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Alison B. Ross
Scripps College

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**APPLYING THE BIOPSYCHOSOCIAL MODEL: FACTORS ASSOCIATED
WITH DEPRESSION IN MEXICAN-AMERICAN ADULTS**

by

ALISON ROSS

**SUBMITTED TO SCRIPPS COLLEGE IN PARTIAL FUFILLMENT OF THE
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**PROFESSOR WALKER
PROFESSOR THOMAS**

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Introduction

The biopsychosocial model, formally presented by George Engel in 1977, remains popular in the field of health psychology, but several researchers question its comprehensiveness, and thus this paper seeks to expand upon it in order to better understand depression in Mexican-American adults. Engel's incomplete address of the role of cultural factors in the health outcomes of patients has led some to believe that the model would improve with such considerations more fully taken into account; though Engel does briefly mention the influence of culture on expression of disease and the line at which behavior is considered abnormal, there is no specific mention of exactly how culturally specific social factors are crucial for identifying the psychological response and origin of disease, nor does Engel fully explain what he means by the term "culture" in the context of his model. Thus, in order to expand upon the model, I seek to examine the predictive power of social risk factors specific to Mexican-American culture that are otherwise considered nonpredictive in the general American population.

Due to its high prevalence among Americans of Mexican descent, I examined the culturally specific factors that may be predictive of depression in this population, including acculturation and living situation. Due to the high incidence of diabetes in Mexican-American adults, I also examined the role of diabetes in these relationships between cultural and social factors. Especially in the case of minority groups in the US, it would be a disservice to only address the dominating social factors upon which psychological grievances are influenced in the dominant population group. Therefore, in line with Engel's ideas despite not being explicitly stated, I propose that the influential power of culturally specific social factors should be explicitly determined in psychological impairments such as depression.

The Biopsychosocial Model - History and Critiques

In the late 1970s, the biomedical model was a popular model used by physicians for diagnosing and treating illness. According to Engel (1977), the biomedical model is a linear theoretical framework in which physicians understand overall health as singularly influenced by physical processes. Physicians using this model often operated under a crisis-management style, in which the primary goal is detection of physical dysfunction or imbalance. In this framework, little attention is paid to social, environmental and psychological factors that may have contributed to the genesis of disease. In fact, in some cases, physicians are urged to avoid considering these so-called 'extraneous' social and psychological factors and urged to focus only on the biological origins (Engel, 1977).

Clinicians and researchers challenged this reductionist view at this time as incomplete and overly simplistic. George L. Engel, at the University of Rochester, formally proposed a model that attempted to address all the factors that interact in order to form a client's presentation of mental and physical health. Called the "biopsychosocial" model, Engel's model (1977) is a model for practicing and research-oriented psychologists, nurses, physicians, and social workers (Hatala, 2013). Both the American Psychiatric Association and the American Board for Psychiatry and Neurology have officially endorsed it (Ghaemi, 2009; Tavakoli, 2009); this is a strong indication that the model has been integrated into the field of psychology. As the name suggests, the model proposes that biological, psychological and social factors interact with one another to create a patient's current state of mind and body. Biological factors include genetic predispositions to disease or imbalance. Psychological factors include health beliefs and lifestyle. This also includes behaviors of the healthcare providers with which the

individual interacts. Social factors include family relationships, SES, and social support. Engel proposes that both medical and psychological professionals should focus on treating or at least addressing all aspects of an individual in order to ensure better outcomes for their patients.

Despite the fact that it is commonly referenced in order to understand both medical and psychological illness, the biopsychosocial model has its critics, and many clinicians still do not employ it. According to Gabbard and Kay (2001), most psychiatrists have drifted from the integration of the physical, social and psychological, still often primarily focusing on either psychopharmacology or psychotherapy alone. This is despite the fact that several researchers have found that integrative treatments employing both approaches increase treatment efficacy (Gabbard and Kay, 2011). This tradition persists partly because most psychiatric residencies still do not systematically teach integrative approaches to medicine and psychotherapy, forcing psychiatrists to choose either psychopharmacology or psychotherapy (Gabbard and Kay, 2011). This practice, in turn, forces patients to employ a two-clinician model, in which one clinician prescribes medication and the other treats the patient with therapy, even though a one-clinician model may be more effective due to greater continuity of care. The increasing prevalence of the managed health care techniques also play a role in the two-clinician model; some managed care companies argue that separating the psychopharmacology aspects of treatment from the psychotherapy aspects is more cost effective (Gabbard and Kay, 2011). This claim has not been rigorously studied, however, and some preliminary findings dispel the notion that this two-person model has any financial benefits (Gabbard and Kay, 2001).

