Indigenous and Mestizo Mexican Migrant Farmworkers: A Comparative Mental Health Analysis

William Donlan
Portland State University, donlan@pdx.edu

Junghee Lee
Portland State University

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William Donlan and Junghee Lee

School of Social Work
Portland State University

ABSTRACT

Explores effect of ethnicity on mental health status among 179 indigenous and mestizo Mexican-origin migrant farmworkers using: (a) lifetime prevalence of culture-bound syndromes, (b) self-rated emotional/mental health, (c) depression measured by PHQ-9, (d) stress level. Demographic and psychosocial variables were examined by ethnicity and gender using Chi square and independent t-tests. Logistic and linear regression models were constructed for mental health variables. Indigenous participants reported significantly higher stress compared to mestizos, and indigenous women reported significantly higher stress compared to all groups. Prevalence of culture-bound syndromes and mean PHQ-9 severity score was highest for indigenous females. Mean self-rated emotional/mental health was lowest among indigenous females. Controlling for main effects and other interactions, (a) indigenous females were significantly more likely to report culture-bound syndromes, and reported significantly higher levels of stress, (b) more Spanish literate indigenous respondents were less likely to report culture-bound syndromes, and more educated indigenous respondents were less likely to have a depressive syndrome. Indigenous participants living in U.S. for seven years or more: (a) were significantly less likely to report poorer emotional/mental health, and (b) reported significantly lower stress. Adult education and literacy programs may be especially effective emotional/mental health intervention for newly arrived indigenous Mexican-origin migrants.

INTRODUCTION

Background

There are currently an estimated 11.5 million individuals living in the U.S. who were born in Mexico (Passel & Cohn, 2009). These and other Mexican-origin immigrants comprise a substantial and growing presence in rural communities throughout the United States. Many of these immigrants initially enter the U.S. as migrant farmworkers, where they now constitute the vast majority of the U.S. agricultural work force (Carroll, Samardick, Bernard, Gabbard, & Hernandez, 2005). Recently, growing numbers of Mexican migrant farmworkers are bringing

family members and are dispersing and settling in rural areas throughout the nation (Stephen, 2004; Zabin, & Hughes, 1995). There is mounting evidence that this migrant steam, which feeds the labor force needs of U.S. agriculture, includes increasing numbers of individuals and families coming from indigenous, pre-Columbian communities in southern Mexico (Gabbard et al., 2008; Rivera-Salgado & Escala Rabadan, 2004; Zabin, 1995). The Mexican government estimates there are over 12 million indigenous people in Mexico coming from diverse cultures and speaking 62 officially recognized languages (Instituto Nacional de Estadistica Geographica e Informática, 2007). Beginning in the 1980s, and accelerating with passage of the Immigration Reform and Control Act of 1986, the amount and diversity of indigenous Mexican immigration to the U.S. has increased greatly, especially in California, Texas, Florida, New York, and Oregon (Fox & Rivera-Salgado, 2004). Analysis of 2000 U.S. Census data identified over 400,000 Hispanic American Indians, primarily from Mexico, and it was estimated that in California alone, during the course of ten years, their population grew by 146 percent (Huizar Murillo & Cerda, 2004). By the year 2004, indigenous, Mexican-origin individuals comprised an estimated 20 percent of the California farm labor force (Aguirre International, 2005).

Despite their growing presence in the U.S. agricultural and service industry workforce, and increasing awareness of their unique languages, customs, beliefs, cultural identity and historical experience, there is a lack of research examining the mental health status of the indigenous Mexican-origin community in the U.S. There is ample evidence that indigenous cultural belief systems and practices combine with the social, political, and economic marginalization of indigenous Mexican communities, in Mexico and the U.S., to limit access to and use of mainstream healthcare (Bade, 2004; Gabbard, Nakamoto, Carroll, & Saltz, 2008; Holmes, 2007; Stephen, 2004). In many U.S. rural areas, Mixtec, Zapotec, Náhuat, Mayan, Triqui, and other indigenous groups from Mexico lack stable work, decent living conditions, and adequate health care (Farquhar et al., 2008; Finch, Frank, & Vega, 2004; Zabin, Kearney, Garcia, Runsten, & Nagengast, 1993). Indigenous groups suffer racism in Mexico and many come here with a fear of mainstream institutions because of prejudice, discrimination, and violence experienced in Mexico (Holmes; Linares, 2008). When they come to the U.S., indigenous migrants endure the racism typically experienced by Mexican immigrants from mainstream U.S. society, as well as that from non-indigenous or *mestizo* Mexicans. In surveys of Mexican-origin migrant farmworkers in California, stress due to discrimination was found to be highly correlated with depression (Alderete, Vega, Kolody, & Aguilar-Gaxiola, 1999), and among indigenous Mexican-origin migrant farmworkers the prevalence of mood disorders was found to be twice as high, and the rate of dysthymia almost five times greater, compared to the rate for mestizos (Alderete, Vega, Kolody, & Aguilar-Gaxiola, 2000b). The unique experience and cultural identity of indigenous Mexicans suggests that their mental health status, and the factors that are significantly associated with it, may differ from those of non-indigenous or *mestizo* Mexicans, and other rural populations in the U.S.

