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ORIGINAL PAPER

Examining *Nervios* Among Immigrant Male Farmworkers in the MICASA Study: Sociodemographics, Housing Conditions and Psychosocial Factors

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Abstract *Nervios* is a culturally defined condition of psychological stress with important implications for Latino health. Using epidemiological research methods, we examined the prevalence of *nervios* and associated risk factors, including drug and alcohol use, acculturation, and housing conditions in a population-based study of farm worker families in Mendota, CA (the MICASA Study). A household enumeration procedure was used for sampling, and 843 individuals were interviewed in 2006–2007. In this analysis, we present data on 422 men, 381 accompanied (family) males and 41 unaccompanied males. The prevalence of *nervios* was 22 %, with no difference in prevalence by household status. Low family incomes, drug use, medium/high acculturation, and poor housing conditions were associated with increased odds of *nervios*. Self-reported poor/fair health, depressive symptoms, and high perceived stress were also associated with *nervios*. Since *nervios* has been shown to be a clinical indicator of psychiatric vulnerability among Latinos, this analysis furthers public health goals of reducing health disparities.

Keywords Farmworkers · Latinos · Mental health · *Nervios*

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Background

Nervios is a culturally-defined mental health condition that is shared across Latino subgroups with considerable intergroup agreement as to specific features [1]. The signifier *nervios* at once connotes the illness *nervios*, specific symptoms pertaining to *nervios*, and the illness experience of *nervios,* as well as a strategy for coping in adverse life conditions [1–3]. Lack of understanding of culture-bound syndromes such as *nervios* contributes to the creation and perpetuation of health disparities among Latinos. Although sufficient data exists to conclude that mental health is a serious concern for immigrants, there remains a lack of research regarding specific psychosocial challenges faced by Latino immigrant farm workers, a vulnerable and hard-to-reach population.

Latinos in the United States represent a rapidly growing segment of the US population, comprising approximately 50.5 million or 16 % of the US population in the 2010 US Census; however, Latino farm workers are disproportionately overrepresented among agricultural workers [4]. Nationally over 2.6 million people are employed in agricultural labor [5–7]. In California, estimates suggest that over 450,000 people are employed in agriculture, with more than two-thirds being of Latino ethnicity [6].

There are innumerable stressors faced by Latino immigrants that may predispose them to negative mental health outcomes, including *nervios.* California farm workers and immigrant Latinos face disadvantages in prevention and management of mental health problems because they are among the least assimilated immigrants, despite long US residencies. Compounding the problem are low family incomes and limited access, availability, and utilization of mental health services. Some of the important risk factors are related to individual circumstances of immigration, poverty, and weakened social support, particularly among

males immigrating without their families [8]. The experience of immigration in general carries significant mental health risk, and creates conditions for increased anxiety and depression [9–11].

Although not considered by Latinos to be a mental illness, which would carry significant stigma, *nervios* has nevertheless been clinically associated with depression and anxiety. As an idiom of distress, *nervios* is considered to be clinically useful to identify psychiatric vulnerability among Latinos [12–15]. Lewis-Fernandez et al. [15] describe the symptoms of *nervios* as anxiety, depression and somatization; having "too many thoughts," irritability, sadness, fearfulness, predisposition to explosive anger, and even psychosis [3, 16, 17]. Other symptoms found to be connected with *nervios* include hopelessness, nervousness, inability to function in occupational roles; trembling, sweating, feelings of suffocation, loss of control, and desperation; and somatic symptoms including headaches, chest and abdominal pains, and high and low blood pressure [1, 18]. The syndrome has been reported more frequently among women, and therefore is less well characterized in men [1, 19]. However, it is likely that men may also be affected to a significant degree, and factors associated with *nervios* among male agricultural workers may represent a unique set of circumstances that warrant closer investigation and analysis.

For example, adverse material life conditions and risk behaviors, such as alcohol use, have been found to increase the prevalence of *nervios* [20]. Substandard housing and lack of control over living conditions have been implicated as a source of stress for migrant farm workers and increase the risk for negative mental health outcomes, particularly anxiety and depression [21–23]. Magaña and Hovey, in a qualitative study of 75 farm workers in the Midwest, found that crowded living conditions may be associated with *nervios* [22]. Acculturative stress, the feeling of stress and anxiety resulting from life changes in adapting to the receiving society, and low social support also correlate positively with *nervios* [24–26].

