al. (1987) specifically studied attitudinal familism changes due to acculturation levels and findings suggested that high levels of perceived family support persisted despite higher acculturation into mainstream U.S. culture, whereas familial obligations were perceived lower with higher levels of acculturation[40]. It is these beliefs about familism that impact an individuals psychosocial outcomes and how one deals with mental illness[40]. Therefore, evidence in the literature suggests that a combination of nativity, culture, and acculturation may affect health outcomes, including depression, in Latinos.

**Contribution of this study**

Prior studies have established the important connection between diabetes and depression, demonstrating the disproportionate burden of these two conditions that is borne by Latinos, and the failure of the health system to provide adequate treatment for mental health in Latinos. This prior research points to the importance of understanding *why* depression is undertreated in Latinos with diabetes and depression. Because of the diversity of levels of acculturation within the Latino population, and because of the well-documented associations between acculturation and health outcomes and healthcare utilization, acculturation represents an important construct to consider in models explaining disparities in mental health.

To date, relatively few studies have examined the association between acculturation and the utilization of mental health services in Latinos with type 2 diabetes *and* depression. There is

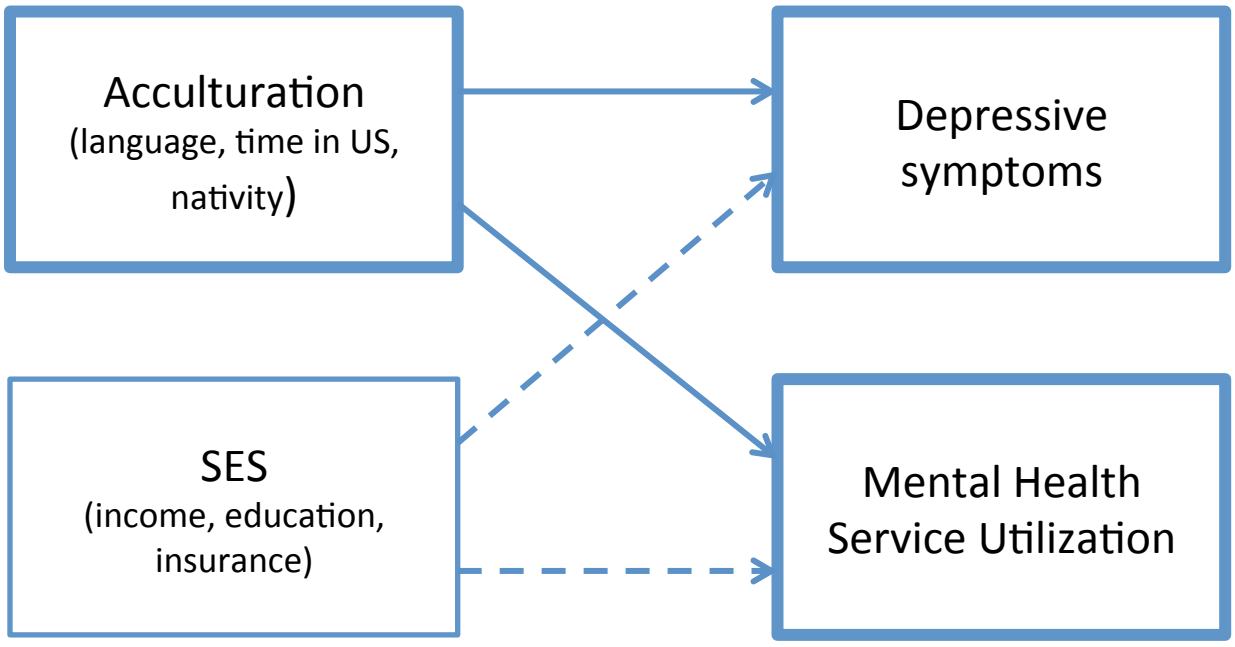
a clear disparity both in diabetes rates and depression rates, with a greater comorbid disparity in those who have both diseases. Moreover, the rates of depression treatment are significantly lower in Latinos. Understanding these outcomes can prove useful in developing appropriate strategies for prevention, as well as intervention through the identification and treatment of depression, particularly in Latinos with poor glycemic control. Understanding the issues of migration and acculturation with respect to comorbid conditions, and Latino perspectives on chronic disease can inform about the underlying social, cultural, psychological, and health care needs of this particular group of patients. Furthermore, with a growing Latino population and increasing rates of diabetes and depression, physicians can tailor clinical approaches to treatment and counseling patients of Latino origin.

This study will aim to fill the existing gap in the knowledge by examining the relationship between levels of Latino acculturation and rates of treatment for depression. This information will serve to provide insight into whether acculturation explains the low rates of utilization of mental health services in Latinos with type 2 diabetes and depression.

Furthermore, this study will test the conceptual model presented in figure 1 below. The model demonstrates the association between acculturation and the utilization of mental health services in individuals with type 2 diabetes and depression. In this study, acculturation was determined considering the following factors; language preferences at home, time spent in the U.S., and place of birth. Acculturation therefore affects the utilization of mental health services but additionally has an effect on the presence of depressive symptoms in an individual, as outlined in the previous sections. This relationship is delineated by a solid arrow and corresponds to aim 1. The relationship between the effects of acculturation on mental health service utilization is established by a solid arrow in the conceptual model, and will be measured in aim

2. Because acculturation is associated with SES[37], and low SES on its own may contribute to poorer depression outcomes and mental health service utilization[37,38], the relationship between socioeconomic status (SES) and both outcomes is considered in the conceptual model as a possible confounding relationship in the hypotheses tested in aims 1 and 2 and is delineated by dashed arrows. The primary questions that will guide this study is whether there is association between acculturation levels and (1) reports of depressive symptoms and (2) utilization of mental health services.

*Figure 1.* Conceptual model for the association between acculturation and the utilization of mental health services in individuals with type 2 diabetes and depression.




Note: Solid arrows= aim 1 and aim 2. Dashed arrows= confounding relationship. SES= socioeconomic status.