Objectives

This study focuses on addressing the following research questions: what differences exist between indigenous and mestizo Mexican-origin farmworkers in terms of: (a) lifetime prevalence of culture-bound mental health syndromes as measured by self-reported experiences of *susto*, *coraje*, and *nervios*, (b) self-rated emotional/mental health status, (c) depression as

measured by the Patient Health Questionnaire depression module (PHQ-9), and (d) level of stress as measured by a 10-item Migrant Farmworker Stress Scale. Differences in these indicators of mental health status between indigenous and mestizo Mexican-origin farmworkers are calculated, along with multivariate analysis of demographic and other psychosocial factors previous research has shown may possibly be associated with such differences. We conclude with a discussion of the implications our findings hold for practitioners and researchers working with indigenous Mexican-origin migrant farmworkers.

METHODS

Study Design and Participant Recruitment

This study was one part of the Migrant Health Outreach Project, a binational community-based participatory research and educational project designed to promote migrant farmworker health in the summer of 2007. This project, which was funded by the Oregon Community Foundation, brought together academic researchers and health professionals from Portland State University (PSU) in Oregon with: (a) Mexican health professionals and academic researchers from the *Universidad Popular Autónoma del Estado de Puebla* (UPAEP), and (b) health professionals from a migrant health promotion and services outreach program provided by a local community health clinic and their community partners in Oregon. The bicultural and bilingual principal investigator and first author trained and supervised five bilingual social work graduate students from PSU, and five monolingual Spanish speaking health sciences graduate students from UPAEP who conducted research interviews.

This research employed definitions from federal statutes governing migrant health programs that define a migrant farmworker as an individual whose principal employment is in agriculture, and who, for purposes of employment, establishes a temporary home and migrates either from farm to farm, within a state, interstate, or internationally. Researchers worked within a community health clinic's camp outreach program, which provided services to migrant farmworkers that returned from work in late afternoon. After they had participated in health promotion workshops, and/or had met with clinic intake personnel and received medications or referrals for services at clinic sites, farmworkers were approached by research interviewers. If farmworkers indicated they were at least 18 years of age, interviewers described the research project and invited them to participate in survey questionnaire based interviews. Interviewers then obtained the informed consent of participants in accordance with university Human Subjects Research Review Committee requirements. A total of 179 migrant farmworkers residing in camps where outreach services were provided were interviewed in Spanish, and these interviews averaged approximately 75 minutes in length. Since our survey questionnaire was not translated into any indigenous language, our sample did not include indigenous individuals who could not speak any Spanish. Indigenous respondents who spoke inadequate Spanish were often assisted by indigenous companions who had a better command of Spanish, which usually resulted in interviews lasting more than two hours.

Measures

A culturally and linguistically appropriate survey questionnaire was created to collect data related to the health and mental health status of Mexican-origin migrant farmworkers, as well as other related aspects of their experience in Mexico and the United States. This Spanish language questionnaire was created in collaboration with participating U.S. and Mexican public health researchers and medical personnel, as well as representatives from the migrant farmworker population who participated in the project. Participants were categorized as indigenous through asking whether they self-identified as indigenous, or whether they, their parents, or their grandparents spoke an indigenous language (e.g., Mixteco, Zapoteco, Triqui, Nahautl), which is a method that has been used in previous research seeking to identify indigenous Mexican respondents (Alderete, 2000a, 2000b; Gabbard, Kissam et al., 2008).

Survey questions inquired as to the presence of culture-bound mental health syndromes and asked whether participants had suffered in the past, or were currently suffering from either of three culture-bound syndromes identified as *nervios*, *susto*, and *coraje*. The Glossary of Culture-Bound Syndromes in Appendix I of the DSM-IV-TR (APA, 2000), states that these syndromes refer to "patterns of aberrant behavior and troubling experience that may or may not be linked to a particular DSM-IV diagnostic category [and] are generally limited to specific societies or culture areas" (p. 898). It further states that *nervios* includes "a wide range of symptoms of emotional distress, somatic disturbance, and inability to function" (p. 901). Research in rural Mexico and among Mexican-origin farmworkers in rural Florida has found that *nervios* is prevalent in rural areas and especially among women where it has been found to be associated with a variety of mental health problems including mood disorders (Baer et al, 2003; Salgado de Snyder, Diaz-Perez, & Ojeda, 2000; Weller, Baer, Alba Garcia, & Salcedo Rocha, 2008). The Glossary (APA) describes *susto* as an illness prevalent among people in Mexico, which is "attributed to a frightening event that causes the soul to leave the body and results in unhappiness and sickness" (p. 903) Empirical studies among Mexican origin and other Latino populations (Poss & Jezewski, 2002; Weller et al., 2002; Weller et al., 2008) have revealed that symptoms of *susto* are very similar to those of *nervios*, as well as those included in depression inventories such as the Zung Self-Rating Scale (Zung, 1965) and the Center for Epidemiological Studies Depression Scale (CES-D) (Radloff, 1977), and resemble criteria for depressive disorders as indicated in the DSM-IV-TR. *Coraje* is identified as *bilis* in the Glossary (APA) where it is stated that "the underlying cause of these syndromes is thought to be strongly experienced anger" (p. 899). Researchers have found *coraje* to be associated with *nervios, susto*, and depression (Bender, 2003; Cartwright, 2007; Kennedy & Olsson, 1996; Mendenhall, Seligman, Fernandez, & Jacobs, 2009). Participants were placed into one of two groups based on whether they had or had not experienced any culture-bound health syndromes in their lifetime.