In addition to these risk factors for *nervios*, male Latino farmworkers in California are more likely to immigrate without their spouses or families. According to 2003–2004 data from the National Agricultural Worker Survey (NAWS), 60 % of male farmworkers were in California without any members of their immediate family [27]. This group is most vulnerable to substandard housing conditions because of their unaccompanied status [28].

Sensitivity to culturally-interpreted idioms of distress furthers public health goals of reducing health disparities, particularly in minority and immigrant populations that are medically underserved. Understanding the relationships between *nervios* and Latino farmworker environment and culture is essential to addressing the health risks of this population. These relationships are complicated by Latino use of the term *nervios* to describe mental health distress, which may be masking more extensive prevalence of depression, anxiety and post-traumatic stress disorder (PTSD) among immigrants who are less likely to report symptoms according to Western diagnostic categories. In this paper, we describe socio-demographic and housing characteristics of a cohort of Latino immigrant farm workers in Fresno County, California, specifically examining two segments of this population—family and unaccompanied males. Additionally, we assess the prevalence of *nervios* and the possible association with potential risk factors such as housing conditions, alcohol and drug use, acculturation, depressive symptoms, family support, and perceived stress. Our goal is the improved understanding of the prevalence and etiology of this syndrome, which will assist health providers in distinguishing between Western notions of depression and anxiety, which are stigmatized in Hispanic culture, from the more culturally acceptable idiom of distress, *nervios.* We believe that clients would be more likely to seek care for a familiar, non-stigmatized malaise, furthering the public health goal of reducing health disparities.

Methods

Participants

The Mexican Immigration to California: Agricultural Safety and Acculturation (MICASA) Study is a prospective cohort study of farm worker families in Mendota, CA. Mendota was chosen as the study site because of the high proportion of farm workers in the population, both permanent residents and seasonal migrant laborers. A two-stage stratified area probability sampling strategy was used with household enumeration to identify and recruit eligible participants. The enumeration procedure was conducted in July 2005 with participant recruitment commencing in December 2005. Further details of the sampling and enumeration procedures have been previously described [29]. Eligible participants were 18–55 years of age, self-identified as Mexican or Central American, resided in Mendota at the time of interview, and lived with at least one household member who had worked in agriculture for 45 days or more in the year prior to the interview. At recruitment, the study objectives and procedures were explained, and written informed consent in Spanish was obtained. All study protocols and procedures were approved by the Institutional Review Board of the University of California, Davis.

Data Collection

Baseline interviews were completed with participants between January 2006 and April 2007. A questionnaire was

administered to both the head of household and spouse for all households that agreed to participate, and interviews were conducted in Spanish by trained interviewers hired from the community. Overall, 467 households participated in baseline interviews, resulting in 843 individual interviews (81 % participation). One hundred ninety-six individuals declined, and 350 were determined ineligible. The present analysis describes results on 422 men who completed the baseline interview. Of these, 381 men were residing in the US with their family and 41 were termed "unaccompanied" since they were in the US for work, their families remaining in the country of origin.

Measures

The baseline interview assessed demographic characteristics, smoking, alcohol and drug use, work history, acculturation, housing conditions and psychosocial factors including *nervios*, depressive symptoms, perceived stress and family support. The questionnaire was conducted in the participant's home or at the project office and required approximately 1 h to complete. Questions on *nervios* were based upon the work of Salgado de Snyder et al. [2]. A general question asked if the individual reported ever having *nervios*. In addition, symptoms of *nervios* were assessed concurrent with the general question and included whether participants had ever felt distracted or absent-minded; sad, depressed or down; irritable or angry; or having an idea stuck in one's mind. Depressive symptoms were assessed using the Center for Epidemiologic Studies Depression Scale (CES-D) adapted by Burnam et al. [30].