**Research Questions and Hypothesis**

This paper will primarily focus on two separate aims:

*Aim 1*— To determine whether acculturation level is associated with individual reports of depressive symptoms after controlling for potential confounding variables in the context of the association between depressive symptoms and acculturation level.

*Aim 2*— To assess whether levels of acculturation are correlated with low rates of utilization of mental health services in Latinos with clinically meaningful levels of depressive symptoms.

The aspects of the conceptual model that will be tested in this study have been discussed above and include the influences of nativity status, time in the U.S. and language preferences on establishing acculturation level of an individual, which in turn will be examined as a predictor of depressive symptomatology and utilization of mental health services. Therefore, the hypothesis corresponding to aim 1 is that that there will be a positive association between acculturation level and individual reports of depressive symptoms after controlling for potential confounding variables. While the hypothesis for aim 2 is that low levels of acculturation will be correlated with low rates of utilization of mental health services (diagnosis, prescribed medications and seeing a mental health provider) in Latinos with type 2 diabetes and clinically meaningful depressive symptoms.

# CHAPTER 2: METHODS

## Setting

Data were derived from the Reducing Racial/Ethnic Disparities in Diabetes: The Coached Care (R2D2C2) Project, a multiyear study examining the contributors to racial/ethnic disparities in diabetes outcomes[1]. Participant recruitment occurred at seven multicultural and geographically diverse outpatient clinics affiliated with an academic center in Southern California. A diabetes registry of adult patients with type 2 diabetes identified eligible patients who had one encounter with a physician; namely, a family medicine, internal medicine, or endocrinology health care provider within the year ending June 30, 2007 (n=3,894). The mean age of the registry patients was 58.9 [SD=13.5] and 56.8% were female. Ethnic demographic breakdown included 27.0% non-Hispanic white, 41.2% Mexican American, 13.4% Asian, and 18.5% of other ethnic origin. Medicare was the primary insurance for 43.2% of patients, Medicaid for 21.4%, commercial insurance for 19.2%, and 16.2% were uninsured[1].

## Study Design

The initial data from the R2D2C2 study was obtained through a cross-sectional study whose aim was to identify the major contributors to the disparities in glycemic control for type 2 diabetes amongst three racial/ethnic groups identified from a diabetes registry. The present study was a cross-sectional study as well and examined the association between acculturation and the utilization of mental health services in Latinos with type 2 diabetes and depression.

**Derivation of Analytic Patient Sample**

Study participants were recruited from the diabetes registry who met the following criteria: 1) were 18 years of age or older; 2) were of Vietnamese American, Mexican American, or non-Hispanic white ethnicity; 3) had type 2 diabetes (as indicated by HbA1c ≥ 6.5% , fasting glucose >126mg/dl, a 2 hour glucose tolerance test >200mg/dl, or random glucose >200mg/dl, were actively being treated with oral antihyperglycemic medications or insulin, or had an ICD-9, DRG, or CPT codes for diabetes or diabetes-related complications). Patients were excluded on the bases of certain criteria: 1) age ≥ 80 years; 2) diagnosis of schizophrenia, dementia, or other serious mental health problem; 3) diagnosis of cancer or other serious medical problem; 4) or could not speak English, Spanish, or Vietnamese. 1,971 eligible patients (50.6% of the diabetes registry) who met the inclusion criteria were approached prior to their regularly scheduled diabetes appointments. Of these, 1,484 (75.3%) consented to participate. The final analytic sample for this analysis includes 749 eligible Hispanic patients, which was further reduced according to available data for each aim. The University of California, Irvine's Institutional Review Board approved the research design, survey questions, and study procedures for the original study.

**Data Collection**

Upon enrollment in the R2D2C2 project, participants completed a baseline survey and allowed the study team to access medical record, laboratory, and administrative data.

**Study Measures**

*Acculturation.* Acculturation scoring was modeled after a study on the association between acculturation levels and diabetes prevalence among Hispanic and Asian American populations [41]. Acculturation level was defined using a combination of information from three data points: 1) nativity status, born in the U.S. (0 = no, 1 = yes); 2) length of time in the U.S. (those who had lived in the U.S. for less than 10 years, 10 – 20 years, and for 20 or more years); and 3) primary language spoken (1 =English-speaking only or English better than Spanish, 2= equal proficiency in both English and Spanish, and 3= Spanish-speaking only or Spanish better than English). This scoring system used by Kandula et.al. (2008) was used to derive a composite acculturation score in order to provide a more accurate representation of acculturation with the consideration that the three characteristics are often clustered within an individual; as opposed to analyzing each variable separately[41].

The available data was combined to create a point scale from 0 – 3 representing nativity and time spent in the U.S. (0 = foreign-born and lived in the U.S. for less than 10 years, 1 = foreign-born and lived in the U.S. for 10 – 20 years, 2 = foreign-born and lived in the U.S. for 20 or more years, 3 = born in the U.S.). The categories corresponding to language spoken were assigned a second point scale from 0 – 2 (0 = Spanish-speaking, 1 = both equally, 2 = English-speaking). The two computed scores were then added together to create an overall acculturation score, with scores ranging from 0 (least acculturated) to 5 (most acculturated). Participants were then categorized into 3 separate groups, less acculturated (scores = 0 – 2), moderately acculturated (score= 3), and a highly acculturated group (scores = 4 – 5).

*Depressive Symptomatology.* The Center for Epidemiological Studies Depression Scale (CESD) was used to measure depressive symptoms in this study sample. The CESD is a self-report scale whose internal consistency, test reproducibility, validity, and reliability have all been proven[42]. The CESD, originally composed of 20-items was shortened to 11-items (see Appendix 1.1) for the purposes of the R2D2C2 study in order to decrease respondent burden, with answers rated on a Likert scale ranging from 'most or all of the time' to 'none of the time'[43]. For this analysis, CESD was stratified and "dummy coded" based on presence of depression versus no depression. Scores of 0 to 11.9 correspond to no presence of depressive symptoms and this was given a '0'. Any score 12.0 or greater was given a '1' corresponding to presence of depressive symptoms[42].

