American Psychological Association

Journal of Rural Mental Health

2018, Vol. 42, No. 2, 69–88
http://dx.doi.org/10.1037/rmh0000090

Elevated Depressive Symptoms Among Hired Crop Workers in the United States: Variation by Sociodemographic and Employment Characteristics

Toni Alterman
National Institute for Occupational Safety and Health, CDC, Cincinnati, Ohio

Joseph G. Grzywacz
Florida State University

Carles Muntaner
University of Toronto

Rui Shen
Emergint Technologies, Louisville, Kentucky

Susan Gabbard, Annie Georges, and Jorge Nakamoto
JBS International, Burlingame, California

Daniel J. Carroll
U.S. Department of Labor, Washington, DC

We present prevalence rates, along with demographic and economic characteristics associated with elevated depressive symptoms (EDS), in a nationally representative sample of hired crop workers in the United States. We analyzed in-person interviews with 3,691 crop workers collected in 2009–2010 as part of a mental health and psychosocial supplement to the National Agricultural Workers Survey. The prevalence of EDS was 8.3% in men and 17.1% in women. For men, multivariate analysis showed that EDS was associated with years of education, family composition, having a great deal of difficulty being separated from family, having fair or poor general health, ability to read English, fear of being fired from their current farm job, and method of payment (piece, salary, or a combination). Interactions were found between region of the country and family composition. Multivariate analyses for women showed that fear of being fired, fair or poor general health, having children ≤15 years of age, being unaccompanied by their nuclear family, expectation for length of time continuing to do farm work in the United States, and authorization status were associated with EDS. Interactions were found with Hispanic ethnicity and region of the country, as well as presence of the nuclear family and region. The present study identifies important risk

This article was published Online First May 24, 2018.

Toni Alterman, Division of Surveillance, Hazard Evaluation and Field Studies, National Institute for Occupational Safety and Health, CDC, Cincinnati, Ohio; Joseph G. Grzywacz, Department of Family and Child Services, Florida State University; Carles Muntaner, Dalla Lana School of Public Health and Bloomberg Faculty of Nursing, University of Toronto; Rui Shen, Louisville, Kentucky, Emergint Technologies; Susan Gabbard, Annie Georges, Jorge Nakamoto, Aguirre Division, JBS International, Burlingame, California; Daniel J. Carroll, Employment and Training Administration, U.S. Department of Labor Washington, D.C.

Funding was provided by the National Institute for Occupational Safety and Health, Centers for Disease Control and Prevention, and the U.S. Department of Labor, Employment, and Training Administration.

We thank the farmworkers and interviewers for their participation. We also thank our colleague Marcia Gomez, from the National Institutes of Health, formerly at the Health Resources and Services Administration for her support and collaboration and Ms. Jia Li for statistical assistance.

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the National Institute for Occupational Safety and Health, Centers for Disease Control and Prevention, or the U.S. Department of Labor.

Correspondence concerning this article should be addressed to Toni Alterman, Surveillance Branch, Division of Surveillance, Hazard Evaluations and Field Studies, National Institute for Occupational Safety and Health, 1090 Tusculum Avenue (MS R-17), Cincinnati, OH 45226-1998. E-mail: talterman@cdc.gov

factors in this first population-based assessment of EDS in a nationally representative sample of U.S. crop workers. The importance of social support from family, job insecurity, and high prevalence of EDS in female crop workers support the need for screening and outreach in this primarily rural group of men and women crop workers.

Keywords: depressive symptoms, depression, farmworkers, crop workers

Previous studies have found poor mental health among migrant and seasonal hired crop workers, the majority of whom are Latino immigrants (Alderete, Vega, Kolody, & Aguilar-Gaxiola, 1999; Crain et al., 2012; Hiott, Grzywacz, Davis, Quandt, & Arcury, 2008; Hovey & Magaña, 2000; Mora, Quandt, Chen, & Arcury, 2016; Pulgar et al., 2016; Ramos, Su, Lander, & Rivera, 2015). Nationally representative samples of crop workers are lacking, but studies have assessed mental health in a variety of locations in the United States. For example, approximately half of crop workers in several counties in North Carolina were found to meet caseness for depression (Crain et al., 2012), and approximately 18% reported high levels of anxiety (Hiott et al., 2008). Data from 200 migrant crop workers in rural Nebraska showed that nearly half (45.8%) were depressed (Ramos et al., 2015). Survey results from rural central California showed that 21% of men and 19.7% of women crop workers met the definition of caseness based on the Centers for Epidemiologic Studies of Depression Scale (CES-D; Alderete et al., 1999).

Studies also have found that members of minority groups with less education and without health insurance, a group similar to a large segment of the U.S. crop worker population, are at increased risk of depression (Lorant et al., 2003; Pulgar et al., 2016). Factors examined previously have included sociocultural factors addressing social, cultural, and economic conditions of crop workers, including community violence, immigration, economic strains, family separation, local migration pressures, and health care access barriers (Carvajal et al., 2014). Alderete et al. (1999) found that depression was higher among widowed, separated, or divorced crop workers and those with higher levels of acculturation (e.g., longer exposure to U.S. society) and lower social support. Ward (2007) proposed an ecological model of determinants of Hispanic migrant crop worker health that included predictors of health such as age, gender, legal status, working conditions, housing conditions, education, language barriers, social support, family income, and tangible assets. These led to individual responses such as psychosocial stress and issues of access to care. Magaña and Hovey (2003) identified stressors among these workers as including rigid working conditions, low wages, poverty, and poor housing.

Crop work is strenuous and often is performed in rural areas with many barriers to health care, including a shortage of primary care and mental health providers (Carvajal et al., 2014; Crain et al., 2012). In addition, crop workers often are not eligible for county-funded services because they are not permanent county residents. Ramos et al. (2015) found that economics and problems with transportation, difficulty finding a job, social isolation (e.g., being away from family), and health were correlated with elevated depressive symptoms (EDS) in Latina crop workers as measured with the CES-D. A number of studies also have found that depression affects women almost twice as much as men (Pulgar et al., 2016; Roblyer et al., 2016). Another analysis of crop workers found that those with EDS were more likely to use health care in the United States than those without EDS (Georges et al., 2013).

Analysis of nationally representative data on mental health among crop workers has been lacking. Although there have been studies examining aspects of mental health among these workers, studies have tended to be small or regionally fragmented (Alderete et al., 1999; Alderete, Vega, Kolody, & Aguilar-Gaxiola, 2000; Crain et al., 2012; Grzywacz, Quandt et al., 2010; Grzywacz et al., 2011; Grzywacz, Hovey, Seligman, Arcury, & Quandt, 2006; Hiott et al., 2008; Hovey & Magaña, 2000; Magaña & Hovey, 2003; Mazzoni, Boiko, Katon, & Russo, 2007). This study provides the first population-based assessment of EDS among a nationally representative sample of hired crop workers in the United States and helps to develop a better understanding of farmworker mental health. To accomplish this goal, we use the

data to (1) document the national prevalence of EDS; (2) examine associations between EDS and sociodemographic, labor market, and employment characteristics; and (3) further the understanding of factors associated with EDS among these workers to aid rural health providers in understanding issues that may underlie mental health problems.

Method

Participants

Findings reported in this article use data from a 2009–2010 psychosocial health supplement to the U.S. Department of Labor's National Agricultural Workers Survey (NAWS). This supplement resulted from recommendations developed at a national meeting of experts from multiple disciplines with experience in conducting research in migrant health and mental health, including Latino populations. The NAWS is the primary source of data on U.S. workers in crop agriculture. Since 1989, the NAWS has conducted interviews with a national probability sample of field workers employed in crop agriculture, not including workers with a temporary work permit (H2A visa). Eligible respondents are employed in crop agriculture or support services for crop agriculture (North American Industry Classifications 111 and 1151), respectively. Activities include all phases of crop production (preharvest, harvest, and postharvest), including operating machinery. A detailed description of the NAWS sampling and weighting can be found at https://www.doleta.gov/ag/naws. A report describing demographic characteristics for these workers also is available at the above site (U.S. Department of Labor, Employment and Training Administration, 2014).

Procedure

The NAWS used a multistage sampling design to account for seasonal and regional fluctuations in the level of farm employment. The year is divided into three interviewing cycles, each lasting 4 months to capture seasonal fluctuations in the agricultural workforce. Five levels of sample selection are used: region, county cluster, county within cluster, employer, and field worker. The sample includes only workers actively employed in crop agriculture at the time of the interview. In each of the 12 regions, the number of interviews allocated to each cycle is proportional to the crop activity at that time of the year. Within each selected county, employers are selected at random from a list of agricultural employers. The sampling frame of workers is constructed after contact with the employer to identify workers at that establishment. Once interviewers have a list of workers, a random sample is chosen. The interviewers approach workers directly to set up interview appointments in their home or other agreed-upon locations. The agricultural employer participation rate was 60%. A $20 honorarium given to crop workers has enabled the survey to achieve a worker response rate of over 90%.

All NAWS data are collected through face-to-face interviews conducted by trained interviewers in the language chosen by the crop worker. Prior to collecting data, interviewers explain the purpose of the survey to the workers, ask them to participate, and obtain written informed consent.