A short six-item Perceived Stress Scale (PSS) with Likert responses was derived from the original 14-item PSS [31]. Higher scores indicated higher levels of perceived stress, and a cutpoint was made at the median. Because the items comprising the scale were adapted from a standardized source, internal reliability was assessed using Cronbach's α, which was 0.80. Family support, a measure of social support, was assessed using a 7-item measure from the family dimension of the provision of social relations (PSR) Scale [32]. In a similar fashion, a cutpoint was made at the median with higher scores indicating higher levels of family support. Internal reliability was evaluated, and Cronbach's α for these items was 0.88.

Acculturation score was determined using the Acculturation Rating Scale for Mexican Americans-II (ARSMA-II), which assesses language preference, ethnic identity and ethnic interaction [33]. Since there are precedents in the literature for employing the ARSMA-II with non-Mexican Hispanics, the instrument was used with all participants, even though a substantial number of participants were Central American [34–37]. Scores can be classified into five levels of acculturation, however, few participants scored into levels II through V on the ARSMA-II, so these were collapsed into one medium/high acculturation category.

Questions to examine housing conditions were drawn from previous survey instruments and used indicators that included home ownership; availability of heat in the home; water damage and presence of molds; and presence of cockroaches [38].

Analysis

Statistical analysis examined the relationships between reported *nervios* and demographic and behavioral characteristics, housing conditions and psychosocial factors among all males and by household status (unaccompanied vs. family male). χ^2 tests were used to compare categorical variables, and *t* tests were computed to compare continuous variables. Bivariate comparisons between *nervios* with variables of interest and potential confounders were made for model building determinations. Multivariate logistic regression modeling, with census tract and census block included as strata and cluster variables, was performed to account for potential within-cluster correlation. Crude and adjusted prevalence odds ratios (ORs) and 95 % confidence intervals (CIs) were estimated for *nervios* by selected behavioral characteristics, acculturation, housing conditions and psychosocial factors. Models were adjusted for age entered as a continuous variable, income, and education. Variables retained in final models were determined by a priori knowledge or those resulting in 10 % change in OR point estimate with inclusion. Data were analyzed with SAS statistical software, version 9.2 for Windows (SAS Institute, Cary, NC, USA).

Results

Unaccompanied and Family Male Characteristics

Among men, 381 family and 41 unaccompanied men were interviewed. Mean age was 38.5 years (SD = 10 years), the majority were from Mexico, and two-thirds had primary school education or less (Table 1). Unaccompanied men were less likely to be married or living as married and were more likely to be current smokers compared to family males (Table 1). Level of acculturation was low overall, with only 5 % of both family and unaccompanied males classified as medium/high acculturated. Unaccompanied males reported lower annual incomes, with 49 % earning $10,000 or less in the past year. They also reported significantly shorter residency in the US compared to family males, 12 versus 18 years respectively ($p < 0.0001$) and

Table 1 Sociodemographic characteristics of family males and unaccompanied males in MICASA farmworker sample, 2007–2008

Characteristics	Family males (n = 381) % (n)	Unaccompanied males (n = 41) % (n)
Age (mean ± SD)	38.6 ± 10.6	37.7 ± 11.4
Years living in the US (mean ± SD)	17.7 ± 9.9	12.1 ± 9.2†
Years working in agriculture (mean ± SD)	16.7 ± 9.9	11.9 ± 9.4**
Marital status		
Married/living as married	99.7 (380)	50.0 (20)†
Single/divorced/widowed	0.3 (1)	50.0 (20)
Education		
No school	5.7 (20)	12.5 (5)
Primary	59.1 (207)	57.5 (23)
Greater than primary	35.1 (123)	30.0 (12)
Annual household income		
$0–$10,000	14.6 (54)	48.8 (20)†
$10,000–$20,000	44.9 (166)	39.0 (16)
>$20,000	40.5 (150)	12.2 (5)
Country of birth		
US	3.4 (13)	4.9 (2)
Mexico	65.6 (250)	53.7 (22)
Central America	31.0 (118)	41.5 (17)
Smoking status		
Never	67.9 (258)	78.0 (32)**
Ex-smoker	17.1 (65)	0
Current smoker	15.0 (57)	22.0 (9)
Alcohol consumption (drinks/week)		
<10	85.9 (323)	77.5 (31)
10+	14.1 (53)	22.5 (9)
Ever used drugs	4.3 (16)	4.9 (2)
Acculturation level		
Low	94.9 (355)	94.9 (37)
Medium/high	5.1 (19)	5.1 (2)
Food insecure	11.6 (44)	19.5 (8)
Poor/fair self-reported health	34.2 (130)	27.5 (11)
Depressive symptoms (past week)	13.0 (45)	5.1 (2)[a]
Nervios (lifetime)	19.5 (74)	27.5 (11)
Nervios symptoms		
Idea stuck in head	21.4 (81)	17.1 (7)
Distracted	34.3 (130)	29.3 (12)
Sad	74.5 (283)	87.8 (36)
Irritable	80.8 (307)	97.6 (40)**
Reason given for *nervios*		
Family problems	23.0 (17)	63.6 (7)
Personal/emotional problems	14.9 (11)	9.1 (1)
Illness	14.9 (11)	0
Financial problems	12.2 (9)	9.1 (1)
Work issues	9.5 (7)	0
Unspecified	25.7 (19)	18.2 (2)
Family support (mean ± SD)	14.2 ± 0.19	9.9 ± 0.60†
Score ≥14[b]	54.1 (192)	16.2 (6)
Perceived stress score (mean ± SD)	4.2 ± 0.17	4.7 ± 0.53
Score ≥4[b]	55.3 (208)	65.0 (26)