The one subfield of psychology in which the biopsychosocial model is consistently referenced is health psychology, a field of psychology that was formally recognized by the APA in 1978 (Hatala, 2013). However, in a one year review of published literature in the field about 20 years after its inception, Suls and Rothman (2004) found that 94% of studies published from 2001 to 2002 in the journal *Health Psychology* only assessed psychological variables in physical illness presentation and did not consider social factors at all. Thus, some researchers believe the model only practically operates under a "psychosomatic" framework, rather than one that is truly integrative of the factors that it claims to consider (Hatala, 2012). Perhaps the problem is that to practice biopsychosocial medicine, psychiatry or social work, one's knowledge must grow to encapsulate far more than just the fields of medicine, psychology, sociology or anthropology alone. Maybe to increase prevalence of biopsychosocial practices, professionals in medical, psychiatric and social work realms should be educated within the context of the populations they seek to serve. These concerns explain why I chose to focus on only one population in its relationship to depression rather than conduct a comparative analysis between two populations.

Linking Culture to the Biopsychosocial Model

Another critique of the biopsychosocial model is its vague and incomplete consideration of cultural influence on both psychology and illness (Hatala, 2012). Thus, this research was conducted in order to address the intersection between the fields of health psychology and cultural psychology and to specifically address the most understudied aspect of the biopsychosocial model: cultural influence.

Cultural psychologists have similar goals to health psychologists in that they seek

to diverge from a homogenized understanding of human health and psychology to more integrated approaches that consider the role of an individual or group's cultural values and upbringings. Cultural psychologists attempt to understand the link between cultural and psychological expression, specifically how culture can exaggerate, suppress, divert or obscure what may have previously been considered standard or universal psychological or cognitive constructs. Definitions of culture vary and are widely contested, and it is difficult to accurately compare one culture to another (Hatala, 2013). This difficulty is a result of the presupposition that any culture is either bound by space or time, is singularly explanatory for all modes of behavior and belief across individuals, and easily deducible into any number of concrete items, symbols, beliefs or practices (Hatala, 2013). For this reason the goal of this research is not to compare depression across cultural groups, but rather to examine one cultural group alone in its unique situational psychological expression. Especially among Hispanic-Americans, there has been a tendency in the psychological literature to measure the entire group as a seemingly homogenous entity, when in fact the ethnic/racial groups Hispanic and Latino/a refer to a large group of diverse people who span many cultures, countries of origin, dialects, and degrees of Americanization. Therefore, the focus of this study was on Mexican-Americans alone.

Cultural background is often indicated as one of the, if not the single, most important factors in presentations of emotional and cognitive understandings of the world (Schweder, 1999). While individual differences still occur within a single culture, culture, in most cases, dictates the understanding of what the world is, and isn't, and therefore what behaviors are appropriate and inappropriate (Schweder, 1999). Further, beyond just an understanding of what behavior is acceptable in a given setting, cultural norms give an

individual a mode of expression for fixations, anxiety, and emotional pain (Schweder, 1999). According to Keel and Klump (2003), some psychological disorders may be culture-bound. Lai (2000), for example, even proposed that increased Westernization may lead to a rise of characteristically Western mental illnesses in societies where specific Western incarnations of the illness previously did not exist. The question remains whether sufferers of the illness were there all along, hidden and misunderstood by culturally-bound clinicians who were ignorant of specific illnesses, or whether the specific Western pressures and practices themselves create the illnesses; however, Lai suggests the latter, implying that our psychological makeup is fluid, which also further implies the fluidity of culture as well.

Mexican-American Culture and Illness

Mexican-American culture has its own models of health beliefs that may differ from the ones typically employed by other Americans. Rubel (1960) described three physical afflictions observed in a Mexican-American country on the Texan Mexican border that display the manner in which the Mexican-American culture may shape illness. These afflictions were believed to have emerged due to the violation of cultural norms regarding male-female, family-stranger, or elder-younger relationships. They might be understood as simple somatization disorders, but their origins are entirely sociocultural. One of these disorders, called *mal ojo*, or “bad eye,” comes from the inappropriately prolonged attention of one individual towards another. The person who is looked at may experience prolonged headache, fatigue, or malaise (CDC, 2008). The illness is unheard of in the greater American culture, but its symptoms are observable and for all intents and purposes “real.” While the disorders discussed in the current study are

generally considered non-culture specific, it is still important to recognize that the factors that may lead to depression may not be or at least may not be perceived to be the same for Mexican-Americans as they are for the general American population. Further, it is important to note that the explanation for the origin of a disease has a hand in shaping its suggested cure. For example, in Mexican-American culture, some of the genesis of diabetes, regardless of type, is sometimes attributed to what is referred to as *susto*, or a traumatized response to a frightening event (Hunt, Valenzuela, & Pugh, 1998).

Fortunately, there is no relationship between disbelief in non-biomedical health models and patient compliance (Castro, Furth & Karlow, 1984), but no current research exists on the relationship between non-dominant health beliefs and depressive symptoms.