Previous research has found self-rating measures of emotional or mental health to be significantly associated with ratings from the CES-D and with other self-reported emotional, nervous, and psychiatric problems (Finch, Frank, & Vega, 2004; Waite & Hughes, 1999; Wallace & Herzog, 1995). Participants were asked if their current emotional or mental health was "poor," "fair," "good," or "very good." Positive emotional/mental health was defined as a response of "good" or "very good" to this question, and participants were placed in either this group or with those who indicated that their emotional/mental health was "poor" or "fair."

The Spanish translation of the PHQ-9 depression module, taken from the "Patient Health Questionnaire" (Spitzer, Kroenke, & Williams, 1999; Wulsin, Somoza, & Heck, 2002), was included in the study questionnaire. As mental health providers are required by private and public third-party payer reimbursement policies to document and substantiate depression treatment by reference to DSM-IV diagnostic criteria, and as the PHQ-9 consists of the actual nine criteria upon which the diagnosis of DSM-IV depressive disorders is based, the PHQ-9 is an ideal brief screening measure to be used by community clinics and their outreach programs that serve migrant farmworkers. The validity and reliability of the PHQ-9 has been well established in a number of settings and among diverse populations (Adewuya, Ola, & Afolabi, 2006; Diez-Quevedo, Rangil, Sanchez-Planell, Kroenke, & Spitzer, 2001; Gilbody, Richards, Brealey, & Hewitt, 2007; Han et al., 2008; Huang, Chung, Kroenke, Delucci, & Spitzer, 2006; Kroenke, Spitzer, & Williams, 2001; Lowe et al., 2004; Martin, Rief, Klaiberg, & Braehler, 2005; Wulsin et al; Yeung et al., 2008). Each PHQ-9 question asks respondents to assess for the presence and frequency of depressive symptoms experienced in the previous two weeks. Participants were assigned to one of three diagnostic categories according to the PHQ-9 coding algorithm. *Major depressive syndrome* (MDS) is defined as when five or more of nine depressive symptoms were present at least "more than half the days", and one of the symptoms was depressed mood or anhedonia. *Other depressive syndrome* (ODS) is defined as when two, three or four depressive symptoms were present at least "more than half the days," and one of the symptoms is depressed mood or anhedonia. One of the nine symptoms ("thoughts that you would be better off dead or of hurting yourself in some way") counts if present at all for either diagnosis. Participants that did not meet either of the above categorical requirements were placed in the *no depressive syndrome* diagnostic group. Internal consistency of questions within the PHQ-9 estimated by Cronbach's alpha in the study was .83, which indicates strong internal consistency. Total PHQ-9 severity score, which can range from "0" to "27," was also calculated for each participant.

The study questionnaire included a 10-item Migrant Farmworker Stress Scale that captures many types of stress, which previous research has demonstrated to negatively impact Mexican-origin farmworkers. We incorporated acculturation stress items used in the Mexican American Prevalence and Services Survey and described in the work of Finch et al. (2004), including three items addressing perceived discrimination, three items that capture language conflict, and two items related to immigration status. As our sample comprised a highly transient and migrant population that lived in relatively isolated and overcrowded rural labor camps lacking many of the basic amenities of residential life, we added two items that asked, "How difficult is it for you to deal with your current living situation in this camp," and "How much do you worry about your family in Mexico." All items were scored on a "0-3" continuum with "3" indicating "very much." Internal consistency of scale questions estimated by Cronbach's alpha in the study was .77, which indicates good internal consistency.

Social support variables included a dichotomous indicator of emotional support (i.e., whether or not respondent has someone to share innermost thoughts, feelings, and problems with), and an indicator of instrumental support that asked "How confident are you that you will have support from someone if you need it?" Participants who indicated "not at all" or "a little" were put in one group, and those who answered "moderately" or "very much" in another. Two religiosity items similarly measured the importance of religious/spiritual beliefs in daily life and the degree to which one seeks spiritual comfort for problems, with respondents being put in one of two groups, as was done with the indicator of instrumental support.

Analysis

Data was analyzed using SPSS 17.0. Demographic and psychosocial variables along with prevalence of mental health disorders were examined by ethnicity and gender, then Chi square and independent t tests were calculated. Logistic and linear regression models were constructed for each mental health variable with main effects and interaction terms. Theoretically chosen predictor variables, such as ethnicity, gender, age, living status, education, literacy, total years in U.S., and indicators of religiosity and social support were entered first. Then, in order to arrive at a parsimonious final model, statistically significant interaction terms of each predictor variable by ethnicity were selected using backwards removal method. Nagelkerke approximation of R^2 is reported as measures of strength of association in the logistic regression model. Although this pseudo-R^2 approximation measure can be treated as somewhat similar to R^2 in linear regression, the Nagelkerke approximation of R^2 indicates a more modest effect for a *good* logistic model than R^2 from an equivalent *good* least-squares linear model (Hosmer & Lemeshow, 2000).