* $p < 0.05$; ** $p < 0.01$; † $p < 0.001$ for differences between family and unaccompanied males

[a] Fisher's exact test

[b] Scores for family support and perceived stress were divided at the median value for each score

had fewer years of experience working in agriculture ($p = 0.0004$) (Table 1).

The prevalence of *nervios* was 20 % for family males and slightly higher at 28 % for unaccompanied males, but this difference was not statistically significant (Table 1). Reasons for *nervios* reported by respondents included family problems (28 %), personal/emotional problems (14 %), illness (13 %), and financial problems (12 %). Sixty-four percent of unaccompanied males reporting *nervios* attributed their *nervios* to family problems, and for family males, family problems were also the most frequently reported reason (23 %) (Table 1). There was no statistically significant difference in the prevalence of depressive symptoms or mean perceived stress scores between unaccompanied males and family males although unaccompanied males reported significantly less family support than family males ($p < 0.0001$).

Housing Conditions

A number of characteristics related to housing were assessed at interview, and many of these items varied significantly by household status. Unaccompanied males were less likely to own a home (15 vs. 58 %), more likely have lived 1 year or less at the current residence (46 vs. 26 %) and more likely to report no heat in the residence (28 vs. 0.5 %) (Table 2). There were no differences between family and unaccompanied male homes with respect to reported prevalence of water leaks, water stains and mold in the kitchen or bathroom. However, 39 % of unaccompanied males reported cockroaches inside the home compared to 24 % of family males ($p = 0.04$). Finally, a measure of home disrepair was created to assess overall home conditions, and 44 % of unaccompanied males

Table 2 Descriptive comparisons of housing conditions, MICASA Study family versus unaccompanied males, 2007–2008

Characteristics	Family males (n = 381)	Unaccompanied males (n = 41)
Own home	58.3 (109)	15.4 (2)**
Years in current residence		
1 year or less	26.0 (99)	46.3 (19)*
2–3 years	29.7 (113)	24.4 (10)
4–6 years	19.7 (75)	12.2 (5)
7+ years	24.7 (94)	17.1 (7)
Distance between home and farm		
<100 m	28.1 (102)	12.8 (5)**
100–500 m	16.0 (58)	5.1 (2)
>500 m	55.9 (203)	82.1 (32)
No heat in home	0.5 (2)	27.5 (11)†
Water leaks in home	7.4 (28)	2.4 (1)
Water stains on walls/ceiling	7.4 (28)	7.5 (3)
Mold in kitchen	3.4 (13)	7.3 (3)[a]
Mold in bathroom	8.2 (31)	9.8 (4)[a]
Use bathroom fan	73.9 (255)	36.8 (14)†
Roaches in home	24.1 (91)	39.0 (16)*
Home disrepair score[b]		
0	56.2 (214)	22.0 (9)†
1	26.8 (102)	34.2 (14)
2+	17.1 (65)	43.9 (18)

* $p < 0.05$; ** $p < 0.01$; † $p < 0.001$ for differences between family and unaccompanied males

[a] Fisher's Exact test

[b] Home disrepair score includes seven items: no heat, water leaks, water stains, kitchen mold, bathroom mold, do not use bathroom fan, cockroaches in home

reported two or more items of disrepair in the home compared to 17 % of family males ($p < 0.0001$).