A crucial element of Mexican-American culture in regards to this study is the observation recorded in both sociological and anthropological literature that the extended family unit seems to be the most important aspect of both Mexican and Mexican-American culture. In Rubel's (1960) descriptions, Mexican-Americans in San Antonio were described as more or less interacting solely with family members. Women especially were expected to solely interact with only their cousins, sisters, mothers, sister-in-laws, etc. for social interaction, and in general, large groups of extended family members resided under the same roof (Rubel, 1960). This tendency to rely on relatives for family support is also noted by Keefe, Padilla & Carlos (1979), who observed that while both Anglo-Americans and Mexican-Americans were likely to turn to family for support, Mexican-Americans did so much more often, regardless of geographical proximity, while Anglo-Americans increasingly turned to their friends for social support. Knight et al. (2010) also noted that importance of familism in the development of a

Mexican-American Cultural Values scale. While lack of social support, especially during critical periods, has been identified as a predictor for depression in the general American population (Brown et al., 1986), this culturally specific social norm may well be a good predictor of the absence or presence of certain psychological responses such as depression. For the current study, I therefore have addressed depression specifically in response to a culturally non-ideal living situation. In order to obtain more accurate results, I also attempted to differentiate between the more and less Americanized participants, partly in light of Rubel (1960)'s assertion that more "modernized" Mexican-Americans abhor more traditional models of health beliefs. Therefore, the investigation focused on the relationship among acculturation, living situation, traditional health beliefs and depression.

As an aside, there is a tendency in the psychological literature to reduce non-dominant cultural groups of Americans into homogenous groups when discussing the factors that might influence their psychological illnesses. This is perhaps Engel's (1778) biggest downfall in his brief mention of culture, for he does not address, for example, the possible psychological effects of being entrenched in a complex political and power relationship between "minority" cultures and popular culture, instead, mentioning culture in a rather vague manner without actually elucidating what he means by the term. Does a sub-culture count as a culture? A counterculture? Does an immigrant or second or third generation culture count as its own culture, or is it simply the straddling of two distinct cultures? It seems that through Engel's language, especially his reference to "folk models of disease" (p. 388) that he might employ a somewhat reductionist or otherizing view of cultures beyond his own, not fully considering that practices that he might term "folk

medicine" are employed by educated individuals within the very country and culture from which he operates. Thus, while cultural generalities are discussed, the purpose of this research was not to claim that these cultural values and their applied implementations might in any way paint a complete picture between the two factors. There may be some third factor that could explain the predicted association between living with one's family and depression. For example, it is possible that not only might persons feel a sense of longing inflicted by their culturally derived ideals when their parents or extended family are not with them, they might also be victims of social exclusion due to their nonconformity to the dominant Mexican-American culture. Nor is there any attempt to apply the patterns surrounding depressive symptoms in Mexican-Americans to any other culture, no matter how superficially similar they might seem.

Prevalence and Psychological Relevance of Diabetes

One chronic illness that is especially relevant to healthcare today is diabetes. Prevalence of diabetes in the United States has increased considerably over the last 50 years. In 2010, the American Center for Disease Control estimated that 11.3% of Americans aged 20 or over have been diagnosed with diabetes, and that over 35% of Americans of the same age group are prediabetic, meaning they display some symptoms that may precede an eventual onset of diabetes (CDC, 2010). Undiagnosed diabetes may mean there are even higher numbers of diabetic Americans. Type II diabetes is best predicted by obesity, lack of exercise, and genetic inheritance, whereas Type I diabetes is generally understood as a genetically inherited illness. For this study, both Type I and Type II diabetics participated, and they were not treated as separate groups

experimentally due to evidence that their psychological outcomes are similar (Rubin and Peyrot, 2001).

Psychological Effects of Diabetes

Beyond the physical risks of diabetes, which include risk of necrosis in the extremities of the body, blindness, kidney failure, heart disease, stroke, loss of vision and impotence (CDC, 2010), diabetes, especially Type I diabetes, can lead to a variety of poor psychological outcomes. Because Type I diabetics usually have no internally produced insulin at all, maintaining the appropriate blood sugar so they can avoid both hyper- (too much) or hypo- (too little) glycemia (blood sugar) requires a constant vigilance that may be psychologically exhausting or frustrating. This, combined with the anxiety that may accompany the knowledge that poor adherence may lead to the aforementioned poor health outcomes, can lead to depression and anxiety in diabetic patients in numbers that far exceed national averages (Rubin & Peyrot, 2001).