RESULTS

Demographic and Psychosocial Characteristics

Table 1 shows that 85.4% (n = 153) of our sample came from the four southern Mexican states of Oaxaca, Puebla, Veracruz, and Chiapas. Indigenous Mexicans comprised 68.7% (n = 123) of our sample, with 66.7% (n = 82) of them coming from Oaxaca, which was also home for 89.2% of all indigenous females. Out of a total of 179 participants, 40 came from Zapotec communities in Oaxaca, and there were representatives from eight other indigenous Mexican peoples including the Náhua (23), Triqui (20), and Mixtec (19) (Not shown in Table 1). While the overall mean age of indigenous participants did not differ significantly from that of mestizos, the median age of indigenous respondents (27) was lower compared to that of mestizos (30). Among male participants, there were more indigenous (51.2%) than mestizos (33.3%) in the younger age 18-27 category ($X^2(1) = 3.62$, $p < .10$). More indigenous respondents (12%) reported having no education compared to mestizos (5%) (Not shown in Table 1), which is reflected in the lower mean indigenous educational level of 4.78 years ($SD = 3.17$) compared to 5.52 ($SD = 2.79$) for mestizos, although this difference did not rise to statistical significance. However, compared with mestizo female participants, indigenous females reported a significantly lower mean level of education ($t(49) = 1.86$, $p < 0.05$), as well as a significantly lower mean level of Spanish literacy ($t(49)=1.71$, $p < 0.05$). Among male respondents, more indigenous reported having no emotional support ($X^2(1) = 3.10$, $p < .10$), and among female respondents, less indigenous reported little or no instrumental support ($X^2(1) = 3.06$, $p < .10$). Overall, indigenous participants reported on average having lived in the U.S. for a significantly shorter duration (mean of 4.5 and median of 3 years) compared to mestizos (mean of 6.1 and median of 5 years) ($t(176)=2.03$, $p < 0.05$), and among males, indigenous reported significantly lower years of living in U.S. ($t(125) = 1.76$, $p < 0.05$).

Table 1.
Demographic and Psychosocial Differences by Ethnicity and Gender

	Male (N = 128)			Female (N = 51)			Total (N = 179)		
	Mestizo 32.8 (42)	Indigenous 67.2 (86)	Statistical Comparison	Mestizo 27.5 (14)	Indigenous 72.5 (37)	Statistical Comparison[b]	Mestizo 31.3 (56)	Indigenous 68.7 (123)	Statistical Comparison[b]
State of Origin									
Oaxaca	21.4 (9)	57.0 (49)	*n/a*	28.6 (4)	89.2 (33)	*n/a*	23.2 (13)	66.7 (82)	*n/a*
Puebla	31.0 (13)	11.6 (10)		-	-		23.2 (13)	8.1 (10)	
Veracruz	21.4 (9)	10.5 (9)		21.43 (3)	2.7 (1)		21.4 (12)	8.1 (10)	
Chiapas	-	15.1 (13)		-	-		-	10.6 (13)	
Age (M/SD)	*32.02/9.02*	*31.77/11.74*	ns^b	*26.07/7.51*	*28.22/10.37*	ns^{bc}	*30.54/8.99*	*30.70/11.42*	ns^{bc}
18-27	33.3 (14)	51.2 (44)	$X^2(1) = 3.62^\dagger$	64.3 (9)	59.5 (22)		41.1 (23)	53.7 (66)	
28-71	66.7 (28)	48.8 (42)		35.7 (6)	40.5 (15)		58.9 (33)	46.3 (57)	
Living Condition									
Alone	47.6 (20)	39.5 (34)	ns^c	-	-	n/a^c	35.7 (20)	27.6 (34)	ns^c
With Family	52.4 (22)	60.5 (52)		100.0 (14)	100.0 (37)		64.3 (36)	72.4 (89)	
Education (M/SD)	*5.40/2.85*	*5.08/3.14*	ns^{bc}	*5.86/2.68*	*4.08/3.17*	$t(49)=1.86^*$	*5.52/2.79*	*4.78/3.17*	ns^{bc}
Years ≤ 6	45.2 (19)	47.7 (41)		35.7 (5)	56.8 (21)	ns^c	42.9 (24)	50.4 (62)	
Years > 6	54.8 (23)	52.3 (45)		64.3 (9)	43.2 (16)		57.1 (32)	49.6 (61)	
Spanish Literacy[a]: 0-3 (M/SD)	*1.71/0.89*	*1.65/0.86*	ns^{bc}	*2.36/0.63*	*1.89/0.94*	$t(49)=1.71^*$	*1.88/0.88*	*1.72/0.89*	ns^{bc}
Not at all or A little	42.9 (18)	41.9 (36)		7.1 (1)	37.8 (14)	n/a^c	33.9 (19)	40.7 (50)	
Well or Very well	57.1 (24)	58.1 (50)		92.9 (13)	62.2 (23)		66.1 (37)	59.3 (73)	
Religious Beliefs[a]: 0-3 (M/SD)	*2.00/0.85*	*1.91/0.98*		*2.00/0.78*	*2.08/1.09*		*2.00/0.83*	*1.96/1.01*	
Not at all or A little	35.7 (15)	36.0 (31)	ns^{bc}	28.6 (4)	32.4 (12)	ns^{bc}	33.9 (19)	35.0 (43)	ns^{bc}
Moderately or Very much	64.3 (27)	64.0 (55)		71.4 (10)	67.6 (25)		66.1 (37)	65.0 (80)	
Spiritual Comfort[a]: 0-3 (M/SD)	*1.81/0.89*	*1.66/1.08*	ns^{bc}	*1.78/0.89*	*2.05/1.02*		*1.80/0.88*	*1.78/1.08*	
Not at all or A little	40.5 (17)	50.0 (43)		50.0 (7)	32.4 (12)	ns^{bc}	42.9 (24)	44.7 (55)	ns^{bc}
Moderately or Very much	59.5 (25)	50.0 (43)		50.0 (7)	67.6 (25)		57.1 (32)	55.3 (68)	
Emotional Support									
No	38.1 (16)	54.7 (47)	$X^2(1) = 3.10^\dagger$	92.3 (12)	67.6 (25)	ns^c	50.0 (28)	58.5 (72)	ns^{bc}
Yes	61.9 (26)	45.3 (39)		7.7 (1)	32.4 (12)		48.2 (27)	41.5 (51)	
Instrumental Support[a]: 0-3 (M/SD)	*1.60/0.99*	*1.43/1.02*	ns^{bc}	*1.00/0.78*	*1.49/1.12*	ns^b	*1.45/0.97*	*1.45/1.05*	ns^{bc}
Not at all/A little	52.4 (22)	61.6 (53)		85.7 (12)	62.2 (23)	$X^2(1) = 3.06^\dagger$	60.7 (34)	61.8 (76)	
Moderate/Very much	47.6 (20)	38.4 (33)		14.3 (2)	37.8 (14)		39.3 (22)	38.2 (47)	
Years in U.S. (M/SD):	*5.86/5.54*	*4.13/5.03*	$t(125)=1.76^*$	*7.00/3.57*	*5.41/4.47*	ns^b	*6.15/5.12*	*4.52/4.89*	$t(176)=2.03^*$