Measures

A supplemental module entitled "Work Organization and Psychosocial Factors" was added to the survey in 2009–2010. The supplemental module was available in Spanish and English and was revised after undergoing cognitive testing and piloting with 400 respondents in 2007 (Grzywacz et al., 2009; Grzywacz, Alterman et al., 2010). Depressive symptoms in the past week, the focal dependent variable for the current study, were assessed using the 10-item version of the CES-D scale (Grzywacz, Hovey et al., 2006; Guarnaccia, Angel, & Worobey, 1989; Kohout, Berkman, Evans, & Coroni-Huntley, 1993; Magaña & Hovey, 2003; Radloff, 1977; Sandberg et al., 2012). The CES-D was selected because it is one of the most widely used measures of depressive symptomatology in community samples and has been found to have good internal reliability and construct validity among Mexican Americans, including samples consisting of primarily low-income crop workers (Casillas et al., 2012; Grzywacz, Alterman et al., 2010; Grzywacz, Quandt et al., 2006; Kohout et al., 1993; Ortega, Rosenheck, Alegría, & Desai, 2000; Vaeth, Caetano, & Mills, 2016; Wassertheil-Smoller et al., 2014). Crop workers first were asked if they

experienced a depressive symptom in the previous 7 days, and if yes, they were asked how many of the past 7 days they experienced the symptom. For the reporting of prevalence of EDS suggestive of clinical severity, the number of days the respondent experienced the symptom was coded as a categorical variable—values ranged from 1 to 3 as follows: 5 days or more coded as 3, 3 or 4 days coded as 2, 1 or 2 days coded as 1. We reverse coded positive items (e.g., enjoyed life, happy). The final score was obtained by summing across the 10 items. Higher scores indicated more depressive symptoms. A CES-D score of 10 or higher was used to indicate EDS suggestive of clinical severity. For use in linear regression analyses, yes was coded as 1, and no was coded as 2; CES-D scores were simply summed. Scores ranged from 0 to 10, with a mean of 1.21 for men and a mean of 1.86 for women.

Statistical Analysis

All analyses were done using SAS 9.3, using weights that account for the complex NAWS survey design. The analytic sample included 3,691 crop workers interviewed from 2009 to 2010. There were 44 crop workers <18 years of age, 91% of whom were emancipated minors; all were included in the analysis. Less than 3% of data for the supplement were missing.

To allow the national analysis to address issues and findings from smaller and regional studies, the analysis includes demographic, cultural, family, health, employment, and geographic characteristics drawn from that literature as well as factors identified at a national meeting of multidisciplinary experts in Latino and hired crop worker mental health, as well as findings from focus groups with crop workers conducted prior to development of the supplemental module. Demographic variables included sex, age group (14–24, 25–34, 35–44, 45–54, and 55 years or older), and ethnicity (Latino, non-Latino White, and non-Latino other). Cultural characteristics included language preference (English, Spanish, or Indigenous), as well as a self-assessed measure of English proficiency, identifying how well the worker spoke or read English ("not at all," "a little/somewhat," or "well"). Educational attainment was categorized by number of years of schooling (0–6, 7–9, 10–12, and 13–16). Family characteristics included parent/child citizenship (whether the family had mixed status, that is, whether at least one child in the household was a U.S. citizen and at least one parent was undocumented) and family composition (single/divorced/separated, married but living alone, married living with full family, or married living with some family). Crop workers also were asked how difficult it was for them to be separated from family, which was coded as a categorical variable (not at all difficult, somewhat, very difficult, or not separated from family). The question wording was general, and workers could have been referring to nuclear and/or extended family. General health was measured by the question, "In general, how would you describe your health (excellent, good, fair, or poor)?" Region of interview also was included (East, Southeast, Midwest, Southwest, Northwest, and California).

Labor market characteristics included total family income (<$5,000, $5,000 with increasing $5,000 intervals, and ≥$20,000 as the highest category) and method of payment for the respondent's current farm job (by the hour, by the piece, combination hourly wage and piece rate, salary, or other). Labor market questions also included whether the respondent worked for that employer on a seasonal basis or year-round, how long the respondent expected to continue doing farm work in the United States (<1 year, 1–3 years, 4–5 years, >5 years, or >5 years and as long as I am able), if the respondent could get a U.S. nonfarm job within 1 month (no, yes), and if the respondent feared being fired from his or her current farm job (no, yes). Employment characteristics included time in the United States stratified at the median (≤14 years, ≥15 years); whether the farmworker migrates for work (i.e., travels more than 75 miles to obtain a farm job; no, yes); years having done farm work in the United States (<5, 6–10, 11–15, >15); whether the farmworker reports being covered by unemployment insurance; whether the farmworker was directly hired by a grower, packing house, or nursery versus hired by a farm labor contractor; and whether the farmworker was authorized to work in the United States. Work authorization was derived from immigrant workers' responses to questions about their visa status.

Prevalence rates for EDS using a definition suggestive of clinical severity were calculated, and because of the large gender difference ($p <$

.001) as well as differences in crops and tasks (i.e., women were more likely to work in preharvest tasks and horticulture), all analyses were stratified by gender. Demographic, ethnic, cultural, family, health, economic, labor market, and employment characteristics served as the independent variables in multivariate linear regression models with EDS as the outcome.

Multiple linear regression analyses were conducted with continuous CES-D scores as the dependent variable, using backward elimination. To examine Hispanic and non-Hispanic differences and issues involving social support from family in more detail, interactions between ethnicity and region, as well as interactions between social support and region, were included in regression models. Because of the larger number of male respondents, the more detailed family composition variable (four categories) was used as a measure of social support for regression analyses with men. However, as a result of the much smaller sample of women and the presence of zero cells, social support from family was measured as the presence or absence of a hired female crop worker's nuclear family.

Results

Sample Characteristics

Characteristics of the sample are presented in Table 1. Participants were predominantly men (76%), with 49% between the ages of 25 and 44 (see Table 1). Most crop workers were Latino (83%), almost half reported having 6 years of education or less (45.1%), a third (32.3%) did not speak English at all, and almost half did not read English at all (43.1%). Half (52.1%) of crop workers came from mixed-status families; almost half (44.7%) were single, divorced, or separated; and 40.8% were married and living with all their family members. Half (50.3%) of crop workers indicated that they were not separated from family, but of those separated from family, almost a third (28.8%) indicated that it was very difficult. Most crop workers (77.6%) reported having good or excellent health.

With regard to income and employment characteristics, almost one quarter (21.2%) of crop workers made less than $5,000 per year, almost a quarter (21.4%) made more than $5,000 but less than $20,000, and nearly 40% earned more than $20,000 per year. Most crop workers (77.9%) were paid by the hour, about half (45.0%) reported that they would receive unemployment insurance payments if they lost their job, and half (49.4%) worked on a year-round basis. Nearly three quarters (71.8%) of respondents expected to continue doing farm work in the United States for 5 years or longer—and as long as they were able. More than 40% (41.7%) believed that they could get a nonfarm job within a month, and most (73.4%) were not afraid that they could be fired from their farm job. Two thirds (66.1%) of these crop workers had been in the United States for 14 years or less, and about a quarter (27.3%) migrated for work. A third (32.9%) of the crop workers had been doing U.S. farm work fewer than 5 years, with a third (32.1%) having done U.S. farm work more than 15 years. Most crop workers (85.2%) worked for a grower, packing house, or nursery rather than for farm labor contractors.

EDS

Table 2 shows the prevalence of EDS suggestive of clinical severity by gender. The overall prevalence of EDS was 10.4%. Women had a higher prevalence rate of EDS (17.1%) compared with men (8.3%). The prevalence of EDS was 8.6% for Latino men and 18.3% for Latino women, which was higher than White non-Latino men (5.9%) and White non-Latino women (10.8%). The sex difference in prevalence of EDS was significant ($p < .01$) for the total sample, as were differences in EDS by demographic, cultural, health, labor market, and employment characteristics (see Table 2). Some examples of different patterns in the prevalence of EDS between men and women can be found in education; the prevalence of EDS was lowest for men with a postsecondary education but highest for women with this level of education. Similar prevalences for EDS were found with regard to reading ability among men, but higher prevalences of EDS were found among women who read English well, followed by those who did not read at all. Examples of similar patterns in EDS prevalence include lower prevalences for both women and men with children <15 years of age and those who worked for their current employer on a year-round rather than seasonal basis. There was