Depression in particular is highly correlated with both Type I and Type II diabetes (Rubin & Peyrot, 2001). Depression may be caused by a decreased functionality and ease of daily life after diagnosis, and then depression may decrease functioning even more, leading to a feedback loop of diabetes and depression (Katon, 2003). Diabetic patients are as much as twice as likely to display depressive symptoms than non-diabetic patients (Ali, Stone, Peters, Davies & Khunti, 2006; Anderson, Freedland, Clouse & Lusteran, 2001). Further, Black, Markides & Ray (2003) found that comorbidity of depression and diabetes in older patients (age 65+) may result in worse health outcomes for sufferers of both, including high mortality rates, while Rubin & Peyrot (2001) found glycemic control to be worse in the general diabetic population when patients display depressive

symptoms. These outcomes may be due to poor health behaviors and a lack of self-regard as a result of their depression (Katon, 2003). For these reasons, the current study examined depression in diabetic patients.

Depression in Mexican-American Diabetics

Depression may occur in response to diabetes for any racial or cultural groups, but Cabassa et al. (2008) found that Hispanics tend to have more depressive symptoms concurrent with a diabetes diagnosis when compared to non-Hispanic Whites, as well as poorer care and a higher rate of disability associated with the co-morbid conditions. Hispanic communities are disproportionately affected by diabetes in general, with 13.3% of Mexican-Americans diagnosed with the disease, compared to 7.1% of non-Hispanic whites (CDC, 2010). For these reasons, the focus of this research was specifically on Mexican-Americans' depression in response to diabetes to see if similar patterns emerge.

Research on depression in the general Mexican-American adult population provides several conflicting results about the prevalence and severity of depression. Some researchers have found that in correlation with perceived discrimination (Finch, Kkolody & Vega, 2000), persons of Mexican descent tend to report elevated levels of depressive symptoms (Hovey & Magaña, 2000). Other factors associated with depression in Mexican-Americans are low self-esteem, lack of social support, lack of life choices, or an external locus of control (Mirowsky & Ross, 1984). Some research has indicated religiosity as a predictive factor for depression, perhaps again due to an external locus of control (Neff & Hoppe, 1993). Other researchers have found that Mexican-Americans tend to have fewer depressive symptoms than the national average (Escobar, Nervi & Gara, 2000; Riolo, Nguyen, Greden & King, 2005). Black, Markides and Miller (1998)

claimed that this is likely due to an insufficient number of older Mexican-Americans aged 65+, who tend, on the whole, to be more depressed than other older adults of other ethnic groups. For the current study, I hoped to get a glimpse of the factors that are concurrent with depressive symptoms in the sample of Mexican-American adults under age 65 living on the US-Mexico border.

Role of Acculturation in Depression

Acculturation is typically defined as the degree to which one participates in a culture, often conceptualized as a long-term, bidirectional, fluid process in which an individual learns and incorporate aspects of a new culture into the culture from which they originate (Marín & Gamba, 1996). Acculturation in many forms may be linked to depression, although there is disagreement about this claim in the current psychological literature. Several researchers have found that less-acculturated Mexican-Americans tend to report more depressive symptoms than highly acculturated Mexican-Americans and Anglo-Americans, in adult (Garcia & Marks, 1989; Neff & Hoppe, 1993), geriatric (González, Haan & Hinton, 2001), and adolescent (Roberts, Roberts, & Chen, 1997) populations. Burnam, Hough, Karno, Escobar & Telles (1987), however, found an opposite association between depression and acculturation, in which more acculturated, US-born Mexican-Americans tended to display more depressive symptoms.

Acculturative stress itself has been associated with a higher level of depressive symptoms (Hovey & King, 1996). Hovey (2000) found that acculturative stress is predicted by factors such as family dysfunction, physical separation from family, negative expectations for the future and low socioeconomic status. English-speaking Mexican-Americans have been found to display lower levels of depressive symptoms than

Spanish-speaking Mexican-Americans, again indicating lower levels of acculturation as correlated with depression (Vega, Warheit, & Meinhardt, 1984). Neff & Hoppe (1993) attributed Mexican-American depression to complex interactions between fatalism, religiosity and acculturation, due to the religiosity of Mexican-American Catholic culture, again indicating that culturally bound factors can predispose individuals to a psychological disorder. The many conflicting and sometimes confusing reports about the relationship between acculturation and depression led the principal researcher to seek to clarify the relationship between acculturation and depression.

Present Study

No significant research has been done on the specific relationship among depression, diabetes, living situation and acculturation in Mexican-American adults aged 18-64. Therefore, the purpose of this study was to answer several crucial questions regarding social factors, acculturation, Type II diabetes and depression in Mexican-American adults between ages 18 and 64. These interactions served as a platform for empirical evaluation of the biopsychosocial model. Do Mexican-American patients with diabetes report more depression than Mexican-Americans without diabetes? How well will acculturation predict depression in Mexican-American diabetic patients between the ages of 18 and 64? How do diabetes and acculturation interact in order to predict depressive symptoms? Is there a difference in depressive symptoms between Mexican-Americans who live with their extended family, as is often customary in Mexican-American culture? Does acculturation even predict the tendency to live with one's extended family?