Note: *: $p < .05$; †: $p < .10$; [a]: Not at all = 0 and Very much/Very Well = 3; [b]: Independent t test based on one tailed research hypothesis; [c]: Chi-square test.

Table 2.
Effects of Ethnicity and Gender on Mental Health

	Male (100%, N = 128)			Female (100%, N = 51)			Total (100%, N = 179)		
	Mestizo 32.8 (42)	Indigenous 67.2 (86)	Statistical Comparison[b]	Mestizo 27.5 (14)	Indigenous 72.5 (37)	Statistical Comparison[b]	Mestizo 31.3 (56)	Indigenous 68.7 (123)	Statistical Comparison[b]
Culture-Bound Syndrome									
Susto	16.7 (7)	19.8 (17)	ns^c	21.4 (3)	35.1 (13)	n/a^c	17.9 (10)	24.4 (30)	ns^c
Coraje	45.2 (19)	36.0 (31)	ns^c	57.1 (8)	62.2 (23)	ns^c	48.2 (27)	43.9 (54)	ns^c
Nervios	45.2 (19)	24.4 (21)	$X^2(1) = 5.69^*$	42.9 (6)	56.8 (21)	ns^c	44.6 (25)	34.1 (42)	ns^c
Any culture-bound syndrome	61.9 (26)	47.7 (41)	ns^c	64.3 (9)	78.4 (29)	ns^c	62.5 (35)	56.9 (70)	ns^c
S-R Emotional/Mental Health									
Self-Rated Score: 0-3 (*M, SD*)	*1.57/0.74*	*1.60/0.62*	ns^{bc}	*1.50/0.65*	*1.38/0.72*	ns^{bc}	*1.55/0.71*	*1.56/0.66*	ns^{bc}
Very Good/Good	57.1 (24)	58.1 (50)		57.1 (8)	51.4 (19)		57.1 (32)	56.1 (69)	
Fair/Poor	42.9 (18)	41.9 (36)		42.9 (6)	48.6 (18)		42.9 (24)	43.9 (54)	
Depressive Syndromes									
Severity Score: 0-27 (*M/SD*)	*3.24/2.81*	*3.46/4.80*	ns^{bc}	*4.79/5.39*	*6.11/4.51*	ns^{bc}	*3.63/3.64*	*4.26/4.85*	ns^{bc}
No Depressive Syndromes	88.1 (37)	84.9 (73)		85.7 (12)	83.8 (31)		87.5 (49)	84.6 (104)	
Any Depressive Syndromes	11.9 (5)	15.1 (14)		14.3 (2)	16.2 (6)		12.5 (7)	15.4 (19)	
Other Depressive Syndrome	11.9 (5)	9.3 (8)		7.1 (1)	8.1 (3)		10.7 (6)	8.9 (11)	
Major Depressive Syndrome	-	5.8 (5)		7.1 (1)	8.1 (3)		1.8 (1)	6.5 (8)	
Stress Level: 0-30 (*M, SD*)	*15.67/5.67*	*16.87/6.19*	ns^b	*14.93/6.27*	*20.45/6.13*	$t(49) = -2.86^{**}$	*15.48/5.77*	*17.95/6.37*	$t(176) = -2.48^{**}$

Note: **: $p < .01$; *: $p < .05$; †: $p < .10$; ^{a}: Not at all = 0 and Very much/Very Well = 3; ^{b}: Independent t test based on one tailed research hypothesis; ^{c}: Chi-square test.