*Mental Health Service Utilization.* Mental health service use was defined using two separate measures. *Provider recognition of depression* included physician noted diagnosis of depression or anxiety and prescriptions for anti-depressant or anti-anxiety medications. This was measured by combining all participants who had data available for both variables and forming a new dichotomous variable, 0= no and 1=yes. *Patient-reported* mental health service utilization was derived from patient self-reports of seeing a mental health provider, 0= no and 1= yes. Participants were asked to answer a single question, 'have you seen a mental health provider?'.

**Statistical Analysis**

Analysis was performed using SPSS v. 23.0 (IBM Corp., Armonk, New York). Participant characteristics including age, gender, income, education, insurance, nativity, and other important variables were compared between groups using univariate and distributional statistics. P values $\leq 0.05$ were reported as statistically significant.

This analysis focused on the association between acculturation and the utilization of mental health services in Latinos with type 2 diabetes and depression by providing descriptive statistics about acculturation levels in each of the aims and with the subset of participants. Logistic regression analysis was used to determine whether acculturation level is associated with individual reports of depressive symptoms after controlling for gender and SES (education level, income, insurance status) (Aim 1). Then, for the subset of participants with clinically meaningful depressive symptoms (CESD$\geq$12.0), the association of acculturation with low rates of utilization of mental health services was also examined with logistic regression controlling for the same potential confounders (Aim 2).

*Aim 1 regression model – predictors of depressive symptoms*

The purpose of aim 1 was to assess the association between acculturation levels and individual reports of depressive symptoms. The independent variable was an individual's level of acculturation, either low or moderate with highly acculturated individuals being the reference group. The dependent variable was the reporting of depressive symptoms as measured by CESD. A binary logistic regression model was derived to allow the prediction of the dependent variable from the independent variable by exponentiating a beta value and obtaining the odds ratio. This information allowed for the assessment of the prediction of depressive symptoms from levels of

acculturation. Then, a multivariable logistic regression model was used to examine potential confounding variables in the association between acculturation level and depressive symptoms. The confounders identified and included in the adjusted logistic regression models were gender, education, income, and insurance status.

*Aim 2 regression model – predictors of mental health utilization*

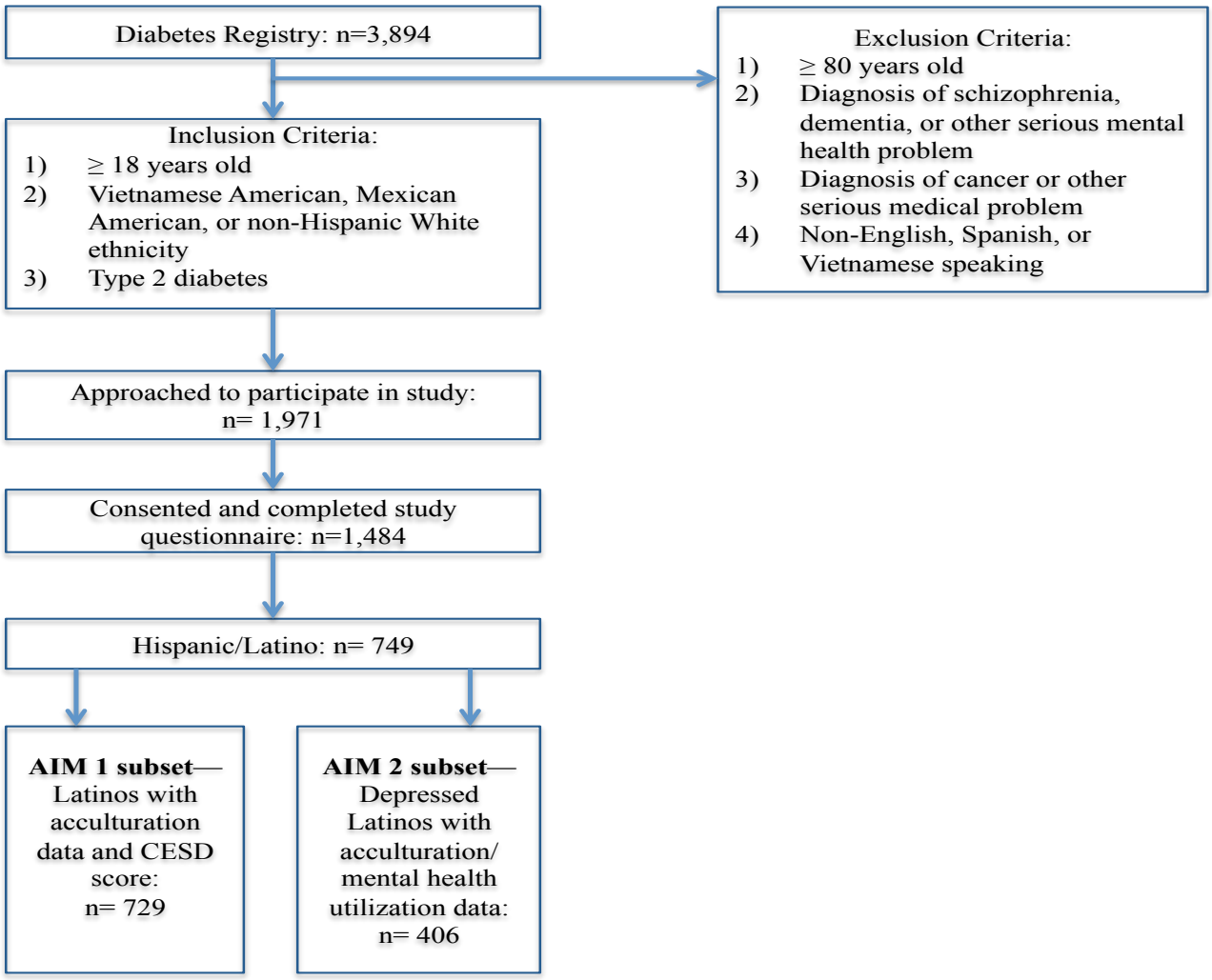
The purpose of aim 2 was to assess whether levels of acculturation are associated with low rates of utilization of mental health services in Latinos with clinically meaningful levels of depressive symptoms. Participants with depressive symptoms, namely a CESD over 12.0 were selected to become part of a smaller dataset. The independent variable was an individual's level of acculturation, either low or moderate with highly acculturated individuals being the reference group. While the dependent variable was the rates of utilization of mental health services as noted in the participant's chart. Having a diagnosis of depression or anxiety, being prescribed antidepressants or antianxiety medications, and seeing a mental health provider all constituted the definition of mental health service use. A series of binary logistic regression models was derived to allow the prediction of the dependent variable from the independent variable in the same manner as aim 1. The first model provided the odds ratios for *provider recognition* of depression (diagnosed with depression or anxiety and prescription to health system-reported medications as noted in the chart). The second model provided the odds ratios for *patient-reported* mental health service utilization (self-reports of seeing a mental health provider). Confounders identified and included in the adjusted logistic regression models were gender, education, income, and insurance status.