Table 1
Participant Characteristics

Characteristic	Total			Men		Women	
	n	Weighted prevalence %	95% CI	Weighted prevalence %	95% CI	Weighted prevalence %	95% CI
Demographic							
Sex	3,691	100.00		76.00	[74.71, 77.29]	24.00	[22.71, 25.29]
Age							
14–24 years	651	21.90	[20.65, 23.15]	22.62	[21.36, 23.88]	19.61	[18.42, 20.81]
25–34 years	1,021	25.82	[24.50, 27.14]	25.64	[24.32, 26.96]	26.37	[25.04, 27.70]
35–44 years	888	23.63	[22.35, 24.91]	23.03	[21.75, 24.30]	25.54	[24.22, 26.85]
45–54 years	682	18.36	[17.19, 19.53]	17.94	[16.78, 19.10]	19.69	[18.49, 20.89]
55+ years	449	10.30	[9.38, 11.21]	10.77	[9.84, 11.71]	8.79	[7.93, 9.64]
Ethnicity							
Latino	3,058	83.39	[80.75, 83.23]	81.80	[80.64, 82.97]	82.58	[81.43, 83.72]
White/non-Latino	463	12.63	[13.26, 15.52]	14.14	[13.09, 15.19]	15.19	[14.11, 16.27]
Other	146	3.98	[3.02, 4.22]	4.06	[3.46, 4.65]	2.23	[1.79, 2.68]
Cultural							
Educational level							
Primary (≤6 years)	1,787	45.09	[43.59, 46.60]	45.34	[43.84, 46.85]	44.30	[42.80, 45.80]
Middle (7–9 years)	717	18.32	[17.15, 19.49]	18.48	[17.31, 19.66]	17.79	[16.63, 18.94]
High school (10–12 years)	932	26.78	[25.44, 28.12]	26.92	[25.58, 28.26]	26.34	[25.00, 27.67]
Postsecondary (13–16 years)	254	9.81	[8.91, 10.71]	9.25	[8.38, 10.13]	11.57	[10.61, 12.54]
How well do you speak English?							
Not at all	1,223	32.29	[30.87, 33.70]	29.99	[28.61, 31.38]	39.54	[38.07, 41.02]
A little/somewhat	1,575	39.99	[38.51, 41.46]	42.35	[40.85, 43.84]	32.51	[31.10, 33.93]
Well	887	27.73	[26.38, 29.08]	27.66	[26.31, 29.01]	27.94	[26.59, 29.30]
How well do you read English?							
Not at all	1,687	43.08	[41.58, 44.58]	42.00	[40.51, 43.49]	46.50	[45.00, 48.01]
A little/somewhat	1,149	29.68	[28.30, 31.06]	31.14	[29.74, 32.54]	25.05	[23.74, 26.36]
Well	847	27.24	[25.89, 28.58]	26.86	[25.52, 28.20]	28.45	[27.08, 29.81]
Family							
Mixed status (children are authorized but parents are not)							
No	1,088	52.06	[50.55, 53.57]	53.02	[51.51, 54.52]	49.53	[48.02, 51.04]
Yes	841	47.94	[46.43, 49.45]	46.98	[45.48, 48.49]	50.47	[48.96, 51.98]
Family composition							
Single/divorced/separated	1,354	44.66	[43.16, 46.16]	44.90	[43.40, 46.40]	43.91	[42.41, 45.41]
Married but alone	417	11.92	[10.94, 12.90]	15.54	[14.44, 16.63]	.52	[.30, .74]
Married with full family	1,223	40.75	[39.26, 42.23]	37.41	[35.95, 38.88]	51.23	[49.72, 52.74]
Married with partial family	86	2.68	[2.19, 3.16]	2.15	[1.71, 2.59]	4.33	[3.72, 4.95]

Table 1 (*continued*)

Characteristic	Total			Men		Women	
	n	Weighted prevalence %	95% CI	Weighted prevalence %	95% CI	Weighted prevalence %	95% CI
Children younger than 15 years old							
No	2,356	61.52	[60.06, 62.99]	67.22	[65.80, 68.63]	43.51	[42.01, 45.00]
Yes	1,335	38.48	[37.01, 39.94]	32.78	[31.37, 34.20]	56.49	[55.00, 57.99]
How difficult is it for you to be separated from your family?							
Not at all difficult	263	8.08	[7.25, 8.90]	8.11	[7.28, 8.93]	7.99	[7.17, 8.80]
Somewhat (more or less)	462	12.88	[11.87, 13.90]	15.22	[14.14, 16.31]	5.55	[4.85, 6.24]
Very difficult	1,025	28.77	[27.40, 30.14]	30.09	[28.70, 31.47]	24.63	[23.33, 25.93]
Not separated from family	1,912	50.27	[48.76, 51.78]	46.58	[45.07, 48.09]	61.84	[60.37, 63.30]
Health							
General Health: In general, how would you describe your health?							
Excellent/good	2,862	77.62	[76.37, 78.88]	77.99	[76.74, 79.24]	75.86	[74.57, 77.15]
Fair/poor	825	22.38	[21.12, 23.63]	22.01	[20.76, 23.26]	24.14	[22.85, 25.43]
Labor market							
Total family annual income							
Did not work previous year	67	2.67	[2.18, 3.16]	2.69	[2.20, 3.18]	2.61	[2.13, 3.09]
<$5,000	855	21.16	[19.93, 22.40]	21.24	[20.01, 22.48]	20.90	[19.67, 22.13]
$5,000–9,999	222	7.41	[6.62, 8.21]	7.82	[7.01, 8.63]	6.10	[5.37, 6.82]
$10,000–14,999	400	13.99	[12.94, 15.04]	12.90	[11.89, 13.91]	17.55	[16.40, 18.70]
$15,000–19,999	539	14.90	[13.82, 15.97]	16.03	[14.93, 17.14]	11.18	[10.23, 12.13]
$20,000 or more	1,435	39.87	[38.39, 41.34]	39.32	[37.84, 40.79]	41.66	[40.17, 43.15]
How are you paid?							
By the hour	2,935	77.95	[76.69, 79.20]	75.06	[73.75, 76.37]	87.06	[86.04, 88.07]
By the piece	428	14.03	[12.99, 15.08]	15.57	[14.47, 16.66]	9.20	[8.33, 10.08]
Combination hourly wage and piece	56	1.92	[1.50, 2.33]	1.79	[1.39, 2.19]	2.30	[1.85, 2.75]
Are you covered by unemployment insurance if you lose this job							
No	1,974	55.00	[53.50, 56.50]	54.42	[52.92, 55.93]	56.80	[55.30, 58.30]
Yes	1,618	45.00	[43.50, 46.50]	45.58	[44.07, 47.08]	43.20	[41.70, 44.70]
Do you work for this employer on a seasonal basis or year-round?							
Year-round	2,000	49.37	[47.86, 50.88]	52.39	[50.88, 53.90]	39.61	[38.13, 41.09]
Seasonal	1,402	50.63	[49.12, 52.14]	47.61	[46.10, 49.12]	60.39	[58.91, 61.87]
How long do you expect to continue doing farm work in the United States?							
<1 year	78	2.67	[2.18, 3.16]	3.16	[2.63, 3.68]	1.16	[0.83, 1.48]
1–3 years	473	15.68	[14.58, 16.77]	14.59	[13.53, 15.66]	19.06	[17.87, 20.24]
4–5 years	94	2.97	[2.46, 3.49]	2.03	[1.61, 2.46]	5.91	[5.20, 6.62]
>5 years	321	6.87	[6.11, 7.64]	7.47	[6.67, 8.26]	5.02	[4.36, 5.68]
>5 years and as long as I am able	2,617	71.81	[70.45, 73.17]	72.75	[71.41, 74.10]	68.86	[67.46, 70.26]

(*table continues*)

Table 1 (*continued*)

Characteristic	Total			Men		Women	
	n	Weighted prevalence %	95% CI	Weighted prevalence %	95% CI	Weighted prevalence %	95% CI
Could you get a U.S. nonfarm job within a month?							
No	1,769	58.31	[56.82, 59.80]	56.67	[55.18, 58.17]	63.65	[62.20, 65.10]
Yes	1,207	41.69	[40.20, 43.18]	43.33	[41.83, 44.82]	36.35	[34.90, 37.80]
Are you afraid that you could be fired from this farm job?							
No	2,608	73.44	[72.11, 74.78]	76.90	[75.63, 78.18]	62.42	[60.96, 63.88]
Yes	998	26.55	[25.22, 27.89]	23.09	[21.82, 24.36]	37.58	[36.12, 39.04]
Region							
East	537	12.76	[11.75, 13.77]	14.42	[13.35, 15.48]	7.52	[6.73, 8.32]
Southeast	525	12.47	[11.48, 13.47]	13.38	[12.35, 14.41]	9.60	[8.71, 10.49]
Midwest	821	19.51	[18.31, 20.71]	16.31	[15.20, 17.43]	29.63	[28.25, 31.01]
Southwest	301	7.14	[6.36, 7.92]	7.64	[6.84, 8.45]	5.55	[4.86, 6.24]
Northwest	767	18.22	[17.05, 19.39]	19.64	[18.44, 20.84]	13.72	[12.68, 14.76]
California	1,259	29.89	[28.51, 31.28]	28.61	[27.24, 29.97]	33.98	[32.55, 35.41]
Employment							
Years in United States							
<14 years	2,179	66.13	[64.70, 67.56]	65.93	[64.50, 67.36]	66.79	[65.37, 68.21]
15+ years	1,376	33.87	[32.44, 35.30]	34.07	[32.64, 35.50]	33.21	[31.79, 34.63]
Farmworker migrates for work							
No	2,949	72.66	[71.31, 74.01]	69.53	[68.14, 70.92]	82.57	[81.43, 83.72]
Yes	738	27.34	[25.99, 28.69]	30.47	[29.08, 31.86]	17.43	[16.28, 18.57]
Years doing farm work in the United States							
<5 years	930	32.94	[31.52, 34.36]	32.20	[30.79, 33.61]	35.27	[33.83, 36.71]
6–10 years	786	21.68	[20.44, 22.93]	19.87	[18.66, 21.07]	27.38	[26.03, 28.72]
11–15 years	558	13.30	[12.27, 14.32]	13.20	[12.18, 14.22]	13.61	[12.58, 14.65]
>15 years	1,383	32.08	[30.67, 33.49]	34.74	[33.30, 36.17]	23.74	[22.45, 25.02]
Current status							
Citizen	946	27.65	[26.30, 29.00]	28.82	[27.45, 30.19]	23.96	[22.67, 25.25]
Has work authorization	839	20.66	[19.44, 21.88]	19.39	[18.20, 20.58]	24.66	[23.36, 25.97]
Unauthorized	1,883	51.69	[50.18, 53.20]	51.79	[50.28, 53.30]	51.37	[49.86, 52.88]
Employer							
Grower, packing house, nursery	3,227	85.19	[84.12, 86.27]	85.92	[84.87, 86.97]	82.90	[81.76, 84.03]
Farm labor contractor	464	14.81	[13.73, 15.88]	14.08	[13.03, 15.13]	17.10	[15.97, 18.24]