Table 3.
Effects of Ethnicity on Culture-Bound Syndromes, Self-Rated Emotional/Mental Health, Depressive Syndromes and Stress Level

| | Criterion Variable with Logistic Regression | | | | | | Criterion Variable with Linear Regression | | |
| | Lifetime Culture-Bound Mental Health Syndrome | | Poor/Fair Emotional/Mental Health | | PHQ-9 Depressive Syndrome | | Stress Level | | |
Predictor Variable	OR (95% CI)		OR (95% CI)		OR (95% CI)		Beta (95% CI)		Predictor Variable
Female (*Reference*: Male)	0.69	0.14-3.44	1.08	0.49-2.38	1.57	0.50-5.00	-0.04	-4.49-3.46	Female
Age 28-71 (*Reference*: Age 18-27)	0.62	0.29-1.33	1.18	0.58-2.38	0.54	0.20-1.48	0.17†	-0.01-0.21	Age
Living Condition - Alone (*Reference*: With Family)	2.12†	0.96-4.70	0.79	0.36-1.73	0.84†	0.27-2.63	-0.10	-3.41-0.82	Living Alone
Education (*Reference:* ≤ 6 years)	0.62	0.26-1.51	0.62	0.27-1.46	5.44†	0.77-38.58	-0.05	-0.48-0.25	Years of Education
Level of Spanish Literacy (*Reference:* Not at all/A little)	2.52	0.59-10.76	0.89	0.45-1.78	0.20*	0.07-0.58	0.07	-0.72-1.68	Level of Literacy
Years in U.S. (*Reference*: < 2 Years)							-0.06	-0.38-0.24	Total Residency (Yrs)
Liv2: Living in U.S. ≥ 2 < 7	0.68	0.30-1.573	10.14*	1.06-97.06	0.53	0.18-1.56			
Liv7: Living in U.S. ≥ 7	0.48	0.19-1.21	7.65†	0.80-73.10	0.36†	0.09-1.35			
Social Support (*Reference*: None)	0.79	0.38-1.64	1.30	0.66-2.57	1.95	0.65-5.84	-0.03	-1.64-1.11	Social Support
Religiosity (*Reference*: Not at all)	2.61	0.60-11.31	1.06	0.50-2.22	1.41	0.45-4.39	0.07	-0.56-1.58	Religiosity
Indigenous (*Reference*: Mestizo)	2.94	0.45-19.41	7.42†	0.84-65.62	1.91	0.48-7.69	0.06	-1.42-2.93	Indigenous Mexican
Interaction Terms									**Interaction Terms**
Indigenous × Female	8.66*	1.40-53.43	-	-	-	-	0.27†	-0.29-8.41	*Indigenous × Female*
Indigenous × Education	-	-	-	-	0.10†	0.01-1.12			*Indigenous × Education*
Indigenous × Spanish Literacy	0.22†	0.04-1.13	-	-	-	-	-	-	*Indigenous × Literacy*
Indigenous × Liv2	-	-	0.11†	0.01-1.28	-	-			
Indigenous × Liv7	-	-	0.08*	0.01-0.91	-	-	-0.30*	-0.82- -0.07	*Indigenous × Residency*
Indigenous × Religiosity	0.23†	0.04-1.30	-	-	-	-	-	-	*Indigenous × Religiosity*
Model Summary	Nagelkerke R^2 = 0.16		Nagelkerke R^2 = 0.09		Nagelkerke R^2 = 0.18		R^2 = 0.21 (Adjusted R^2 = 0.16)		

Note. *: $p < .05$; †: $p < .10$

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Table 2 presents prevalence of mental disorders by ethnicity and gender. A majority (58.7%) of our sample reported having suffered from any culture-bound mental health syndrome in their lifetime. The only statistically significant ethnic difference appeared among males where indigenous had a lower prevalence rate for *nervios*. However, a clear pattern emerges in that the prevalence rate for any culture-bound syndrome, as well as for any particular culture-bound syndrome was higher for indigenous female respondents compared to mestizo females, and all males. Although there were no statistically significant ethnic differences in mean self-rated emotional/mental health, the mean score for indigenous females ($M = 1.38$, $SD = 0.72$) was the lowest among all groups and indicates a state slightly better than "fair." While ethnic differences in depression did not reach statistical significance, the mean PHQ-9 severity score for indigenous respondents ($M = 4.26$, $SD = 4.85$) was higher compared to mestizos ($M = 3.63$, $SD = 3.64$), and indigenous females had the highest severity level ($M = 6.11$, $SD = 4.51$) among all groups. Depressive syndromes were more prevalent among indigenous participants (15.4% vs. 12.5%), as well as major depressive syndrome (6.5% vs. 1.8%), and while no mestizo males met criteria for major depressive syndrome, 5.8% of indigenous males did. The mean stress level of indigenous participants ($M = 18.0$, $SD = 6.4$) was significantly higher than that of mestizos ($M = 15.5$, $SD = 5.8$), $t(176) = -2.48$, $p < 0.01$. The mean stress level among indigenous females ($M = 20.5$, $SD = 6.1$) was also significantly higher than that of mestizo females ($M = 14.9$, $SD = 6.3$), $t(49) = -2.86$, $p < 0.01$.

Multivariate Analysis of Effects of Ethnicity on Mental Health

Table 3 presents multivariate test results in predicting lifetime prevalence of any culture-bound mental health syndrome, self-rated poor/fair emotional/mental health, having depressive syndromes, and stress level. As a group, the background variables, namely, gender, age, living condition, education, Spanish literacy, years living in U.S., social support and religiosity indicators, along with interaction terms were able to explain approximately 16% of the variance in culture-bound mental health syndromes, 9% in self-rated emotional/mental health, 18% of depressive syndromes using the Nagelkerke pseudo-R^2 approximation, and 16% in the level of stress using R^2 approximation.