## CHAPTER 3: RESULTS

### Derivation of analytic sample

Figure 2 below outlines the derivation of the analytic sample used in both aims. From the 749 Hispanic/Latino participants of the greater dataset there were n=729 individuals both with acculturation data and CESD scores that made up the subset of the aim 1 sample. Those without that available information were excluded. In the aim 2 subset, there were n=406 individuals included who had depressive symptoms or a CESD >12.0 and with mental health service utilization data.

*Figure 2.* Derivation of analytic sample.



**Results for Aim 1: Acculturation level and depressive symptoms**

***Sample characteristics – Aim 1 Subset***

The patients in the analytic sample were all Latinos with type 2 diabetes (n=749, derivation of analytic sample in figure 2 above). There were 596 individuals with low acculturation levels, 79 with moderate acculturation levels, and 74 with high acculturation levels. Age, gender, education level, average income, insurance status, nativity, and length of time living in the U.S differed significantly between the three acculturation groups. The average age of low acculturated individuals was 56.0 (SD= 11.0), while average ages of mid acculturated individuals was 54.0 (SD= 13.0) and high acculturated participants was 53.8 (SD=11.0). 70% of low acculturated participants were female. Females represented 52% and 58% of the moderate and highly acculturated individuals. 60.2% of low acculturated individual reported an average income of less than $20,000, while 54.4% and 56.8% of the moderate and highly acculturated individuals reported the same average. However, 24.5% of low acculturated individuals chose to not disclose their income, compared to 7.6% and 10.8% of moderate and highly acculturated individuals who did not disclose this information either. 95.6% of low acculturated individuals preferred to speak Spanish at home, while 47.1% and 6.8% of moderate and highly acculturated individuals cited Spanish as their preferred language. Complete participant demographics for this study can be found in table 1 below.

*Table 1.* Participant Characteristics.

| | **Low acculturation level (n= 596)** | **Moderate acculturation level (n= 79)** | **High acculturation level (n= 74)** | **p-value** |
|---|---|---|---|---|
| **Characteristic—** | | | | |
| **Age, *mean (SD)*** | 56.0 (11) | 54.0 (13) | 53.8 (11) | 0.004 |
| **Gender, *% female*** | 70 | 52 | 58 | 0.001 |
| **Education level, %** | | | | <0.001 |
| **Less than high school** | 89 | 72 | 59.2 | |
| **Greater than high school** | 6 | 28 | 39.4 | |
| **Undisclosed** | 5 | 0 | 1.4 | |
| **Average Income, %** | | | | <0.001 |
| **Less than $20,000** | 60.2 | 54.4 | 56.8 | |
| **$20,000 to $40,000** | 12.4 | 22.8 | 14.8 | |
| **$40,000 or greater** | 2.9 | 15.2 | 17.6 | |
| **Undisclosed** | 24.5 | 7.6 | 10.8 | |
| **Insurance status, *% insured*** | 58.9 | 80 | 89.2 | <0.001 |
| **Nativity, % born outside U.S.** | 100 | 35.4 | 17.6 | <0.001 |
| **Preferred language, % reporting Spanish** | 95.6 | 47.1 | 6.8 | 0.59 |
| **Living in U.S. >10 years, *%*** | 90 | 98.5 | 100 | <0.001 |
| **Years with diabetes, *mean (SD)*** | 9.6 (7.2) | 10.3 (8.7) | 9.4 (7.4) | 0.14 |
| **A1C, *mean (SD)*** | 8.18 (2.0) | 8.4 (2.2) | 8.06 (2.3) | 0.22 |
| **High CESD score, %** | 53.7 | 50.6 | 62.2 | 0.91 |

***Logistic Regression***

Results from logistic regression analysis examining the association between acculturation and depression symptomatology can be found below in table 2, which presents unadjusted and adjusted results. In the unadjusted analysis there was no statistically significant association between levels of acculturation and reporting of depressive symptoms. In contrast, the adjusted odds ratio, when controlling for confounding variables, indicates that the odds of presenting with depressive symptoms are 41% lower in low acculturated individuals compared to high acculturated individuals, a statistically significant relationship (OR [95% CI] = 0.59 [0.37, 0.95], p=0.03). There was no difference in depressive symptoms between the mid and high acculturation groups. Furthermore, there were significant effects of several demographic and socioeconomic variables on depressive symptoms. Namely, the odds of presenting with depressive symptoms are 28% lower in males (OR [95% CI] = 0.72 [0.52, 0.99], p=0.04). In addition, the odds of presenting with depressive symptoms are 3.4 times greater in individuals with undisclosed income (OR [95% CI] = 3.40 [1.55, 7.44], p=0.002). The odds were also 3.53 times and 2.24 times greater in individuals as income brackets increase by $20,000 respectively (OR [95% CI] = 3.53 [1.71, 7.30], p=0.001 and OR [95% CI] = 2.24 [1.02, 4.90], p=0.04). Depressive symptom reporting on the other hand was 39% lower for those who were uninsured (OR [95% CI] = 0.61 [0.44, 0.83], p=0.002). There was no effect of education on reports of depressive symptoms.