In order to answer these questions, participants completed a short surveys in order to assess correlations between acculturation, depression, and Type II diabetes. This survey included the Center for Epidemiological Studies Depression Scale (CES-D) and the Bidirectional Acculturation Scale for Hispanics (BAS). The CES-D was used because Mexican-Americans and non-Hispanic whites tend to report similar numbers of depressive symptoms on the scale, suggesting validity across cultural groups, although Mexican-Americans do tend to display more somatic symptoms than non Mexican-Americans (Golding, Aneschensel & Hough, 1992). Participants were also asked to complete the Attitudes Towards and Stereotypes of Mental Health Scale as formulated by Aromaa et al. (2011). This was to get a sense of whether participants were downplaying their depressive symptoms due to a belief that depression or mental illness in general is socially unacceptable. Participants completed the Bidirectional Acculturation Scale for Hispanics (BAS), which gives two scores for Hispanic and non-Hispanic acculturation. Finally, participants were asked to fill out a short questionnaire asking about their demographics and living situation. Participants were also asked to give what they believe is the cause for their diabetes. The goal was for their answer to give some insight into whether the patient believed in singularly biomedical causes for his or her diabetes, or if he or she had views that were likely to differ from those of his or her doctor.

The hypotheses were as follows:

H1. Participants with diabetes will shower higher numbers of depressive symptoms than participants without diabetes.

H2. Low non-Hispanic acculturated participants will show higher numbers of depressive symptoms.

H3. Diabetes will moderate reported number of depressive symptoms in low non-Hispanic acculturated participants.

H4. Low non-Hispanic acculturated participants who live with their extended families will report fewer depressive symptoms than low non-Hispanic acculturated participants who live with only their nuclear family unit (spouse and children).

H5. High non-Hispanic acculturated participants will be more likely to report only biomedical (in Type I diabetes) or behavioral (in Type II diabetes) causes for their diabetes, whereas low non-Hispanic acculturated participants are likely to report other causes alongside the biomedical/behavioral causes, such as *susto*.

Establishing the link between acculturation and depression in diabetic Mexican-American patients is crucial in ensuring that primary care providers (PCPs) are appropriately equipped and attentive to possible depressive symptoms in this population. Somatic symptoms may be especially important for PCPs to note in case there exists a language barrier that bars providers from easy communication with their patients. Adoption of the CES-D may be beneficial for the provider to ensure that their patient may be able to find a psychological referral, if necessary. If patients are primarily Spanish-speaking or otherwise low-acculturated and are diagnosed with diabetes, the PCP can be especially stringent in making sure to check for depressive symptoms, especially if the patient is living alone.

Methods

Participants

Eighty-six participants responded to print ads and in-person recruitment efforts at a non-profit clinic for border health in Arizona. Participants were offered a chance to win a \$50 Visa Check Card in compensation for their time. Participants were of Mexican-American descent and were between ages 18 and 64. Thirty-six of the participants (41.8%) were diabetic and fifty of the participants (58.2%) were nondiabetic. Fifty-three of the participants (61.6%) were female and thirty-three (38.4%) were male. Participants chose if they preferred to complete the study materials in English or Spanish; twenty-one participants (24.5%) chose to respond in English, and sixty-five (76.5%) chose to respond in Spanish.

Materials

Participants responded to three randomly ordered scales to assess the psychological constructs of interest: acculturation, depressive symptoms, and mental illness biases. They also responded to questions regarding two other constructs, health beliefs and living situation.

Acculturation. Participants completed the Bidirectional Acculturation Scale for Hispanics (Marin & Gamba, 1996). The 12-item scale assesses acculturation as evidenced by primary language use, language proficiency in English and Spanish, and media consumption. The scale is split into the Hispanic and non-Hispanic domain. The scale has been found to be highly reliable and valid in these areas (Marin & Gamba, 1996). Questions for primary language use subscale included questions like "how often do you speak in Spanish?" Questions for the media consumption subscale included

questions such as "how often do you watch TV programs in English?" Response categories for primary language use and media consumption subscales were (4) *almost always*, (3) *often*, (2) *sometimes* and (1) *almost never*. The language proficiency subscale included items such as "how well do you speak English?" The response categories for the language proficiency subscale were (4) *very well*, (3) *well*, (2) *poorly*, and (1) *very poorly*. Average scores from each section range from 1-4 in each cultural domain. Scores about 2.5 were used as the minimum score for high acculturation scores, following the guidelines of Marin & Gamba. A score of 2.5 or more in both Hispanic and non-Hispanic domains were thought to indicate biculturalism, again following suggestions from Marin & Gamba. Cronbach's alpha was .9 for the Hispanic domain and .96 for the non-Hispanic domain (Marin & Gamba, 1996). The scale also displays some convergent validity with the Short Acculturation Scale for Hispanics (SASH): 0.64 for the Hispanic domain and .79 for the non-Hispanic domain (Marin & Gamba, 1996). The scale as published by Marin & Gamba was published in both English and Spanish, and both versions were employed for this study.