Risk Factors Associated with *Nervios*

In unadjusted logistic models, household status (unaccompanied vs. family males) was not associated with *nervios* (Table 3). Likewise, there were no associations with marital status, education or country of birth. Men earning <$10,000 annual income had more than twice the odds of *nervios* compared to men earning more (Table 3). The odds of *nervios* were higher among those who reported ever using drugs (OR = 3.29, 95 % CI 1.42–7.67), were classified as medium/high acculturated (OR = 2.85, 95 % CI 1.05–6.26), and self-reported poor or fair health (OR = 2.55, 95 % CI 1.66–3.93) (Table 3). The odds of *nervios* were more than seven times higher in those reporting depressive symptoms and significantly higher in men reporting higher levels of perceived stress (Table 3). Poor housing conditions, including water leaks in the home, mold in kitchen and bathroom, and cockroaches in the home were all associated with increased odds of *nervios* among men (Table 3). Additionally, those reporting two or more items on the home disrepair score had more than twice the odds of *nervios* (Table 3).

Logistic models including census tract and block as cluster and strata variables and adjusted for age, education and income produced findings largely consistent with unadjusted models. Men who had ever used drugs (OR = 3.47, 95 % CI 1.45–8.28) or were classified as medium/high acculturated (OR = 3.13, 95 % CI 1.25–7.81) reported significantly higher odds of *nervios* (Table 3). Similarly, in adjusted models, the odds of *nervios* among men was associated with psychosocial factors including self-rated fair or poor health (OR = 2.32, 95 % CI 1.48–3.65), depressive symptoms (OR = 7.15, 95 % CI 3.41–15.01) and higher perceived stress score (OR = 1.80, 95 % CI 1.03–3.13) (Table 3). Likewise, housing conditions associated with higher odds of *nervios* in unadjusted models remained significantly associated with *nervios* in adjusted models although having cockroaches in the home and the home disrepair score were only marginally significant (OR = 1.61, 95 % CI 0.97–2.66 and OR = 1.89, 95 % CI 0.93–3.82, respectively).

Discussion

Nervios and associated symptoms of depression and anxiety, and by extension, general mental health concerns, are pervasive in this population of male farmworkers in California. Participants who reported depression and stress were more likely to also report *nervios*, suggesting that *nervios* might signal negative mental health outcomes, something to which health professionals working with this population should be attuned. Key findings include the strong association of income, drug use, poor self-rated physical and/or mental health and poor housing conditions with this culturally-relevant mental health condition.

Latino immigrants face significant mental health risks, particularly related to anxiety and depression, both clinically associated with *nervios* and with similar etiological stressors. These risks may be exacerbated by occupational health risks, poor housing conditions, social isolation and discrimination. Farm labor is dangerous, difficult, and dirty, and workers often have little control over employment conditions making it difficult to take time off for illness, doctor visits or to care for a sick child. Low pay leaves many earning at the US federal poverty level, and immigration to the US for work creates social isolation from family. That rates of Western mental health categories such as depression and anxiety are so high among this

population should come as no surprise, and in fact these prevalence rates are likely significantly underestimated.

The experience of suffering from *nervios* has previously been correlated with depression and depressive symptoms [1, 3, 17, 23, 39], and in fact, MICASA Study participants with depressive symptoms were seven times as likely to report suffering from *nervios.* While differences were not statistically significant, it is interesting to note that prevalence of *nervios* was higher among unaccompanied males while prevalence of depressive symptoms was higher among family males. Since unaccompanied males in our cohort were comprised of newer immigrants compared to family males, the higher prevalence of reported *nervios* among unaccompanied males is likely to reflect newcomers' preference for and greater identification with familiar, culturally-relevant explanatory models that more meaningfully convey distress; rather than foreign diagnostic categories that signify the stigmatized social identity of mental illness [12, 19]. These results suggest that mental health issues among farmworkers have the strong potential of being overlooked by US health providers because of linguistic discrepancies in idioms of distress. Further, mental health outcomes tend to be stigmatized among Hispanics, which impedes health-seeking behavior, a factor in the development of and increase in minority health disparities. The culturally-defined illness category of *nervios* allows individuals to express distress without that stigma.