Table 2
Elevated Depressive Symptoms Suggestive of Clinical Severity

Characteristic	Total		Men		Women		
	Weighted prevalence %	95% CI	Weighted prevalence %	95% CI	Weighted prevalence %	95% CI	*p* value[a]
Demographic							
Sex	10.42	[9.50, 11.34]	8.31	[7.48, 9.14]	17.07	[15.93, 18.21]	<.0001
Age							<.0001
14–24 years	9.79	[8.89, 10.69]	8.66	[6.61, 10.71]	13.93	[9.11, 18.75]	
25–34 years	11.26	[10.31, 12.21]	9.28	[7.29, 11.26]	17.36	[12.81, 21.91]	
35–44 years	7.70	[6.89, 8.51]	7.50	[5.60, 9.41]	8.28	[4.92, 11.64]	
45–54 years	12.99	[11.97, 14.01]	6.86	[4.79, 8.92]	30.67	[24.26, 37.07]	
55+ years	11.26	[10.31, 12.21]	9.45	[6.36, 12.54]	18.28	[10.24, 26.32]	
Ethnicity							<.0001
Latino	10.72	[9.69, 11.75]	8.64	[7.56, 9.72]	17.25	[14.68, 19.82]	
White/non-Latino	7.10	[5.05, 9.15]	5.86	[3.69, 8.03]	10.75	[5.83, 15.67]	
Other	17.76	[11.68, 23.84]	10.76	[5.42, 16.10]	58.16	[37.73, 78.58]	
Cultural							
Educational level							<.0001
Primary (≤6 years)	10.00	[9.09, 10.91]	7.55	[6.19, 8.91]	17.98	[14.42, 21.53]	
Middle (7–9 years)	12.45	[11.45, 13.45]	12.58	[9.90, 15.25]	12.03	[7.27, 16.79]	
High school (10–12 years)	9.73	[8.83, 10.63]	8.96	[7.05, 10.86]	12.24	[8.30, 16.18]	
Postsecondary (13–16 years)	10.42	[9.50, 11.34]	1.69	[0.22, 3.16]	32.53	[24.04, 41.03]	
How well do you speak English?							<.0001
Not at all	11.65	[10.68, 12.62]	9.42	[7.57, 11.27]	17.01	[13.33, 20.70]	
A little/somewhat	9.23	[8.36, 10.10]	7.65	[6.23, 9.06]	15.76	[11.82, 19.71]	
Well	10.71	[9.78, 11.64]	8.17	[6.36, 9.97]	18.67	[14.13, 23.22]	
How well do you read English?							<.0001
Not at all	10.85	[9.91, 11.79]	8.50	[7.01, 9.99]	17.59	[14.14, 21.03]	
A little/somewhat	8.48	[7.64, 9.32]	8.27	[6.56, 9.98]	9.29	[5.71, 12.87]	
Well	11.87	[10.89, 12.85]	8.11	[6.29, 9.94]	23.09	[18.22, 27.96]	
Family							
Mixed status (children are citizens but parents are not)							.0098
No	10.95	[10.01, 11.89]	11.18	[9.08, 13.27]	11.54	[7.96, 15.12]	
Yes	8.86	[8.00, 9.72]	4.62	[3.14, 6.10]	19.31	[14.93, 23.69]	
Family composition							
Single/divorced/separated	12.19	[11.20, 13.18]	8.36	[6.82, 9.91]	24.49	[20.19, 28.80]	
Married but alone	21.46	[20.22, 22.70]	21.52	[17.62, 25.42]	15.81	[0, 49.29]	
Married with full family	4.00	[3.41, 4.59]	2.84	[1.83, 3.86]	6.66	[4.35, 8.97]	
Married with partial family	13.71	[12.67, 14.75]	6.06	[0.03, 12.14]	25.67	[11.75, 39.60]	

(*table continues*)

Table 2 (*continued*)

Characteristic	Total		Men		Women		p value[a]
	Weighted prevalence %	95% CI	Weighted prevalence %	95% CI	Weighted prevalence %	95% CI	
Children younger than 15 years old							<.0001
No	12.93	[11.64, 14.22]	11.19	[9.86, 12.52]	21.44	[17.60, 25.28]	
Yes	6.40	[5.20, 7.59]	2.42	[1.49, 3.35]	13.71	[10.89, 16.53]	
How difficult is it for you to be separated from your family?							<.0001
Not at all difficult	6.69	[5.94, 7.44]	1.63	[0.08, 3.18]	22.78	[13.63, 31.93]	
Somewhat (more or less)	6.56	[5.81, 7.31]	6.01	[3.89, 8.14]	11.27	[2.99, 19.54]	
Very difficult	15.44	[14.35, 16.53]	15.88	[13.56, 18.20]	13.75	[9.47, 18.03]	
Not separated from family	9.29	[8.05, 10.54]	5.53	[4.36, 6.70]	18.17	[15.15, 21.20]	
General health							
In general, how would you describe your health?							<.0001
Excellent/good	7.86	[6.94, 8.79]	6.35	[5.40, 7.31]	12.88	[10.49, 15.27]	
Fair/poor	19.12	[16.61, 21.63]	15.26	[12.58, 17.95]	29.55	[23.95, 35.16]	
Labor market							
Total family income							<.0001
Did not work previous year	22.62	[21.36, 23.88]	11.98	[4.98, 18.98]	58.47	[38.97, 77.97]	
<$5,000	12.85	[11.84, 13.86]	11.15	[8.74, 13.57]	18.47	[13.04, 23.90]	
$5,000–9,999	11.31	[10.35, 12.27]	9.90	[6.13, 13.68]	17.22	[7.44, 27.00]	
$10,000–14,999	11.82	[10.84, 12.80]	6.84	[4.35, 9.32]	23.79	[17.29, 30.29]	
$15,000–19,999	8.67	[7.82, 9.52]	8.95	[6.43, 11.47]	7.35	[2.36, 12.34]	
$20,000 or more	8.75	[7.90, 9.60]	6.58	[5.18, 7.98]	15.45	[11.87, 19.03]	
How are you paid?							<.0001
By the hour	10.84	[99.90, 11.78]	8.55	[7.43, 9.67]	17.05	[14.57, 19.54]	
By the piece	10.06	[9.15, 10.97]	8.97	[6.46, 11.49]	15.87	[8.44, 23.30]	
Combination hourly wage and piece rate	7.19	[6.41, 7.97]	3.65	[0, 8.51]	15.89	[1.02, 30.75]	
Covered by unemployment insurance if you lose this job?							<.0001
No	11.49	[10.53, 12.45]	9.65	[8.24, 11.05]	16.99	[13.90, 20.07]	
Yes	9.12	[8.25, 9.99]	6.63	[5.33, 7.92]	17.32	[13.75, 20.89]	
Work for this employer on a seasonal basis or year-round?							<.0001
Year-round	6.83	[6.07, 7.59]	8.19	[7.23, 9.15]	12.53	[8.99, 16.07]	
Seasonal basis	12.65	[11.65, 13.65]	20.46	[2.16, 38.76]	20.60	[17.10, 24.10]	
How long do you expect to continue doing farm work in the United States?							<.0001
<1 year	11.01	[10.06, 11.96]	7.51	[2.27, 12.75]	40.90	[12.37, 69.44]	
1–3 years	12.26	[11.27, 13.25]	12.97	[9.87, 16.08]	10.55	[6.15, 14.94]	
4–5 years	33.94	[32.51, 35.37]	13.73	[5.21, 22.25]	55.66	[42.91, 68.41]	
>5 years	16.72	[5.59, 17.85]	12.56	[8.28, 16.84]	36.07	[22.69, 49.45]	
More than 5 years and as long as I am able	8.35	[7.51, 9.19]	6.56	[5.54, 7.59]	14.26	[11.63, 16.89]	
Could you get a U.S. nonfarm job within a month?							.0049
No	10.31	[9.39, 11.23]	9.64	[8.12, 11.16]	12.26	[9.39, 15.13]	

Table 2 (*continued*)