After controlling for main effects and interactions, we found that all participants with higher self-rated Spanish literacy were significantly less likely to have a depressive syndrome (OR = 0.20, $p < 0.05$, 95% CI = 0.07-0.58). In predicting prevalence of lifetime culture-bound mental health syndromes and stress levels, significant or marginally significant interaction effects were found between ethnicity and gender. After controlling for main effects and other interactions, indigenous female participants had: (a) significantly increased odds for reporting culture-bound mental health syndromes (OR = 8.66, $p < 0.05$, 95% CI = 1.40-53.43), and (b) marginally significant increased odds for higher stress levels ($\beta = 0.23$, $p < 0.10$, 95% CI = -0.29-8.41). After controlling for the main effects and other interactions, (a) more educated indigenous respondents were less likely to have a depressive syndrome, and (b) more Spanish literate indigenous respondents were less likely to report culture-bound syndromes, but both were only at a marginal level of significance (p < .10). Significant interaction effects between years in the

U.S. and ethnicity were found to predict self-rated emotional/mental health and stress levels. Indigenous respondents living in the U.S. for seven years or more (a) were significantly less likely to report poor/fair emotional/mental health (OR = 0.08, $p < .05$, 95% CI = 0.01-0.91), and (b) reported significantly lower stress levels (β = -0.30, $p < 0.05$, 95% CI = -0.82 - -0.07).

DISCUSSION

We have examined differences in demographic and psychosocial characteristics previous research has suggested might have important implications for rural mental health providers serving Mexican-origin individuals and families. Our findings add more support to the findings of recent research regarding the changing racial/ethnic characteristics of the current flow of migrant farmworkers from Mexico (Aguirre International, 2005; Gabbard et al., 2008; Huizar Murillo & Cerda, 2004; Rivera-Salgado & Escala Rabadan, 2004). We found that indigenous Mexicans comprised over 69% of our sample, and the vast majority (85%) came from four southern Mexican states that rank very high in terms of their numbers of indigenous citizens: Oaxaca (1st), Chiapas (2nd), Veracruz (3rd), and Puebla (5th) (Linares, 2008). It is important to note that among our relatively small sample of 179 individuals, we identified nine indigenous groups coming from unique cultures and speaking distinctly different languages. It is also important to keep in mind that among, and even within, indigenous groups such as the Zapoteco or Mixteco, there is great diversity in historical experience, as well as culture and language. Indigenous Mexican identities are essentially based in their local communities, and often members of neighboring communities may not recognize a shared ethnic identity although they may speak the same language. In categorizing all these groups as indigenous Mexicans, we run the risk of minimizing differences in identities that may turn out to be very important (Linares).

The median age of indigenous participants (27) was younger compared to mestizos (30), and there were substantially more indigenous men in the youngest age bracket that confirms trends in previous research conducted in California among Mexican-origin migrant farmworkers (Aguirre International, 2005; Alderete et al., 2000b), which has found that indigenous migrants are more often newcomers with less time in the U.S. Previous research among Mexican-origin immigrants in California has also found indigenous participants to have lower levels of education compared to mestizos (Alderete, et al., 2000a, 2000b). In our study, indigenous female participants reported significantly lower levels of education and Spanish literacy compared to mestizo women. Recent research undertaken by various agencies at the federal level in Mexico provides evidence that, on average, indigenous households, and especially females, have less access to basic services offered by the Mexican government, particularly in the areas of education and health (Linares, 2008). In Mexico, at six years of age, nine out of ten children attend school, but only eight out of ten indigenous children do (Instituto Nacional de las Mujeres, et al., 2006). Up until 11 years of age, the rate of school attendance between indigenous males and females is relatively similar, but the gender gap grows rapidly thereafter. This racial/ethnic and gender disparity in education is reflected in literacy rates where, while 9.4% of the national population over 15 years of age is unable to read Spanish, 27.2% of indigenous are illiterate (Linares). This disparity is even greater among indigenous women where the rate of illiteracy rises to 34.4%. It is important to note that these educational disparities can vary from one indigenous group to another, as some groups like the Zapoteco have higher rates of education and literacy compared to other groups like the Mixteco and Triqui (Instituto Nacional de las Mujeres).

In 1996, in California, Aldrete et al. (2000b) conducted rigorous, representative study that comparatively examined prevalence rates of depression and mood disorders between indigenous and non-indigenous Mexican migrant farmworkers. Their study found: (a) lifetime prevalence rate of any mood disorder to be higher among indigenous (8.3%) compared to mestizos (5.5%), (b) lifetime prevalence rate of major depressive episode among indigenous (6.2%) to be higher compared to mestizos (3.6%), and (c) lifetime prevalence rates among indigenous females of both major depressive disorder and any mood disorder to be higher than that found in either male group or among mestizo females. Eleven years later, we found similar racial/ethnic and gender results in our Oregon sample.

In our study, indigenous participants reported significantly higher levels of stress compared to mestizos, and indigenous women reported significantly higher levels of stress compared to all participants. The high level of stress reported by indigenous women in our sample is notable, as in contrast, using a stress scale similar to the one employed in this study, Alderete et al. (1999) found female migrant farmworkers *less* likely to have high levels of stress, and in our study mestizo and indigenous men both had higher stress levels than mestizo women. While there were no statistically significant ethnic differences in lifetime prevalence of culture-bound syndromes, we did find prevalence rates for any culture-bound syndrome, as well as for any particular culture bound syndrome to be highest among indigenous female respondents. Although there were no statistically significant ethnic differences in depression, as captured in PHQ-9 severity scores or in prevalence of depressive syndromes, indigenous females were the only group whose mean PHQ-9 severity score (6.11, $SD = 4.51$) was above the cut-off score of five, which previous research suggested as an appropriate threshold for depression screening that provides the best trade-off in terms of specificity and sensitivity (Adewuya et al., 2006; Francis, Weiss, Senf, Heist, & Hargraves, 2007; Han et al., 2008). In our multivariate analysis, after controlling for main effects and other interactions, we also found that in comparison to all other groups, indigenous females were significantly more likely to report culture-bound syndromes, and at a marginal level of significance, to report higher levels of stress. Clearly, in our sample, the mental health status of indigenous females calls for special attention.