The 20 % prevalence of *nervios* reported by MICASA male participants is consistent with estimates on depression reported elsewhere, and our analysis suggests an association between the likelihood of reporting *nervios* among participants who reported depressive symptoms. Research suggests that between 20 and 50 % of farmworkers in the United States suffer from some type of mental illness or psychiatric vulnerability, although these data often exclude culturally-interpreted idioms of distress such as *nervios* [39]. In the US–Mexico border region and in agricultural regions of Texas, prevalence rates of *nervios* are more than double those found in California, 41 and 46 %, respectively [40]. In the Midwest, Hovey and Magaña report that 29 % of farm workers suffer from levels of anxiety sufficient to impair daily activity, and 38 % met caseness for depression [21, 41]. Additionally, we found a clear connection between self-reported poor health, high perceived stress and elevated odds of *nervios,* a finding that agrees with previous research on Latinos who suffered comorbid mental health sequelae such as depression and PTSD from political violence [42].

The nature of the sample afforded the opportunity to examine differences between family male and unaccompanied male immigrant farmworkers, and while the prevalence of *nervios* by household status was not statistically different, more than a quarter of unaccompanied males reported suffering from this condition compared to <20 % of family males. Additionally, these two groups of men differed significantly in several key ways indicative of the lifestyles inherent to working unaccompanied in the US compared to migrating and residing with family. Unaccompanied males were less likely to be married; reported significantly lower levels of family support; and were more likely to be smokers than family males. Housing conditions for unaccompanied males tended to be poorer than those of family males, consistent across several items of housing assessment as well as measured as an index of home disrepair. Unaccompanied males represent the newest immigrants (12 years in the US vs. 18 years for family males) and concurrently have a shorter agricultural work history compared to family males, 12 and 17 years, respectively. The lower incomes reported by unaccompanied males, as well as the potential for harsher working conditions, may be related to their recent immigrant status and a contributing factor in the higher prevalence of reported *nervios*. Stress over money, making ends meet, and sending remittances home likely contribute to increased *nervios* among men who earn $10,000 or less.

The etiology of *nervios* has long been associated in Latino cultures with family disruption and the breakdown in family relationships, and serves as a means of diverting the expression of stressors associated with familial dysfunction (including separation) into a self-directed idiom of distress [43]. The inability to properly support family or administer family problems likely contributes to the sense among men that family issues are a key reason reported for their *nervios.* Sixty-four percent of unaccompanied males, compared to only 23 % of family males, cited "family problems" as the main reason for their *nervios*, a compelling observation given the lower levels of family support reported by the unaccompanied group. For this group, distance from family may be the single most significant factor resulting in limited family communication and interactions, the loss of intimacy with spouse and children, inability to resolve family problems from a distance; and limitations on visits home due to cost and document status.

New Contribution to Literature

We present new data on *nervios* among Mexican and Central American male farmworkers, a population for whom there is a significant lack of information. In particular, there is a lack of information about this population with regard to mental health and associations between mental health and the health risks of the immigrant farm worker experience, such as substandard housing and family problems. Because of the associations between depression and *nervios* found in our analysis, this research provides a

Table 3 Factors associated with *nervios* among men in the MICASA Study cohort, 2007–2008