*Table 2.* Unadjusted and adjusted models with odds ratios (OR) for depressive symptomatology at different levels of acculturation.

| **Models for depressive symptomatology at different levels of acculturation** | | | | |
|---|---|---|---|---|
| **Variable** | **Unadjusted OR (95% CI)** | **p- value** | **Adjusted OR (95% CI)** | **p- value** |
| **Acculturation level—** | | | | |
| **Low** | 0.72 (0.46-1.11) | 0.13 | 0.59 (0.37-0.95) | 0.03* |
| **Moderate** | 0.62 (0.34-1.12) | 0.11 | 0.63 (0.34-1.18) | 0.15 |
| **High (ref)** | 1.0 | -- | 1.0 | -- |
| **Gender—** | | | | |
| **Male** | -- | -- | 0.72 (0.52-0.99) | 0.04* |
| **Female (ref)** | -- | -- | 1.0 | -- |
| **Education level—** | | | | |
| **Greater than high school** | -- | -- | 0.68 (0.41-1.14) | 0.14 |
| **Less than high school (ref)** | -- | -- | 1.0 | -- |
| **Income—** | | | | |
| **Undisclosed** | -- | -- | 3.40 (1.55-7.44) | 0.002* |
| **0-$20,000** | -- | -- | 3.53 (1.71-7.30) | 0.001* |
| **$20,000-$40,000** | -- | -- | 2.24 (1.02-4.90) | 0.04* |
| **Over $40,000 (ref)** | -- | -- | 1.0 | -- |
| **Insurance status—** | | | | |
| **Uninsured** | -- | -- | 0.61 (0.44-0.83) | 0.002* |
| **Insured (ref)** | -- | -- | 1.0 | -- |

Note: Odds ratios were computed using logistic regression models. * = significant association, p value <0.05. ref= reference group.

**Results for Aim 2: Acculturation and mental health service utilization**

***Sample characteristics – Aim 2 Subset***

In this subset of Latino patients with diabetes who reported clinically meaningful depressive symptoms (n=406), there were 320 individuals with low acculturation levels, 40 with moderate acculturation levels, and 46 with high acculturation levels (see table 3). 73.8% of low acculturated participants were female. Females represented 55% and 60.9% of the moderate and highly acculturated individuals. 62.8% of low acculturated individual reported an average income of less than $20,000, while 67.5% and 67.4% of the moderate and highly acculturated individuals reported the same average. However, 25.9% of low acculturated individuals chose to not disclose their income, compared to 12.5% and 6.5% of moderate and highly acculturated individuals who did not disclose this information either. Between group differences in age, gender, education level, average income, insurance status, nativity, preferred language, and length of time living in the U.S were statistically significant (p's $<0.05$).

*Table 3.* Participant characteristics of aim 2 subset.

| | **Low acculturation level (n= 320)** | **Moderate acculturation level (n= 40)** | **High acculturation level (n= 46)** | **p-value** |
|---|---|---|---|---|
| **Characteristic—** | | | | |
| **Age, *mean (SD)*** | 56.2 (10.2) | 52.8 (13.2) | 54.5 (10.8) | 0.006 |
| **Gender, *% female*** | 73.8 | 55 | 60.9 | 0.016 |
| **Education level, %** | | | | <0.001 |
| **Less than high school** | 90.6 | 77.5 | 65.2 | |
| **Greater than high school** | 4.4 | 22.5 | 32.6 | |
| **Undisclosed** | 5 | 0 | 2.2 | |
| **Average Income, %** | | | | <0.001 |
| **Less than $20,000** | 62.8 | 67.5 | 67.4 | |
| **$20,000 to $40,000** | 10.01 | 12.5 | 17.4 | |
| **$40,000 or greater** | 1.25 | 7.5 | 8.7 | |
| **Undisclosed** | 25.9 | 12.5 | 6.5 | |
| **Insurance status, *% insured*** | 65 | 77.5 | 87 | 0.005 |
| **Nativity, % born outside U.S.** | 100 | 25 | 19.6 | <0.001 |
| **Preferred language, % reporting Spanish** | 96.3 | 45.7 | 8.7 | <0.001 |
| **Living in U.S. >10 years, *%*** | 91.3 | 97 | 100 | <0.001 |
| **Years with diabetes, *mean (SD)*** | 10.1 (7.5) | 12.2 (9.3) | 9.1 (6.9) | 0.06 |
| **A1C, *mean (SD)*** | 8.2 (2.0) | 8.5 (2.3) | 8.1 (2.2) | 0.18 |
| **CESD, *mean (SD)*** | 19.1 (5.4) | 19.2 (4.6) | 19.2 (5.3) | 0.9 |

Comparisons of several indicators of mental health utilization are presented in table 4. 41.3% of low acculturated individuals had a provider recognition of depression, namely a notation of diagnosis *or* prescription noted in their chart contrasted to 50% and 37% of moderate and highly acculturated individuals. When further stratifying this finding, only 28.4% of low acculturated individuals had depression or anxiety noted in their chart, while 42.1% and 34.1% of moderate and highly acculturated individuals had the same diagnosis. Additionally, 35.4% of low acculturated individuals were prescribed either an antidepressant or antianxiety medication, compared to 44.7% of moderately and 28.9% of highly acculturated individuals. On the other hand, 4.9% of those with low acculturated levels reported seeing a mental health provider at the time of surveying compared to 23.7% and 15.9% of moderate and highly acculturated individuals.