After controlling for main effects and other interactions, we found that (a) all participants with higher self-rated Spanish literacy were significantly less likely to have a depressive syndrome, (b) at a marginal level of significance, more Spanish literate indigenous respondents were less likely to report culture-bound syndromes, and more educated indigenous respondents were less likely to have a depressive syndrome. Together, these findings appear to suggest that interventions emphasizing adult education and literacy might be an effective intervention for this population. Research has demonstrated that literacy education for adults with limited literacy and depression resulted in a significant reduction in depression, accompanied by a significant improvement in self-efficacy, which was interpreted to have mediated the effect of literacy education on depression (Francis et al., 2007). Since in our sample indigenous females reported significantly lower levels of education and literacy, an intervention that focused on improvement in this area might be especially effective in treating symptoms of depression, culture-bound syndromes, and other forms of mental distress. As previous research has indicated that most migrant farmworkers do not have personal transportation (Carroll et al., 2005), to be effective, such programs would have to be freely available and easily accessible to migrant workers, such

as at migrant camps, or by free transportation to nearby community centers. During the interview process, researchers were surprised by the number of migrant respondents who indicated a strong wish for easily accessible English language programs.

Our findings appear to indicate that the mental/emotional health of indigenous migrants is especially at risk during their initial years in the U.S. After controlling for main effects and other interactions, we found that indigenous participants living in the U.S. for seven years or more: (a) were significantly less likely to report poor/fair emotional/mental health, and (b) report significantly lower stress levels. In probing this finding using scatter plot graphs, we could see that compared to mestizos, indigenous migrants with less than two years in the U.S. reported much higher levels of stress, but that by seven years or longer in the U.S., this gap had all but disappeared. This may be reflective of the fact that when indigenous migrants leave their highly integrated and homogeneous community cultural settings in Mexico, they experience the severing of connections with social support networks in a more stressful manner compared to mestizos. Alderete et al. (2000a) suggested that when indigenous Mexican immigrants arrive in the U.S., they do not have the support of fully developed cultural enclaves that mestizos have, as they are a relatively new element of Mexican immigration. Current research also indicates that indigenous Mexican migrants are more likely to cross the U.S. border clandestinely and arrive in the U.S. without legal authorization (Aguirre International, 2005; Carroll et al., 2005). For many, the clandestine border crossing is very stressful, as can be the omnipresent fear of being deported if apprehended by immigration authorities (Finch et al., 2004). One of our Migrant Farmworker Stress Scale items asked respondents to rate how much they feared the consequences of deportation. We found that indigenous respondents reported significantly higher levels of fear, and that 91.9% of indigenous women chose the highest level of fear ("very much").

Our findings that indigenous women scored highest on both indicators of religiosity, and that more religious indigenous respondents were less likely to report lifetime culture-bound syndromes, suggests that local churches should be considered as possible sites for prevention and outreach programs. In our field observations we noted that some churches had established formal support relationships with nearby camps. Previous research with this population has recommended interventions by religious organizations that promote social networking and dissemination of information needed by migrants, such as that regarding their legal rights (Hovey & Magana, 2000). As the importance of religious institutions is deeply embedded in the culture of the indigenous Mexican population (Linares, 2008), outreach programs sponsored by churches are likely to have their trust and respect.

The findings from this study in Oregon cannot be generalized to all indigenous Mexican migrants in the U.S., and should be considered preliminary due to its non-randomized and non-representational design, relatively limited sample size, and its self-report methodology. As our survey questionnaire was not translated into any indigenous language, and as we did not have any indigenous Mexican interviewers, we had limited access to indigenous migrant farmworkers who could not speak Spanish well. Although we attempted to complete interviews with any indigenous person who expressed a desire to participate in our research, usually through the assistance of their indigenous companions who had a better command of Spanish, we strongly recommend that future research with indigenous Mexican migrants be conducted using instruments that have been translated into the indigenous languages spoken by the groups with a

known larger representation in the U.S., such as the Zapotec, Mixtec, and Náhuat peoples. Instruments such as the PHQ-9 need to be validated among these unique cultural groups, and using native speakers from these groups as translators and as interviewers would assure the validity of such research.

In conclusion, our findings suggest that adult education and literacy programs may be an especially effective intervention for newly arrived indigenous Mexican-origin migrants suffering from high levels of stress and symptoms of depression, and associated culture-bound mental health syndromes such as *susto*, *nervios*, and *coraje*. For rural mental health providers who often see indigenous Mexican immigrants as being no different than other Mexican immigrants, and fail to recognize their distinct cultural and psychosocial characteristics, as well as the implications these differences hold for delivering appropriate services, we hope that this exploratory study has provided some initial insight into this unique and rapidly growing U.S. population.

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