Depressive symptoms. Participants completed the Center for Epidemiological Studies Depression scale (CES-D; Melchior, Huba, Brown & Reback, 1993), a 20-item scale measuring six major dimensions of depression: feelings of guilt and worthlessness, loss of appetite, psychomotor retardation, loss of appetite, and sleep disturbance. Cronbach's α coefficients for internal reliability range from .85-.9 and the scale has been found to display concurrent validity by clinical and self-report criteria (Raldoff, 1977). Response options range from 0 to 3 for each item (0 = Rarely or None of the Time, 1 = Some or Little of the Time, 2 = Moderately or Much of the time, 3 = Most or Almost All

the Time). Scores range from 0 to 60, with high scores indicating greater depressive symptoms. Scores over 16 are considered to be depressed. Versions were available in both English and Spanish. The Spanish translation came from Masen et al. (1986) and was found to have a Cronbach's α of .86 and .80 in two different samples, as well as a .59 correlation between the Spanish version of the CES-D and the Beck Depression Inventory (BDI) with a significance of $p < .001$.

Mental Health Bias. Participants completed the Attitudes towards and Stereotypes of Mental Illness questionnaire (Aromaa et al., 2011). This is a 16-item scale that tests for biases against mental illness on two dimensions using Likert-type responses. The two dimensions are public stigma/stereotype awareness and personal stigma/stereotype awareness. Public stigma/stereotype awareness items are questions such as "Depression is a sign of failure." Personal stigma/stereotype awareness are questions such as "If one tells about his/her mental problems, all his/her friends will leave her." Possible answers are (1) *strongly disagree* (2) *disagree* (3) *agree* and (4) *strongly agree*. The Kaiser-Meyer-Olkin value of the original English scale was 0.830. The scale was also translated into Spanish by the principal investigator and then tested for translation accuracy through back-forward translation by fluent speakers. The Spanish language scale was tested for validity in a sample of 15 participants. Cronbach's α was .779 for the Spanish version of the test and the Pearson's correlation for test-retest reliability was .746.

Health Beliefs. Participants with diabetes were asked "what do you believe was the cause for your diabetes?" Their responses were coded into three categories:

1= biomedical, which included responses such as inadequate insulin production, hereditary reasons, or obesity, 2="I don't know" and 3=cultural, non-medical beliefs such as *susto*.

Living Situation. Participants responded to two questions about their living situations: "How many people do you currently live with?" and "Whom, specifically, do you live with?" The second question was coded for particular responses: (0) for lived alone, (1) for living with a spouse and children and (3) for living with other family members such as grandchildren, nephews, or siblings.

Demographics. All patients answered questions about their demographic information including their gender, age, employment, and whether or not they have diabetes.

Procedure

Participants entered an experimental room with the investigator, who explained the goal of the study and asked for the participants' informed consent to participate. Upon informed consent, participants were then verbally administered each of the three scales measuring social desirability, depressive symptoms and acculturation in a randomized order in order to minimize any effects of order that might occur. They then verbally completed a questionnaire containing the questions about health beliefs, living situation and demographic information. Study materials, including informed consent and debriefing documents, were available in both English and Spanish and administered based on participants' stated preference. After they completed the scales, participants were debriefed and their contact information was collected for participation in the raffle.

Results

The mean age of participants was 47.5 years of age. Thirty-three of the participants were male (38.4%) and 53 of the participants were female (61.6%). Thirty-six of the participants were diabetic (41.9%) and 50 of the participants were non-diabetic (61.6%). The mean depression score for the sample was 15.13, which is less than one point less than the score that is considered to be associated with depression. The mean Hispanic Acculturation score was 3.58 out of 4. The mean Non-Hispanic acculturation score was 2.06 out of 4. Six (16.7%) participants reported non-biomedical causes for their diabetes, 13 (36.1%) stated they did not know the cause of their diabetes, and 17 (47.2%) reported biomedical causes of their diabetes.

There was a significant relationship between age and low non-Hispanic acculturation ($R^2(84)=.410, p<.001$), though there was no such relationship between age and Hispanic acculturation ($R^2(84)=.082, p=.007$). This indicates that there was an even distribution of Hispanic acculturation among the entire sample, whereas the older participants were less likely to be acculturated in the non-Hispanic domain. This also indicates high biculturalism in the younger participants. There was no significant relationship between diabetes and Hispanic acculturation ($t(84)=-0.682, p=.497$). There was no significant relationship between diabetes and non-Hispanic acculturation, although this relationship fell just short of significance ($t(84)=-2.75, p=.007$).