Characteristic	Total		Men		Women		p value[a]
	Weighted prevalence %	95% CI	Weighted prevalence %	95% CI	Weighted prevalence %	95% CI	
Yes	9.17	[8.30, 10.04]	6.25	[4.82, 7.67]	20.50	[15.83, 25.18]	
Are you afraid that you could be fired from this farm job?							.0066
No	5.76	[5.06, 6.46]	4.97	[4.10, 5.83]	8.86	[6.61, 11.10]	
Yes	22.89	[21.62, 24.16]	19.25	[16.37, 22.12]	30.01	[25.34, 34.69]	
Region							<.0001
East	9.77	[8.87, 10.67]	8.70	[6.13, 11.27]	16.28	[7.98, 24.58]	
Southeast	8.29	[7.46, 9.12]	9.01	[6.30, 11.73]	5.10	[0.72, 9.48]	
Midwest	5.93	[5.22, 6.64]	5.78	[3.78, 7.78]	6.19	[3.46, 8.92]	
Southwest	10.64	[9.71, 11.57]	7.22	[3.97, 10.46]	25.57	[14.15, 36.98]	
Northwest	11.41	[10.45, 12.37]	7.35	[5.31, 9.39]	29.81	[22.19, 37.42]	
California	13.85	[12.81, 14.89]	10.19	[8.23, 12.15]	23.59	[19.10, 28.08]	
Employment							
Years in United States							<.0001
0–14 years	11.17	[10.22, 12.12]	9.86	[8.56, 11.17]	15.45	[12.58, 18.32]	
15+ years	10.32	[9.40, 11.24]	5.92	[4.48, 7.35]	25.34	[20.45, 30.24]	
Farmworker migrates for work							<.0001
No	10.37	[9.45, 11.29]	7.69	[6.58, 8.80]	17.50	[14.92, 20.08]	
Yes	10.57	[9.64, 11.50]	9.76	[7.89, 11.62]	15.04	[9.76, 20.32]	
Years doing farm work in the United States							<.0001
<5 years	10.24	[8.64, 11.85]	9.24	[7.46, 11.02]	13.12	[9.61, 16.63]	
6–10 years	14.04	[11.78, 16.31]	8.91	[6.68, 11.13]	25.75	[20.60, 30.91]	
11–15 years	8.78	[6.43, 11.13]	8.62	[5.93, 11.31]	9.27	[4.42, 14.11]	
>15 years	8.71	[7.20, 10.22]	6.81	[5.32, 8.30]	17.44	[12.64, 22.25]	
Current status							<.0001
Citizen	7.15	[6.37, 7.93]	5.87	[4.35, 7.39]	12.02	[7.91, 16.12]	
Has work authorization	12.29	[11.30, 13.28]	7.21	[5.17, 9.26]	24.87	[19.49, 30.25]	
Unauthorized	11.29	[10.33, 12.25]	10.10	[8.65, 11.56]	15.08	[11.99, 18.16]	
Employer							<.0001
Grower, packing house, nursery	9.11	[8.24, 9.98]	7.63	[6.63, 8.62]	13.98	[11.64, 16.33]	
Farm labor contractor	17.92	[16.76, 19.08]	12.51	[9.45, 15.56]	32.03	[25.07, 38.98]	

[a] p value for difference between men and women.

less variability in prevalence of EDS by region for men than for women. The lowest prevalence of EDS was found in the Midwest for men and in the Southeast, followed by Midwest for women. Prevalence of EDS was higher for both men and women working for a farm labor contractor rather than a grower, packing house, or nursery.

Linear Regression

Final models for multivariate analyses are presented separately for men (see Table 3) and women (see Table 4). Results of backward multiple linear regression analyses on continuous CES-D scores for hired male crop workers are shown in Table 3, model $F(42, 145) = 24.34$, $p < .0001$. Cultural, family, health, and employment characteristics, as well as geographic-by-family interaction effects, were significantly ($p < .05$) associated with EDS among men. Demographic factors (age, ethnicity) were not significantly associated with EDS by themselves or when ethnicity was crossed by regions. For education, mean CES-D scores were higher among men with less than a postsecondary school education, with slightly higher means for those with a middle school and high school education. Men who read English well or somewhat also had higher mean CES-D scores than those who did not read English at all. The highest mean CES-D scores were found for those who reported that being separated from family was very difficult, followed by those who were not separated from family. Mean CES-D scores were higher among male workers with poor or fair health compared to those with good or excellent health. Several labor market–related factors were significant. Mean CES-D scores were highest among workers with the lowest and highest incomes. CES-D scores also were higher among those who were afraid of being fired and workers who had been in the United States for less than 15 years. Significant interactions were found between region and family composition. In the Southeast and Southwest, men who were married and with some, but not all, family members had the highest CES-D scores. In the remaining four regions, the highest mean CES-D scores were for men who were married but alone.

Results of backward linear regression on continuous CES-D scores for women are shown in Table 4, model $F(28, 145) = 19.58$, $p < .0001$. Demographic, family, health, employment, and geographic characteristics each were significantly associated with EDS among women, while cultural factors (education, English language ability) were not. Among demographic factors, neither age nor ethnicity was significant by itself; however, mean CES-D scores were higher among non-Hispanic women in each of the regions, except for the Northwest, where Hispanic women had higher mean scores. Mean CES-D scores were highest for women having more than four children ≤15 years. Being accompanied by their nuclear family was not significant by itself but was when crossed by region. Mean CES-D scores also were higher among women not accompanied by their nuclear family in the East, Southeast, and Northwest. In contrast, mean CES-D scores were higher among women who were accompanied by their nuclear family in the Midwest, Southwest, and California (see Table 4). Mean CES-D scores were highest for women having more than four children ≤15 years. Mean CES-D scores also were higher among women with fair or poor health compared to those with good or excellent health.

Several labor market factors were significant. Mean CES-D scores were higher among women who expected to continue doing farm work for 4–5 years and lowest among those expecting to do farm work more than 5 years and as long as they are able. Women who were afraid of being fired had higher mean CES-D scores than those who were not. Women who were citizens had the lowest mean CES-D scores, followed by those who were unauthorized. The highest scores were among women who were authorized to work in the United States (see Table 4).

Discussion

Our analysis of this large nationally representative sample of crop workers showed that overall, 10.4% had EDS, with women (17.1%) having twice the prevalence of men (8.3%). Pulgar et al. (2016), in a study of women crop workers, found that a third of farmworker women in rural counties in North Carolina showed significant depressive symptoms based on a short form of the Spanish version of the CES-D. Data from the Hispanic Community Health Study/Study of Latinos (HCHS/SOL) showed a prevalence of 22.3% for depression using the short form of the CES-D among Hispanic/Latinos of Mexican de-

Table 3
Backward Linear Regression Results for Elevated Depressive Symptoms for Men

Characteristic	β	Standard error	Least squares mean (LSM)	LSM confidence interval		Overall *p* value
				Lower	Upper	
Educational level						.0037
Primary (≤6 years)	.4366	.2017	1.3671	1.0243	1.7099	
Middle (7–9 years)	.7073	.2464	1.6379	1.1963	2.0795	
High school (10–12 years)	.5651	.1818	1.4957	1.2033	1.7881	
Postsecondary (13–16 years)	.0000	.0000	.9305	.5199	1.3411	
How well do you read English?						.0010
Not at all	–.5254	.2685	1.0361	.6947	1.3775	
A little/somewhat	–.0857	.2613	1.4758	1.1731	1.7784	
Well	.0000	.0000	1.5615	1.0755	2.0475	
Family						
Family composition						<.0001
Single/divorced/separated	.0000	.0000				
Married but alone	1.0719	.3629				
Married with full family	–.8316	.3796				
Married with partial family	–.1055	.3609				
How difficult is it for you to be separated from your family?						<.0001
Not at all difficult	–.6767	.2035	.8329	.4062	1.2596	
Somewhat (more or less)	–.3498	.1715	1.1597	.7807	1.5387	
Very difficult	.4194	.1742	1.9290	1.6093	2.2487	
Not separated from family	.0000	.0000	1.5096	1.2134	1.8057	
General health						
In general, how would you describe your health?						.0043
Excellent/good	–.4362	.1506	1.1397	.8623	1.4171	
Fair/poor	.0000	.0000	1.5759	1.2163	1.9356	
Labor market						
Total family income						.0007
Did not work previous year	–.6678	.3447	.9935	.3374	1.6496	
<$5,000	.1819	.2035	1.8433	1.4644	2.2222	
$5,000–9,999	–.4494	.2487	1.2119	.8052	1.6187	
$10,000–14,999	–.6242	.2045	1.0371	.7020	1.3723	
$15,000–19,999	–.2617	.2009	1.3996	1.0300	1.7692	
$20,000 or more	.0000	.0000	1.6613	1.3438	1.9789	
Are you afraid that you could be fired from this farm job?						<.0001
No	–1.2056	.1993	.7550	.4201	1.0898	
Yes	.0000	.0000	1.9606	1.6036	2.3176	
Years in United States						.0004
0–14 years	.3854	.1065	1.5505	1.2899	1.8111	
15+ years	.0000	.0000	1.1651	.8241	1.5060	
Region						.3468
East	–.3017	.3735				
Southeast	–.1672	.4096				
Midwest	–.3697	.4513				
Southwest	–.1149	.5084				
Northwest	–.6179	.3957				
California	.0000	.0000				
Region by family composition						.0004
East						
Single/divorced/separated	.0000	.0000	1.2254	.8600	1.5908	
Married but alone	–.2146	.5474	2.0827	.6941	2.2333	
Married with full family	.3765	.3827	.7704	.3047	1.2360	
Married with partial family	–.5914	.5452	.5285	–.3135	1.3706	

(*table continues*)

Table 3 (*continued*)