Characteristics	*Nervios* % (n)	Unadjusted odds ratio [95 % CI]	Adjusted odds ratio[a] [95 % CI]
Age			
18–30 years	20.8 (22)	1.00 [0.98, 1.03]	
31–40 years	17.0 (24)		
41–45 years	21.0 (13)		
45+ years	23.6 (26)		
Marital status			
Married/living as married	19.6 (78)	0.45 [0.18, 1.13]	
Single/divorced/widowed	35.0 (7)	1.0	
Education			
Primary education or less	19.4 (49)	1.0	
Greater than primary	23.1 (31)	0.80 [0.46, 1.37]	
Annual household income			
$0–$10,000	31.5 (23)	2.28 [1.22, 4.28]	
$10,000–$20,000	17.8 (32)	1.07 [0.62, 1.86]	
>$20,000	16.8 (26)	1.0	
Country of birth			
US	21.4 (3)	1.0	
Mexico	21.1 (57)	0.98 [0.21, 4.54]	
Central America	18.5 (25)	0.83 [0.21, 3.35]	
Years living in the US[b]			
<16 years	20.8 (43)	1.0	
16+ years	20.0 (42)	0.95 [0.58, 1.58]	
Years working in agriculture[b]			
<15 years	19.3 (39)	1.0	
15+ years	20.4 (43)	1.07 [0.72, 1.59]	
Smoking status			
Never	19.5 (56)	1.0	
Ex-smoker	18.5 (12)	0.93 [0.52, 1.68]	
Current smoker	25.8 (17)	1.43 [0.83, 2.47]	
Household status			
Unaccompanied male	27.5 (11)	1.56 [0.54, 4.55]	1.32 [0.41, 4.26]
Family male	19.5 (74)	1.0	1.0
Alcohol consumption (drinks/week)			
<10	20.8 (73)	1.0	1.0
10+	14.5 (9)	0.60 [0.29, 1.27]	0.65 [0.32, 1.32]
Ever used drugs			
Yes	44.4 (8)**	3.29 [1.42, 7.67]	3.47 [1.45, 8.28]
No	19.5 (77)	1.0	1.0
Acculturation level			
Low	19.0 (74)*	1.0	1.0
Medium/high	40.0 (8)	2.85 [1.14, 7.10]	3.13 [1.25, 7.81]
Food insecure			
Yes	28.9 (15)	1.71 [0.77, 3.78]	1.56 [0.68, 3.56]
No	19.2 (70)	1.0	1.0
Poor/fair self-reported health			
Yes	30.7 (43)	2.55 [1.66, 3.93]	2.32 [1.48, 3.65]
No	14.8 (41)	1.0	1.0
Depressive symptoms (past week)			
Yes	53.2 (25)[†]	7.11 [3.68, 13.75]	7.15 [3.41, 15.01]

Table 3 continued

Characteristics	*Nervios* % (n)	Unadjusted odds ratio [95 % CI]	Adjusted odds ratio[a] [95 % CI]
No	13.8 (46)	1.0	1.0
Family support score ≥14[c]	24.0 (47)	1.53 [0.91, 2.56]	1.65 [0.93, 2.95]
Family support score <14	17.1 (33)	1.0	1.0
Perceived stress score ≥4[c]	23.7 (55)*	1.77 [0.99, 3.15]	1.80 [1.03, 3.13]
Perceived stress score <4	14.9 (27)	1.0	1.0
Own home			
Yes	17.4 (19)	0.72 [0.35, 1.47]	0.75 [0.32, 1.78]
No	22.7 (20)	1.0	1.0
Distance between home and farm			
<100 m	27.1 (29)	1.60 [0.83, 3.09]	1.63 [0.82, 3.26]
100–500 m	18.6 (11)	0.98 [0.51, 1.90]	1.18 [0.59, 2.36]
>500 m	18.9 (44)	1.0	1.0
No heat in home			
Yes	7.7 (1)	0.32 [0.02, 4.34]	0.18 [0.01, 3.82]
No	20.7 (84)	1.0	1.0
Water leaks in home			
Yes	48.3 (14)†	4.15 [1.87, 9.21]	4.90 [2.11, 11.36]
No	18.4 (71)	1.0	1.0
Water stains on walls/ceiling			
Yes	32.3 (10)	2.07 [0.97, 4.41]	2.00 [0.92, 4.33]
No	18.7 (72)	1.0	1.0
Mold in kitchen			
Yes	37.5 (6)	2.49 [1.11, 5.56]	2.40 [1.06, 5.48]
No	19.5 (78)	1.0	1.0
Mold in bathroom			
Yes	45.7 (16)†	3.90 [1.93, 7.87]	3.80 [1.92, 7.53]
No	17.8 (68)	1.0	1.0
Use bathroom fan			
Yes	20.6 (55)	1.09 [0.64, 1.84]	1.26 [0.64, 2.48]
No	19.3 (22)	1.0	1.0
Roaches in home			
Yes	27.1 (29)*	1.67 [1.05, 2.67]	1.61 [0.97, 2.66]
No	18.2 (56)	1.0	1.0
Home disrepair score[d]			
0	18.2 (40)**	1.0	1.0
1	15.5 (18)	0.83 [0.45, 1.52]	0.91 [0.48, 1.72]
2+	32.5 (27)	2.17 [1.15, 4.09]	1.89[0.93, 3.82]