*Table 4.* Description of the utilization of mental health services in depressed Latinos with type 2 diabetes, stratified by acculturation level.

| | **Low acculturation level (n= 320)** | **Moderate acculturation level (n= 40)** | **High acculturation level (n= 46)** | **p-value** |
|---|---|---|---|---|
| **Type of service—** | | | | |
| **(A) Provider recognition of depression (Notation of diagnosis *or* prescription in chart; B or C), *%*** | 41.3 | 50 | 37 | 0.45 |
| **(B) Diagnosis of depression or anxiety noted in chart, *%*** | 28.4 | 42.1 | 34.1 | 0.19 |
| **(C) Prescription for antidepressants/ antianxiety noted in chart, *%*** | 35.4 | 44.7 | 28.9 | 0.32 |
| **(D) Patient-reported utilization of mental health services (Patient report of seeing a mental health provider), *%*** | 4.9 | 23.7 | 15.9 | <0.001 |

***Logistic Regression***

A logistic regression analysis was used to determine whether levels of acculturation are correlated with low rates of utilization of mental health services in Latinos with depression, after controlling for demographic and SES variables. A set of logistic regression models were run to test whether acculturation levels were associated with provider recognition of depression (either diagnosis or prescription noted in chart, see table 5). In this model, there was no significant finding for unadjusted or adjusted effects of acculturation. However, gender once again provided a significant finding, with results indicating that the odds of presenting with depressive symptoms were 62% lower in men compared to women (OR [95% CI] = 0.38 [0.24, 0.61], $p<0.001$).

*Table 5.* Unadjusted and Adjusted Models with odds ratios (OR) for provider recognition of depression at different levels of acculturation.

| **Models for *provider recognition* of depression at different levels of acculturation** | | | | |
|---|---|---|---|---|
| **Variable** | **Unadjusted OR (95% CI)** | **p- value** | **Adjusted OR (95% CI)** | **p- value** |
| **Acculturation level—** | | | | |
| **Low** | 0.98 (0.57-1.69) | 0.95 | 0.96 (0.53-1.76) | 0.91 |
| **Moderate** | 1.41 (0.64-3.11) | 0.4 | 1.52 (0.66-3.47) | 0.33 |
| **High (ref)** | 1.0 | -- | 1.0 | -- |
| **Gender—** | | | | |
| **Male** | -- | -- | 0.38 (0.24-0.61) | <0.001* |
| **Female (ref)** | -- | -- | 1.0 | -- |
| **Education level—** | | | | |
| **Greater than high school** | -- | -- | 1.62 (0.78-3.36) | 0.2 |
| **Less than high school (ref)** | -- | -- | 1.0 | -- |
| **Income—** | | | | |
| **Undisclosed** | -- | -- | 0.72 (0.20-2.56) | 0.61 |
| **0-$20,000** | -- | -- | 0.61 (0.18-2.05) | 0.43 |
| **$20,000-$40,000** | -- | -- | 0.37 (0.10-1.39) | 0.14 |
| **Over $40,000 (ref)** | -- | -- | 1.0 | -- |
| **Insurance status—** | | | | |
| **Uninsured** | -- | -- | 0.83 (0.53-1.30) | 0.41 |
| **Insured (ref)** | -- | -- | 1.0 | -- |

Note: Odds ratios were computed using logistic regression models. * = significant association, p value <0.05. ref= reference group.

Finally, a second set of models evaluated the unadjusted and adjusted associations between acculturation and patient-reported utilization (i.e. patient report of seeing a mental health provider; table 6). In the unadjusted analysis the odds of having seen a mental health provider are 68% lower in individuals in the low acculturation group (OR [95% CI] = 0.32 [0.13, 0.76], p=0.01). In contrast, the adjusted odds ratio, when controlling for confounding variables, indicates that the odds of seeing a mental health provider are 69% lower (OR [95% CI] = 0.31 [0.12, 0.81], p=0.017). Therefore, less acculturated individuals are less likely to see a mental health provider regardless of demographics or SES. Furthermore, when considering the odds ratios for the specific confounding variables, gender and insurance status show statistically significant relationships to mental health service utilization. Namely, the odds of seeing a mental health provider are 72% lower in males (OR [95% CI] = 0.28 [0.10, 0.78], p=0.015). In addition, the odds of seeing a mental health provider are 93% lower in individuals who are uninsured compared to those with insurance (OR [95% CI] = 0.07 [0.009, 0.52], p=0.009).

*Table 6.* Unadjusted and Adjusted Models with odds ratios (OR) for patient-reported mental health service utilization at different levels of acculturation.

| **Models for *patient-reported* mental health service utilization at different levels of acculturation** | | | | |
|---|---|---|---|---|
| **Variable** | **Unadjusted OR (95% CI)** | **p- value** | **Adjusted OR (95% CI)** | **p- value** |
| **Acculturation level—** | | | | |
| **Low** | 0.32 (0.13-0.76) | 0.01* | 0.31 (0.12-0.81) | 0.017* |
| **Moderate** | 1.83 (0.65-5.11) | 0.25 | 2.07 (0.69-6.16) | 0.19 |
| **High (ref)** | 1.0 | -- | 1.0 | -- |
| **Gender—** | | | | |
| **Male** | -- | -- | 0.28 (0.10-0.78) | 0.015* |
| **Female (ref)** | -- | -- | 1.0 | -- |
| **Education level—** | | | | |
| **Greater than high school** | -- | -- | 0.64 (0.19-2.17) | 0.47 |
| **Less than high school (ref)** | -- | -- | 1.0 | -- |
| **Income—** | | | | |
| **Undisclosed** | -- | -- | 1.09 (0.27-4.41) | 0.91 |
| **0-$20,000** | -- | -- | 1.47 (0.49-4.38) | 0.49 |
| **Over $20,000 (ref)** | -- | -- | 1.0 | -- |
| **Insurance status—** | | | | |
| **Uninsured** | -- | -- | 0.07 (0.009-0.52) | 0.009* |
| **Insured (ref)** | -- | -- | 1.0 | -- |

Note: Odds ratios were computed using logistic regression models. * = significant association, p value <0.05. Ref= reference group. Income groups of $20,000-$40,000 were included in the larger reference group due to small sample size.

## CHAPTER 4: DISCUSSION

This study investigated the association between acculturation and the utilization of mental health services in Latinos with type 2 diabetes and depression through two separate aims.

In the first aim it was hypothesized that there would be a positive association between acculturation level and individual reports of depressive symptoms after controlling for potential confounding variables. Results revealed that there was an association between levels of acculturation and the reporting of depressive symptoms, but only after controlling for potential confounding demographic and SES variables. This suggests that, if there is a protective effect of low acculturation on reports of depressive symptoms, this effect may be offset by the tendency for less acculturated individuals to have lower SES. The adjusted model suggests, however, that when SES is held constant (i.e. when comparing individuals of similar SES but different levels of acculturation), individuals with low acculturation are less likely to report depressive symptoms than individuals with high acculturation.