Six participants gave *susto* or any form of traumatic or scary event as the cause of their diabetes. Responses were incidents such as when a new mother saw her baby falling from the bed when he was a newborn, or a man who had to have an operation for cancer. Although there was no difference in health beliefs between diabetic patients in relation to

their non-Hispanic acculturation ($F(2,36)=1.708, p=.196$), non-diabetic patients were significantly more acculturated on the non-Hispanic domain than diabetic participants who reported non-biomedical causes for their diabetes (Tukey HSD, $p=.038$). There was no relationship between Hispanic acculturation and likelihood to ascribe a non-biomedical cause to diabetes ($F(2,36)=0.973, p=.388$). There was no relationship between biomedical understanding of diabetes and number of depressive symptoms in diabetic participants ($F(2,36)=-0.332, p=.727$, partial $\eta^2=.018$), and this relationship was not mediated by neither Hispanic ($F(2,36)=0.316, p=.731$, partial $\eta^2=.018$) nor non-Hispanic ($F(2,36)=0.307, p=.738$, partial $\eta^2=.018$) acculturation.

Scores on the CES-D depression scale were not significantly different for diabetic participants than they were for non-diabetic participants ($F(1,85)=0.007, p=.932$, partial $\eta^2=.001$). There was no significant relationship between Hispanic acculturation from the Bidirectional Acculturation Scale and score on the CES-D Depression Scale ($\beta=-.096, t(85)=-0.907, p=.367$). There was no significant relationship between non-Hispanic acculturation from the Bidirectional Acculturation Scale and score on the CES-D Depression Scale ($\beta=.034, t(85)=0.302, p=.764$).

There was no linear relationship between number of family members living with the participant and the participant's score on the depression scale ($\beta=-.334, t(84)=-0.550, p=.584$). Participants with low non-Hispanic acculturation who lived with only their immediate family or alone were no less likely to report depressive symptoms than participants with high non-Hispanic acculturation ($F(2,85)=1.473, p=.306$, partial $\eta^2=.036$); high Hispanic acculturation was also not associated with more depressive

symptoms in people living alone or with their immediate family only ($F(2,85)=1.289$, $p=.281$, partial $\eta^2=.031$).

There was a strong association between bias against mental illness and depressive symptoms ($\beta=.336$, $t(84)=3.584$, $p=.001$). Score on CES-D depression scale did not differ by gender ($F(1,85)=0.023$, $p=.880$, partial $\eta^2=.000$). There was no relationship between age of participant and score on CES-D depression scale ($\beta=-.056$, $t(85)=-0.482$, $p=.631$). Participants who were employed outside of the home had, on average, significantly lower scores on the depression scale than those who were unemployed ($F(1,85)=2.22$, $p=.029$, partial $\eta^2=.022$). There was no main effect of gender on this relationship between depressive symptoms and unemployment ($F(1,85)=0.005$, $p=.942$, partial $\eta^2=.000$).

For all scores involving scores on the CES-D scale, bias against mental illness as measured by the Attitudes Towards and Biases Against Mental Illness Scale was controlled for.

Discussion

Diabetes, high Hispanic acculturation and low non-Hispanic acculturation were all expected to have strong linear relationships with depression. None of these hypotheses were confirmed. Diabetes was expected to moderate the relationship between depression and high Hispanic acculturation and low non-Hispanic acculturation, but this relationship was also not supported; without a relationship, there can be no moderation. Nor did any of these factors mediate the relationship between depression and diabetes. Depression was expected to be associated with a low number of cohabiting family members in participants high in Hispanic acculturation, but this did not turn out to be the case.

Diabetic participants with high Hispanic acculturation and low non-Hispanic acculturation were expected to be more likely to report non bio-medical causes for their diabetes, but this hypothesis was not supported. No hypotheses were formed about employment and depression, but high numbers of depressive symptoms were found to have a significant association with unemployment. There was no association between gender and number of depressive symptoms.

The fact that no relationship exists between depression and neither Hispanic nor Non-Hispanic acculturation contributes towards settling the disagreement in the literature about the relationship between acculturation and depression in Mexican-American adults. Both Garcia & Marks (1989) and Neff & Hoppe (1993) reported a relationship between low non-Hispanic acculturation and depression in adults, though Burnam et al. (1987) found an opposite association. Due to the high average Hispanic acculturation scores across all participants, perhaps the homogeneity of Hispanic acculturation in the sample could be a protective barrier against the association between depression and low non-Hispanic acculturation. That is to say, being surrounded by people who are highly acculturated in the Hispanic domain might be protective against depressive symptoms that may arise due to low non-Hispanic acculturation in situations where others are high on non-Hispanic acculturation and low on Hispanic acculturation.