* $p < 0.05$; ** $p < 0.01$;
† $p < 0.001$

[a] Census tract and block included as strata and cluster variables, models adjusted for age, education, and income

[b] Years in US and years working in agriculture divided at median value

[c] Scores for family support and perceived stress were divided at the median value for each score

[d] Home disrepair score includes seven items: no heat, water leaks, water stains, kitchen mold, bathroom mold, do not use bathroom fan, cockroaches in home

clear indication that health providers should investigate comorbid depression among Latinos who report that they are suffering from *nervios.*

Our data on housing conditions provides insight into associations with *nervios*. There is general agreement that housing conditions are implicated in negative mental health outcomes among the poor [22], but no study has definitively linked poor housing conditions to mental health outcomes, partly due to methodological considerations [39, 44]. In the present analysis, we examined specific features of home disrepair that may increase risks of *nervios* among males. The presence of water leaks, mold in the bathroom and kitchen, and cockroaches in the home were all individually associated with *nervios* in men. Additionally, a measure of home disrepair that was a composite score of seven items related to poor housing conditions showed that reporting two or more items of disrepair was associated with higher odds of *nervios*. Farm workers, especially unaccompanied males, often reside in rental homes that are dismally maintained and regulation of farm worker housing standards remains egregiously neglected. It is understandable that such poor housing

conditions may contribute to risk of negative mental health outcomes [39].

Limitations

There are several limitations to this study that should be mentioned inherent to cross-sectional assessments based upon participant interview, such as recall bias and inability to determine temporal order. The questions on *nervios* and individual symptoms of *nervios* assessed lifetime *nervios*, so the time frame of occurrence and whether it preceded immigration to the US was not known. However, since we did find an association between past-week depression and *nervios*, our data on depression among males suggests at least an indirect association between *nervios* and housing conditions. Further, our research shows that two or more items of home disrepair in the current home is associated with higher reporting of *nervios*, also suggestive of an association. Reliance on self-report is vulnerable to recall bias, but assessments used standardized instruments tested with other immigrant populations, where possible. Additionally, the sample of unaccompanied males was small which potentially limited analysis and comparisons that can be drawn with this group. Health research on this important component of the hired farm worker population is inadequate, however, so these descriptive evaluations provide further narrative on the characteristics of this group. A qualitative component that delved further into individual understanding of the etiology of malaise and the cultural meaning of the phenomenon of *nervios* was beyond the scope of the MICASA Study, but merits further investigation.

Conclusions

Challenging life conditions and hardships common to the immigrant farmworker experience are positively correlated with an increased prevalence of *nervios,* which in turn is associated with risk of other mental health issues, including depression. A lack of understanding among health practitioners in the United States regarding Latino attitudes about mental health combined with Latino use of cultural signifiers may mask identifying serious underlying mental health issues. As a result, mental health issues among Latino immigrants present a potential public health crisis that has yet to be well measured.

In conclusion, we have examined specific risk factors that are associated with an increased prevalence of *nervios*, a culturally-interpreted syndrome that corresponds uneasily to a number of Western diagnostic categories. This analysis builds upon previous research to further understanding of culturally-defined idioms of distress in mental health among Latino immigrants that may be overlooked by health care providers and health policymakers. Since *nervios* has been shown to be a clinical indicator of other underlying mental health issues, these findings further public health goals of reducing health disparities among vulnerable and hard-to-reach populations by fostering culturally competent understanding of the meaning of idioms of distress, and of the mental health challenges of low-income immigrant populations.

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