There are several reasons that rates of high depressive symptoms are less common in less acculturated individuals. First, studies that have examined Latino attitudes towards depression treatment have shown that shame in discussing emotional issues, unawareness that providers provide treatments for depression and beliefs that emotional problems should only be discussed within the family have often been cited as deterring Latinos from seeking recognition or treatment of mental health conditions[35,38,39]. Recent studies have also found that Latinos view mental health conditions as serious problems that are caused by social or interpersonal factors[35].

Second, lower rates of depressive symptoms in less acculturated individuals may also be attributed to the cultural characteristics that accompany an individual into the acculturation process. These factors are complex and are as a result of political, economic, sociocultural,

demographic, and psychological manifestations[44]. This continuum and stress of these factors is more present when an individual is impacted by bicultural identity and bilingualism. The effects of globalization have led the U.S. to become one of the most multicultural and multilingual nations[45]. For first-generation Latinos and generations beyond they may be faced with developing several cultural identities that diverge or converge. It is the actual process of managing multiple cultural environments that affects identity and psychological outcomes[45]. The acculturation experience is different for those bicultural individuals and is rooted in integration or high identification with both the Latino and American cultures and influenced by ethnic traditions, practices, values and beliefs; often leading to higher levels of perceived stress[45].

Theories around globalization-based acculturation have been posited to affect identities through the "incorporation of cultural elements from the various world views and practices to which a person has been exposed during his or her life"[45]. This interpretation of acculturation has led to the construct of *bicultural identity integration* (BII), a variable that focuses on bicultural individuals' perception of managing two cultural identities and perceptions of conflict[45,46]. Studies by Benet-Martinez and Haritatos (2005) have shown the negative association between BII and stressors of the linguistic domain and experiences of discrimination and cultural isolation[45,46]. Therefore, individuals who belong to moderate or highly acculturated groups but identify with two cultures may be experience more depressive symptoms but because of their beliefs and experiences do or do not report them thus leading to insignificant findings in this study.

The second aim assessed whether levels of acculturation were correlated with low rates of utilization of mental health services in Latinos with depression. Acculturation was not associated with *provider recognition* of depression, as noted in patient charts. However, when

considering *patient-reported* use of mental health services, results were significant suggesting that individuals with low acculturation scores were less likely to see a mental health provider than high-acculturated individuals.

This latter finding may be explained, in part, by beliefs about familism that are central to Latino culture and may affect depressive symptom perception[40]. If familism values were highly present in individuals with low or moderate acculturation levels, the reliance on familial support could have served as a proxy for reporting depressive symptoms. For Latinos, some cited reasons for differences in diagnosis and treatment in particular, also have to do with the underdetection of depression in individuals, differing symptom presentations in mental health disorders, the somatization of psychiatric distress, cultural identifications of distress, stigma from mental illnesses, losing pay from work, or mistreatment by health professionals[24].

These results also shed a light on the health care system actions of diagnosing and treating depression versus patient perspective on whether they are seeing a mental health provider. An interesting finding was that 41% of low acculturated individuals had notations of diagnosis of depression/anxiety or prescriptions for medication in the medical record, but less than 5% of low acculturated individuals reported seeing a mental health provider. This suggests a disconnect between what is happening at the clinical level and what patients perceive in terms of receiving care.

Further research would be required to determine whether the low rate of self-reported utilization is due to the beliefs about the stigma of reporting mental health disorders, fewer referrals by primary care physicians to seek a higher level of mental health care, less follow through from patients on the referrals, or mental health care being delivered by primary care physicians; and how these factors are affected by acculturation. Stigma of mental illness is a

present fear common amongst Latino communities[47]. The recognition of a mental illness can often lead communities to label that individual as "crazy" and the need for mental health services is reserved for those who are "really crazy"[35,47], factors which contribute to increased stigma in the community. In addition, Latinos frequently believe that depression is a consequence of difficult life circumstances and which are short lived and not necessarily a mental illness that needs to be treated[47]. When Latinos do seek care for mental health issues primary care providers are commonly their first line of treatment because they are not aware that specialty services are available[35,39,47] . Studies have also shown that Latinos recognize the barriers to obtaining mental health services for depression where referrals may be linked to lack of insurance and costs of treatment and medications[47]. Determining this mechanism and its association to acculturation is necessary to establish how interventions can increase mental health service utilization.

In addition to acculturation, SES was shown to play an important role in reports of depressive symptoms and in utilization of mental health services. Lower SES (income, educational attainment, and health insurance status) has been shown to be linked with conflicts as an individual acculturates[37]. That is, the results of this study are consistent with the idea that individuals with lower SES have greater levels of "conflict symptomatology", such as conflict with anxiety disorders, stress, addictions, and conflicts in one's career as outlined by *social inequality theory* that states that low SES immigrants perceive greater inequalities in social status, class, and power when compared their non-immigrant counterparts[37]. Therefore, in the present study, it is possible that those who did not disclose income are actually low SES individuals and are unsatisfied with their social conditions, which may lead to higher rates of depressive symptomatology. However, the results for aim 1 also indicated that as SES increased by $20,000 the odds of reporting symptoms also increased, a relationship that is still unclear.

This study provides insight into the health factors affecting the rising population of Latinos in the U.S. and in California with a special focus on the how this bigger picture is influenced by acculturation. A large issue within the rising epidemic of type 2 diabetes is the simultaneous onset of co-morbid depression, and how depression can be effectively managed. Latinos are disproportionately affected by depression, but less likely to be treated[6–9]. The relationship between acculturation and depressive symptoms and seeking treatment led to findings consistent with the literature, as well as provided the unique findings discussed above. Results of this specific study provide additional data in the realms of Latino health, disparities in health, acculturation, and treatment of depression. It is also important to note that the issues of access and quality of care remain critical issues to consider when working with ethnic minority communities and it is imperative to recognize that ethnicity has an independent effect on accessing depression treatment[24]. With this information, this study provides an understanding into those areas of research as well as guiding directions for future studies.