Ali et al. (2006) and Anderson et al. (2001) also established relationships between diabetes and depression, thus the fact that this relationship was not found in this population was quite unexpected. One possible explanation is the high prevalence of diabetes in the population of interest, both nationally (CDC, 2010) and according to data from the clinic at which this study was conducted. Eleven out of the 33 diabetic

participants (33%) cited that they inherited their diabetes from their parents. Perhaps having high numbers of other diabetics around for support, from both one's family and the community, could be protective against an association between diabetes and depression. Connell et al (1994) and Littlefield et al (1990) already established a negative correlation between depression and social support in diabetics, and although Connell did not find any association between diabetes-specific social support and diabetes, their sample did not specifically focus on Mexican-Americans. Perhaps there could be a protection from depression through diabetes-specific social support in Mexican-American adults, which could explain the results of the present study. On another note, these null results are good evidence against the scientific homogenization of Hispanic-Americans; despite the fact that Cabassa (2008) et al. discussed an association between depression and diabetes in Hispanics, this association was not present in the Mexican-American population studied.

The number of participants who listed non-biomedical causes for their diabetes was fairly low, about 16.7% of diabetic participants, despite the fact that participants were on average highly acculturated in the Hispanic domain. This could be due to several factors: a selection bias due to all participants being recruited at a healthcare clinic that practices medicine in the biomedical tradition could mean that only those who have been exposed to or treated under biomedical models for diabetes would be in the clinic to begin with; an experimenter effect, since the primary researcher was not of Mexican-American descent and thus participants may have assumed ignorance of *susto*; or an overall decline in traditional health beliefs in the population of interest.

For this sample, gender was not correlated with number of depressive symptoms. Other studies, such as that done Garcia & Marks (1989), found higher numbers of depressive symptoms in women than men. There is some research about the gendered cultural standards of Mexican-American women such as *marianismo*, which may have a relationship with depression (Pina-Watson et al., 2013), but more research might be done into gender roles in Mexican-American culture and how that might relate to depressive symptoms. Anecdotally, many of the providers at the clinic expressed concern for diabetic men who were not longer able to work, citing the strong influence of an unreachable male provider role in such situations as a possible source of depressive symptoms. Fragodo & Kaschubeck (2000) found an association between gender role conflict, *machismo*, and depressive symptoms empirically, so the next step might be to imagine how disability or chronic illness might fit into this relationship. Gender role conflict or highly traditional gender role construction and/or adherence may be a mediating relationship between chronic illness and depression, perhaps explaining the lack of relationship found in this study. This would also fit with the finding that employment outside the home can have an effect on depression, which echoes findings by other researchers such as Wilson & Walker (1993). Further research might seek to establish relationships between gender role conflict, *machismo*, *marianismo*, disability or chronic illness, unemployment and depressive symptoms.

Results from the study may have been confounded due to the methodology employed. The scales used and the attempts to create a neutral testing environment left little room to build rapport between the principal researcher and participants. The importance of a trusting relationship between provider and patient has been found to be

integral to culturally competent patient care of Mexican-Americans, due to the general emphasis placed on interpersonal relationships in Mexican-American culture (Salimbene, 2000). Therefore, it is possible that without such rapport established, participants felt distrustful about the questions asked and did not answer as honestly as they might have in a less structured, more personal interview. A better approach may have been to conduct semi-structured interviews in which participants were free to divulge emotional experiences and behaviors at their own discretion, rather than by answering specific questions that left little room for personal input. This method may have several benefits: a more complete picture of attributive beliefs about diabetes may have emerged, and the participants' experiences of depression, separation from the extended family unit, and the interaction between the two factors may have also been elucidated. There is evidence that emotional experience of depression is quite different for Mexican-American sufferers than the emotional experiences described in the CES-D (Cabassa et al., 2008). For this reason, despite the acceptable statistical validity of the CES-D in Mexican-American populations, further research might include a more culturally appropriate depression scale that takes these considerations into account. Perhaps a relationship between separation from extended family and depressive symptoms would have emerged had the constructs been defined and investigated in a more culturally appropriate manner.

Although the results indicate that none of the hypotheses regarding culturally-specific social factors were supported, this is likely due to a weakness in selection of culturally-specific social factors or methodology rather than the power of such a categorization of factors itself. Interesting differences were found in this sample that challenge traditional understandings of depression, such as a lack of gender differences

and a lack of association with diabetes. The research also revealed that low non-Hispanic acculturation was not associated with more depressive symptoms, nor was high Hispanic acculturation. These results stand in contrast with published research by other psychologists. The only factor associated with depression was unemployment. Further research may be done about mediation relationships between gender role conflict, unemployment, chronic illness or disability, and depressive symptoms in Mexican-American adults.

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