Characteristic	β	Standard error	Least squares mean (LSM)	LSM confidence interval		Overall *p* value
				Lower	Upper	
Southeast						
Single/divorced/separated	.0000	.0000	1.3600	.8359	1.8840	
Married but alone	–.9681	.6161	1.4637	.6941	2.2333	
Married with full family	.0530	.4216	.5815	.1371	1.0259	
Married with partial family	1.3902	.5809	2.6448	1.7612	3.5283	
Midwest						
Single/divorced/separated	.0000	.0000	1.1575	.6421	1.6728	
Married but alone	.1820	.6976	2.4114	1.3040	3.5188	
Married with full family	.2436	.4254	.5696	.0507	1.0885	
Married with partial family	–.2560	.5438	.7960	.1923	1.3998	
Southwest						
Single/divorced/separated	.0000	.0000	1.4123	.7244	2.1001	
Married but alone	–.9762	.7345	1.5080	.5209	2.4951	
Married with full family	.3177	.6063	.8985	.0353	1.8322	
Married with partial family	.7877	.5176	2.0945	1.6775	2.5115	
Northwest						
Single/divorced/separated	.0000	.0000	.9093	.5158	1.3027	
Married but alone	.1923	.5094	2.1734	1.6585	2.6884	
Married with full family	.7020	.4080	.7798	.3902	1.1694	
Married with partial family	.1725	.8563	.9763	–.5461	2.4986	
California						
Single/divorced/separated	.0000	.0000	1.4123	.7244	2.1001	
Married but alone	.0000	.0000	2.5990	2.1876	3.0105	
Married with full family	.0000	.0000	.6957	.6620	2.1814	
Married with partial family	.0000	.0000	1.4217	.8723	2.1819	
How are you paid?						.0217
By the hour	–.1456	.2163	1.4332	1.1940	1.6724	
By the piece	–.1052	.2282	1.4736	1.1596	1.7875	
Combination hourly wage and piece rate	–.6332	.2631	.9456	.5273	1.3640	
Salary	.0000	.0000	1.5788	1.0965	2.0611	

scent (Wassertheil-Smoller et al., 2014). In contrast, analysis of the National Latino and Asian American Study (Alegría et al., 2008) found that Hispanic/Latinos had lower rates of depressive disorder (15.4%) than non-Latino Whites (22.3%). Analyses of The Border Study found a prevalence of 19% among men not living on the U.S. Mexican border and 14.67% for those living on the border. Depression prevalence in women was 25% for nonborder residents and 23.16% for border residents (Vaeth et al., 2016). However, these studies included multiple occupations and, in some, data from communities in the Bronx, New York, and Chicago, Illinois (e.g., HCHS/SOL). Ours is the first study reporting national data on hired crop workers. Depressive symptoms, which are part of minor psychiatric morbidity as a consequence of job insecurity, are another important finding among crop workers that is congruent with the broader socioepidemiologic literature (McGuire & Martin, 2007). Our results replicate previous findings on the association between job insecurity and depressive symptoms (Ferrie, Shipley, Stansfeld, & Marmot, 2002; Ferrie et al., 2003; Kim & von dem Knesebeck, 2015; Roblyer et al., 2016) and extend this body of research to hired crop workers, indicating that job security is a salient health issue.

Consistent with evidence suggesting that social support may decrease depression, our results indicated that crop workers who are married and living with their full family had the lowest prevalence of EDS. This finding replicates observations of the negative effects of separation on mental health among other immigrants in the United States; separation from a significant other has been associated with depression. Family members migrating separately at different times has been found to be particularly harmful (Dreby, 2015; Suârez-Orozco, Todorova, & Louie, 2002). Results of qualita-

Table 4
Backward Linear Regression Results for Elevated Depressive Symptoms for Women

Characteristic	β	Standard error	Least squares mean (LSM)	LSM confidence interval		Overall *p* value
				Lower	Upper	
Demographic						
Hispanic ethnicity						.1209
No	2.9331	1.8247				
Yes	.0000	.0000				
Family						
Accompanied by nuclear family						.7676
No	–.9149	.8068				
Yes	.0000	.0000				
Children younger than 15 years old						.0001
None	–1.9348	1.3502	3.3743	2.6529	4.0958	
1–2	–2.0428	1.3635	3.2663	2.3452	4.1875	
3–4	–3.2032	1.3697	2.1060	1.1412	3.0707	
>4	.0000	.0000	5.3091	2.6293	7.9889	
General health						.0121
In general, how would you describe your health?						
Excellent/good	–1.1705	.4606	2.9287	2.0184	3.8389	
Fair/poor	.0000	.0000	4.0992	2.9056	5.2928	
Labor market						
How long do you expect to continue doing farm work in the United States?						.0110
<1 year	1.1344	1.0288	3.6115	1.4353	5.7877	
1–3 years	.7752	.4836	3.2523	1.9979	4.5067	
4–5 years	2.2364	.7313	4.7135	3.2209	6.2062	
>5 years	1.0381	.6758	3.5152	2.1927	4.8378	
More than 5 years and as long as I am able	.0000	.0000	2.4771	1.5062	3.4479	
Are you afraid that you could be fired from this farm job?						.0038
No	–1.0504	.3570	2.9887	1.9767	4.0008	
Yes	.0000	.0000	4.0391	3.0078	5.0704	
Region						.0055
East	–1.1321	.6030				
Southeast	–1.5036	.5264				
Midwest	–1.2766	.5659				
Southwest	–.1977	.8785				
Northwest	–.0762	.7241				
California	.0000	.0000				
Region × Hispanic						.0069
East						
Not Hispanic	–2.2600	1.9527	3.5201	2.1637	4.8764	
Hispanic	.0000	.0000	2.8369	1.6364	4.0374	
Southeast						
Not Hispanic	–1.3358	1.9264	3.9967	2.6828	5.3106	
Hispanic	.0000	.0000	2.3994	1.4488	3.3500	
Midwest						
Not Hispanic	–2.0607	1.9432	3.0479	1.6035	4.4923	
Hispanic	.0000	.0000	2.1755	1.2144	3.1365	
Southwest						
Not Hispanic	–2.2271	1.9617	3.9142	2.6519	5.1765	
Hispanic	.0000	.0000	3.2081	1.6996	4.7166	
Northwest						
Not Hispanic	–5.2021	2.0768	2.6123	2.6123	2.6123	
Hispanic	.0000	.0000	4.8812	4.8812	4.8812	
California						
Not Hispanic	.0000	.0000	6.2540	2.7664	9.7417	
Hispanic	.0000	.0000	3.3209	2.2808	4.3610	
Region by presence of nuclear family						<.0001

(*table continues*)

Table 4 (*continued*)

Characteristic	β	Standard error	Least squares mean (LSM)	LSM confidence interval		Overall *p* value
				Lower	Upper	
East						
Not accompanied	1.2963	.9901	3.3692	1.9077	4.8307	
Accompanied	.0000	.0000	2.9878	1.9000	4.0756	
Southeast						
Not accompanied	1.1642	.8780	3.3227	2.1451	4.5003	
Accompanied	.0000	.0000	3.0734	2.1190	4.0278	
Midwest						
Not accompanied	.2624	.7874	2.2854	1.0414	3.5294	
Accompanied	.0000	.0000	2.9380	1.9669	3.9091	
Southwest						
Not accompanied	.1700	1.0353	3.1886	1.7990	4.5783	
Accompanied	.0000	.0000	3.9336	2.3308	5.5365	
Northwest						
Not accompanied	3.2731	.7679	4.9258	3.6046	6.2470	
Accompanied	.0000	.0000	2.5677	1.2227	3.9127	
California						
Not accompanied	.0000	.0000	4.3300	2.0493	6.6107	
Accompanied	.0000	.0000	5.2449	3.5680	6.9219	
Current status						.0343
Citizen	–.3902	.5106	2.9990	2.0018	3.9962	
Has work authorization	.7644	.4138	4.1536	3.0047	5.3024	
Unauthorized	.0000	.0000	3.3892	2.2459	4.5325	

tive analysis of interviews with Latina migrant farmworkers also support the importance of family and social support in the form of having someone to confide in and having friends (Dueweke, Hurtado, & Hovey, 2015). Although in multivariate analyses, having a great deal of difficulty being separated from family was strongly associated with depressive symptoms in men, it was not in women. However, there were fewer women separated from family, and smaller sample sizes may have made this more difficult to examine. These findings are similar to those of Letiecq, Grzywacz, Gray, and Eudave (2014), who found that male Latino migrant workers who experienced family separation experienced social disadvantages and elevated levels of depression.

Significant interactions between region and family composition for both men and women, as well as region and Hispanic ethnicity in women, suggest the need to examine social and community factors. Both bivariate and multivariate findings support theories of acculturative stress. Our finding that knowledge of English and education is associated with EDS in multivariate analyses for men and bivariate analyses for women concurs with the literature on acculturation among Latino immigrants and mental health (Balls-Organista, Organista, & Kurasaki, 2003; Rogler, Cortes, & Malgady, 1991; Torres, 2010; Vega et al., 1985). Biculturalism, as indicated by the amount of exposure to Latino culture (Alegría et al., 2007; Finch & Vega, 2003) and Latino self-identity (Torres, 2010), has been shown to buffer the effects of acculturation stress on depression.

A recent article by Marsh, Milofsky, Kissam, and Arcury (2015) focuses on the role of social factors in farmworker housing and health, and it includes a discussion of social capital that is relevant to our findings. Although there are many definitions of social capital, Marsh et al. concentrated on the benefit derived from strong social networks. There likely are strong regional differences in social capital, as well as differences in poverty and social isolation. Examination of regional differences showed a much greater proportion of Mexican-born workers in the Northwest and California and a greater proportion of workers who have been in the United States ≤14 years in the East, Southeast, and Southwest. The highest proportion of women who indicated that they would not be able to get a nonfarm job in less than 1 month was in the Northwest. Collectively, this evidence suggests that although screening and outreach efforts to protect farmworker mental

health need to be directed toward workers who are unaccompanied by family members, the situation is more complex, and regional labor market characteristics need to be taken into account. These results were similar to those found by Ramos et al. (2015) in Nebraska, where the highest rated stressors among migrant and seasonal crop workers also included issues of economics, acculturation and social isolation, relationship with partner, health, and concerns for children.