**Study Strengths**

The major strengths of this study included the distinctiveness of the analytic sample being primarily Latinos and foreign-born Latinos with type 2 diabetes, a group of individuals comprising a large subset of the U.S. and Californian populations. Additionally, the large variety of analytic data available allowed for several questions to be answered, in particular with regards to acculturation and mental health service utilization, a focus that is currently lacking in the recent literature. Furthermore, the analysis of the association between acculturation and the several outcomes in the distinctive aims provided a greater understanding of the impact that the understanding of acculturation and levels that a Latino individual may belong to can have on the

recognition/reporting of depressive symptomatology and seeking of treatment in this particular group of individuals. It also showed that the low levels of mental health service use reported for Latinos can be explained, in part, both by SES *and* acculturation levels[35,37,47]. This analysis can assist in the guidance of the development of adequate strategies to detect and treat depression particularly in the context of another co-morbid condition.

**Study Limitations**

Limitations to consider when interpreting results include the fact that the results obtained in the very specific sample population of Latinos excluded other ethnicities/races. Therefore, results may not be generalizable to other groups of individuals. In addition, the sample was comprised on Latinos who have access to medical services, thus it excluded those individuals who do not have access to health care, who may be undocumented, and who quite possibly may be depressed as well as have type 2 diabetes. Exclusion of that particular population limits this study's ability to generalize as well as represent the true situation of Southern California Latinos.

In terms of sample size, there were a significantly lower number of individuals in the moderate and highly acculturated groups in both aims. The population sample in this study included a large number of low acculturated participants, which presents limited statistical power to test multivariable models, particularly in the depressed subset of participants in aim 2. This resulted in large confidence intervals for some of the odds ratios estimated in the models. Future studies should include larger numbers of moderate and higher acculturated participants.

Furthermore, another limitation of this study is that acculturation was measured using a combination of proxy measures that was both available and has been used in previous peer-reviewed publications. A more direct measurement would have been using a scale that considers

ethnic identification, country of origin of parents and grandparents, customs, and dietary preferences[16], in addition to country of birth, time spent in the U.S. and language. Further studies can focus on obtaining acculturation scores through the Acculturation Scale for Mexican Americans (ARSMA) which measures both Mexican orientation and Anglo orientation[33] . The ARSMA is the most widely used acculturation tool in scientific and clinical research and mean scores are computed from each subscale and places individuals on a continuum from high Mexican orientation to high Anglo orientation[33] which can aid in differentiating the levels of acculturation used in this study.

Additionally, limitations to consider in this analysis include the reliance on self-reporting. Participants self-reported seeing a mental health provider, and this number may be different if reported by a health care provider who may be able to distinguish the definition of mental health providers. Comparisons between provider recognition reports and patient-reported utilization are difficult to interpret because they assess different components of utilization. The provider recognition-reported measures that were available for analysis focus on notation of a diagnosis in the chart or prescription for a relevant medication, but not whether or not the patient saw a mental health provider. In contrast, the available patient-reported measure focused only on whether or not a mental health provider was seen, but not whether a diagnosis or medication was noted. For this reason, it is not possible to corroborate each type of utilization with multiple measures. For example, it is unclear whether the low rates of utilization of mental health services reported by the patients in the low acculturation group reflect low rates of true utilization (which could be corroborated with medical records data if it were available), or simply low rates of reporting the utilization due to stigma, lack of awareness, etc. Further investigation would be required to reconcile effects of the measurement type on the utilization

rates observed. However, the data do support the notion that reports of mental health utilization are significantly lower in low versus high acculturation patients with diabetes and clinically meaningful levels of depressive symptoms.

Furthermore, the use of the CESD tool as a way of measuring depressive symptomatology was also a self-reported measure. Despite proven reliability and validity, it is a self-reporting instrument that only indicates presence of symptoms given personal recognition. Although it is widely used, it may not adequately distinguish between clinical depression and disease-specific distress, and as seen in this study and elsewhere[8], may not correspond with a diagnosis of depression.

**Implications**

Considering the strengths and limitations, results of this study have clinical implications. First, the recognition that Latinos are affected by acculturation in different ways and their life experiences may guide what level of acculturation an individual belongs to, and how they cope with life stressors. Specifically, Latinos with type 2 diabetes and co-morbid depression will present with distinctive life trajectories. But is it their history of immigration, acculturation or SES that ultimately affects their presence of depressive symptoms and use of mental health services. What is known now is that low acculturated individuals are less likely to report depressive symptoms and also less likely to see a mental health provider. With this knowledge, clinicians should be meticulous in identifying this group of patients and offer them additional resources for treatment and therapeutic support.

We know that Latinos in the U.S. face poorer health outcomes, and as clinicians it should be our goal to eliminate these persistent health disparities. With this study, clinicians and

researchers can begin to understand the contributors to these disparities, especially within the context of acculturation and its impact on health outcomes. Depression is a treatable condition and especially impacted if detected early on, before it begins to drastically impact one's psychosocial functioning and quality of life[4]. This study can therefore guide clinical practice by informing clinicians of the importance of screening for depression and offering treatment or treatment alternatives, particularly for patients that fit the profile tested in this study.

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## APPENDIX

*Appendix 1.1.* Item groupings and abbreviated item content for CESD.

| Health Scale | Item | Abbreviated Item Content |
|---|---|---|
| Depressive Symptomatology (CESD) | CESD1 | During the past 4 weeks, how often were the following statements true: I was bothered by things that usually don't bother me. |
| | CESD2 | I felt that I could not shake off the blues even with help from my family or friends. |
| | CESD3 | I had trouble keeping my mind on what I was doing. |
| | CESD4 | I felt depressed. |
| | CESD5 | I felt that everything I did was an effort. |
| | CESD6 | My sleep was restless. |
| | CESD7 | I was happy. |
| | CESD8 | I felt lonely. |
| | CESD9 | I enjoyed life. |
| | CESD10 | I felt sad. |
| | CESD11 | I could not get going. |