Multivariate analyses showed significant gender differences. Demographic effects were weak for both men and women, and ethnicity was only significant for women when crossed with region. Age was not significant for either sex. Family was important for both men and women, as was health. Labor market factors such as fear of being fired were also significant for both men and women, but income and method of payment were only significant for men. Years in the United States was significant for men, with number of years expecting to do farm work in the United States significant for women. Citizenship status was only significant for women.

The study's findings should be considered in light of its limitations. Although the NAWS provides the largest ongoing surveillance of hired crop workers, it does have limitations. Data on EDS were only asked in 2009–2010 and, due to lack of funds, have not been asked more recently. The use of cross-sectional data limits our ability to make causal inferences and to examine exposures over the life course. Some analyses were limited because of small cells; therefore, we collapsed some categories (e.g., education, length of time in the United States, and family composition for women) into larger categories. In addition, numbers were too small to analyze by each ethnic subgroup that were collapsed into the "other" category. Also, the nonlinear association between the ability to read English is difficult to interpret without further information. The NAWS does not include workers with temporary work visas, and its sampling strategy based on receiving permission to interview workers in the field may result in biases favoring operations that are more humane to workers.

The use of all self-reported measures is a limitation, and responses may be subject to recall errors, concerns with social desirability, and potential bias resulting from the sensitive nature of some questions. However, as a result of the use of experienced interviewers who are able to establish rapport with crop workers, potential biases are likely to be small. A previous item analysis of the CES-D in this population showed good internal consistency, with a high frequency of reporting feeling happy or enjoying life and a low frequency of reporting negative social interactions (Grzywacz, Alterman et al., 2010). Because of the length of the core NAWS survey, it was not feasible to conduct clinical psychiatric interviews using instruments such as the Diagnostic Interview Schedule from the Epidemiologic Catchment Area Studies (Burnam et al., 1987; Robins & Regier, 1991) and the Composite International Diagnostic Interview from the National Comorbidity Study (Kessler et al., 1994). Although the CES-D is a reliable measure of current depressive symptoms, assessment via diagnostic instruments or clinical interviews is needed to confirm whether the cases of EDS identified here meet diagnostic criteria for depression.

This study has a number of important strengths. We present the first population-based assessment of EDS in a nationally representative sample of primarily rural crop workers in the United States. In addition, the NAWS collects a great deal of data on socioeconomic, demographic, employment, and health conditions. The use of honoraria given to crop workers has resulted in a high level of response that greatly aids in protecting the survey estimates from nonresponse bias.

In conclusion, our findings add weight to the body of evidence suggesting that farm work poses several threats to workers' mental health. Results of this study justify the need for culturally and linguistically appropriate mental health services in rural areas. Interventions should involve identifying characteristics of the population that can be used to target outreach and enable services in rural areas. The results of the national analysis suggest that at least some of the variation in the small and regional studies cited earlier may be the result of differences in local labor markets and local conditions. These study results indicate that taking a community-based approach may be useful, such as increasing social support in the community and outreach to crop workers—particularly those who are separated from family. Clearly, men and women reported different stressors. Stressors also differed by region, suggesting that interventions be sex and region specific. Results demonstrate the need to address health care and labor market issues to improve the mental health of these rural

workers. Future research should consider the probing of associations identified here in a longitudinal study design with particular attention to gender differences. Rural mental health care providers, particularly those providing mental health services, and researchers working with crop workers will benefit from closer examination of context—specific factors that may contribute to EDS.

References

Alderete, E., Vega, W. A., Kolody, B., & Aguilar-Gaxiola, S. (1999). Depressive symptomatology: Prevalence and psychosocial risk factors among Mexican migrant farm workers in California. *Journal of Community Psychology, 27,* 457–471. http://dx.doi.org/10.1002/(SICI)1520-6629(199907)27:4<457::AID-JCOP7>3.0.CO;2-D

Alderete, E., Vega, W. A., Kolody, B., & Aguilar-Gaxiola, S. (2000). Lifetime prevalence of and risk factors for psychiatric disorders among Mexican migrant farmworkers in California. *American Journal of Public Health, 90,* 608–614. http://dx.doi.org/10.2105/AJPH.90.4.608

Alegría, M., Canino, G., Shrout, P. E., Woo, M., Duan, N., Vila, D., . . . Meng, X. L. (2008). Prevalence of mental illness in immigrant and non-immigrant U.S. Latino groups. *The American Journal of Psychiatry, 165,* 359–369. http://dx.doi.org/10.1176/appi.ajp.2007.07040704

Alegría, M., Shrout, P. E., Woo, M., Guarnaccia, P., Sribney, W., Vila, D., . . . Canino, G. (2007). Understanding differences in past year psychiatric disorders for Latinos living in the U.S. *Social Science & Medicine, 65,* 214–230. http://dx.doi.org/10.1016/j.socscimed.2007.03.026

Balls-Organista, P. B., Organista, K. C., & Kurasaki, K. (2003). The relation between acculturation and ethnic minority mental health. In K. M. Chun, P. Balls-Organista, & G. Marin (Eds.), *Acculturation: Advances in theory, measurement, and applied research* (pp. 139–161). Washington, DC: American Psychological Association. http://dx.doi.org/10.1037/10472-010

Burnam, M. A., Hough, R. L., Escobar, J. I., Karno, M., Timbers, D. M., Telles, C. A., & Locke, B. Z. (1987). Six-month prevalence of specific psychiatric disorders among Mexican Americans and non-Hispanic Whites in Los Angeles. *Archives of General Psychiatry, 44,* 687–694. http://dx.doi.org/10.1001/archpsyc.1987.01800200013003

Carvajal, S. C., Kibor, C., McClelland, D. J., Ingram, M., de Zapien, J. G., Torres, E., . . . Rosales, C. (2014). Stress and sociocultural factors related to health status among U.S.-Mexico border farmworkers. *Journal of Immigrant and Minority Health, 16,* 1176–1182. http://dx.doi.org/10.1007/s10903-013-9853-1

Casillas, A., Leng, M., Liu, K., Hernandez, A., Shrager, S., & Kanaya, A. (2012). A long way from home: Comparing mental health measures between foreign and U.S.-born Latinos in the Multi-Ethnic Study of Atherosclerosis (MESA). *Journal of Health Care for the Poor and Underserved, 23,* 1719–1732. http://dx.doi.org/10.1353/hpu.2012.0168

Crain, R., Grzywacz, J. G., Schwantes, M., Isom, S., Quandt, S. A., & Arcury, T. A. (2012). Correlates of mental health among Latino farmworkers in North Carolina. *The Journal of Rural Health, 28,* 277–285. http://dx.doi.org/10.1111/j.1748-0361.2011.00401.x

Dreby, J. (2015). U.S. immigration policy and family separation: The consequences for children's well-being. *Social Science & Medicine, 132,* 245–251. http://dx.doi.org/10.1016/j.socscimed.2014.08.041

Dueweke, A. R., Hurtado, G., & Hovey, J. D. (2015). Protective psychosocial resources in the lives of Latina migrant farmworkers. *Journal of Rural Mental Health, 39,* 162–177. http://dx.doi.org/10.1037/rmh0000038

Ferrie, J. E., Shipley, M. J., Stansfeld, S. A., & Marmot, M. G. (2002). Effects of chronic job insecurity and change in job security on self reported health, minor psychiatric morbidity, physiological measures, and health related behaviours in British civil servants: The Whitehall II study. *Journal of Epidemiology and Community Health, 56,* 450–454. http://dx.doi.org/10.1136/jech.56.6.450

Ferrie, J. E., Shipley, M. J., Stansfeld, S. A., Smith, G. D., Marmot, M., & the Whitehall II Study. (2003). Future uncertainty and socioeconomic inequalities in health: The Whitehall II study. *Social Science & Medicine, 57,* 637–646. http://dx.doi.org/10.1016/S0277-9536(02)00406-9

Finch, B. K., & Vega, W. A. (2003). Acculturation stress, social support, and self-rated health among Latinos in California. *Journal of Immigrant Health, 5,* 109–117. http://dx.doi.org/10.1023/A:1023987717921

Georges, A., Alterman, T., Gabbard, S., Grzywacz, J. G., Shen, R., Nakamoto, J., . . . Muntaner, C. (2013). Depression, social factors, and farmworker health care utilization. *Journal of Rural Health, 29*(Suppl 1), S7–S16. http://dx.doi.org/10.1111/jrh.12008

Grzywacz, J. G., Alterman, T., Muntaner, C., Gabbard, S., Nakamoto, J., & Carroll, D. J. (2009). Measuring job characteristics and mental health among Latino farmworkers: Results from cognitive testing. *Journal of Immigrant and Minority Health, 11,* 131–138. http://dx.doi.org/10.1007/s10903-008-9170-2

Grzywacz, J. G., Alterman, T., Muntaner, C., Shen, R., Li, J., Gabbard, S., . . . Carroll, D. J. (2010). Mental health research with Latino farmworkers: A systematic evaluation of the short CES-D. *Journal of Immigrant and Minority Health, 12,* 652–658. http://dx.doi.org/10.1007/s10903-009-9311-2

Grzywacz, J. G., Chatterjee, A. B., Quandt, S. A., Talton, J. W., Chen, H., Weir, M., & Arcury, T. A. (2011). Depressive symptoms and sleepiness among Latino farmworkers in eastern North Carolina. *Journal of Agromedicine, 16,* 251–260. http://dx.doi.org/10.1080/1059924X.2011.605722

Grzywacz, J. G., Hovey, J. D., Seligman, L. D., Arcury, T. A., & Quandt, S. A. (2006). Evaluating short-form versions of the CES-D for measuring depressive symptoms among immigrants from Mexico. *Hispanic Journal of Behavioral Sciences, 28,* 404–424. http://dx.doi.org/10.1177/0739986306290645

Grzywacz, J. G., Quandt, S. A., Chen, H., Isom, S., Kiang, L., Vallejos, Q., & Arcury, T. A. (2010). Depressive symptoms among Latino farmworkers across the agricultural season: Structural and situational influences. *Cultural Diversity and Ethnic Minority Psychology, 16,* 335–343. http://dx.doi.org/10.1037/a0019722

Grzywacz, J. G., Quandt, S. A., Early, J., Tapia, J., Graham, C. N., & Arcury, T. A. (2006). Leaving family for work: Ambivalence and mental health among Mexican migrant farmworker men. *Journal of Immigrant and Minority Health, 8,* 85–97. http://dx.doi.org/10.1007/s10903-006-6344-7

Guarnaccia, P. J., Angel, R., & Worobey, J. L. (1989). The factor structure of the CES-D in the Hispanic Health and Nutrition Examination Survey: The influences of ethnicity, gender and language. *Social Science & Medicine, 29,* 85–94. http://dx.doi.org/10.1016/0277-9536(89)90131-7

Hiott, A. E., Grzywacz, J. G., Davis, S. W., Quandt, S. A., & Arcury, T. A. (2008). Migrant farmworker stress: Mental health implications. *The Journal of Rural Health, 24,* 32–39. http://dx.doi.org/10.1111/j.1748-0361.2008.00134.x

Hovey, J. D., & Magaña, C. (2000). Acculturative stress, anxiety, and depression among Mexican immigrant farmworkers in the Midwest United States. *Journal of Immigrant Health, 2,* 119–131. http://dx.doi.org/10.1023/A:1009556802759

Kessler, R. C., McGonagle, K. A., Zhao, S., Nelson, C. B., Hughes, M., Eshleman, S., . . . Kendler, K. S. (1994). Lifetime and 12-month prevalence of *DSM–III–R* psychiatric disorders in the United States: Results from the National Comorbidity Survey. *Archives of General Psychiatry, 51,* 8–19. http://dx.doi.org/10.1001/archpsyc.1994.03950010008002

Kim, T. J., & von dem Knesebeck, O. (2015). Is an insecure job better for health than having no job at all? A systematic review of studies investigating the health-related risks of both job insecurity and unemployment. *BMC Public Health, 15,* 985. http://dx.doi.org/10.1186/s12889-015-2313-1

Kohout, F. J., Berkman, L. F., Evans, D. A., & Cornoni-Huntley, J. (1993). Two shorter forms of the CES-D (Center for Epidemiological Studies Depression) depression symptoms index. *Journal of Aging and Health, 5,* 179–193. http://dx.doi.org/10.1177/089826439300500202

Letiecq, B. L., Grzywacz, J. G., Gray, K. M., & Eudave, Y. M. (2014). Depression among Mexican men on the migration frontier: The role of family separation and other structural and situational stressors. *Journal of Immigrant and Minority Health, 16,* 1193–1200. http://dx.doi.org/10.1007/s10903-013-9918-1

Lorant, V., Deliège, D., Eaton, W., Robert, A., Philippot, P., & Ansseau, M. (2003). Socioeconomic inequalities in depression: A meta-analysis. *American Journal of Epidemiology, 157,* 98–112. http://dx.doi.org/10.1093/aje/kwf182

Magaña, C. G., & Hovey, J. D. (2003). Psychosocial stressors associated with Mexican migrant farmworkers in the Midwest United States. *Journal of Immigrant Health, 5,* 75–86. http://dx.doi.org/10.1023/A:1022955825650

Marsh, B., Milofsky, C., Kissam, E., & Arcury, T. A. (2015). Understanding the role of social factors in farmworker housing and health. *New Solutions, 25,* 313–333. http://dx.doi.org/10.1177/1048291115601020

Mazzoni, S. E., Boiko, P. E., Katon, W. J., & Russo, J. (2007). Depression and disability in seasonal and migrant Hispanic agricultural workers. *General Hospital Psychiatry, 29,* 450–453. http://dx.doi.org/10.1016/j.genhosppsych.2007.06.001

McGuire, S., & Martin, K. (2007). Fractured migrant families: Paradoxes of hope and devastation. *Family & Community Health: The Journal of Health Promotion & Maintenance, 30,* 178–188. http://dx.doi.org/10.1097/01.FCH.0000277761.31913.f3

Mora, D. C., Quandt, S. A., Chen, H., & Arcury, T. A. (2016). Associations of poor housing with mental health among North Carolina Latino migrant farmworkers. *Journal of Agromedicine, 21,* 327–334. http://dx.doi.org/10.1080/1059924X.2016.1211053

Ortega, A. N., Rosenheck, R., Alegría, M., & Desai, R. A. (2000). Acculturation and the lifetime risk of psychiatric and substance use disorders among Hispanics. *Journal of Nervous and Mental Disease, 188,* 728–735. http://dx.doi.org/10.1097/00005053-200011000-00002

Pulgar, C. A., Trejo, G., Suerken, C., Ip, E. H., Arcury, T. A., & Quandt, S. A. (2016). Economic hardship and depression among women in Latino farmworker families. *Journal of Immigrant and*

Minority Health, 18, 497–504. http://dx.doi.org/10.1007/s10903-015-0229-6

Radloff, L. S. (1977). The CES-D Scale: (1977). A self-report depression scale for research in the general population. *Applied Psychological Measurement, 1,* 385–401. http://dx.doi.org/10.1177/014662167700100306

Ramos, A. K., Su, D., Lander, L., & Rivera, R. (2015). Stress factors contributing to depression among Latino migrant farmworkers in Nebraska. *Journal of Immigrant and Minority Health, 17,* 1627–1634. http://dx.doi.org/10.1007/s10903-015-0201-5

Robins, L. N., & Regier, D. A. (Eds.). (1991). *Psychiatric disorders in America: The Epidemiologic Catchment Area Study*. New York, NY: Free Press.

Roblyer, M. I., Grzywacz, J. G., Suerken, C. K., Trejo, G., Ip, E. H., Arcury, T. A., & Quandt, S. A. (2016). Interpersonal and social correlates of depressive symptoms among Latinas in farmworker families living in North Carolina. *Women & Health, 56,* 177–193. http://dx.doi.org/10.1080/03630242.2015.1086464

Rogler, L. H., Cortes, D. E., & Malgady, R. G. (1991). Acculturation and mental health status among Hispanics: Convergence and new directions for research. *American Psychologist, 46,* 585–597. http://dx.doi.org/10.1037/0003-066X.46.6.585

Sandberg, J. C., Grzywacz, J. G., Talton, J. W., Quandt, S. A., Chen, H., Chatterjee, A. B., & Arcury, T. A. (2012). A cross-sectional exploration of excessive daytime sleepiness, depression, and musculoskeletal pain among migrant farmworkers. *Journal of Agromedicine, 17,* 70–80. http://dx.doi.org/10.1080/1059924X.2012.626750

Suârez-Orozco, C., Todorova, I. L., & Louie, J. (2002). Making up for lost time: The experience of separation and reunification among immigrant families. *Family Process, 41,* 625–643. http://dx.doi.org/10.1111/j.1545-5300.2002.00625.x

Torres, L. (2010). Predicting levels of Latino depression: Acculturation, acculturative stress, and coping. *Cultural Diversity and Ethnic Minority Psychology, 16,* 256–263. http://dx.doi.org/10.1037/a0017357

U.S. Department of Labor, Employment and Training Administration. (USDOL). (2014). *Findings from the National Agricultural Workers Survey (NAWS) 2000–2009: Profiles of Youth, Parents, and Children of Farm Workers in the United States* (Research Report No. 10). Retrieved from https://doleta.gov/naws/pages/research/docs/NAWS_Research_Report_10.pdf

Vaeth, P. A. C., Caetano, R., & Mills, B. A. (2016). Factors associated with depression among Mexican Americans living in U.S.–Mexico border and non-border areas. *Journal of Immigrant and Minority Health, 18,* 718–727. http://dx.doi.org/10.1007/s10903-015-0236-7

Vega, W. A., Kolody, B., & Warheit, G. (1985). Psychoneuroses among Mexican Americans and other whites: Prevalence and caseness. *American Journal of Public Health, 75,* 523–527. http://dx.doi.org/10.2105/AJPH.75.5.523

Ward, L. S. (2007). Preliminary tests of an ecological model of Hispanic farmworker health. *Public Health Nursing, 24,* 554–564. http://dx.doi.org/10.1111/j.1525-1446.2007.00668.x

Wassertheil-Smoller, S., Arredondo, E. M., Cai, J., Castaneda, S. F., Choca, J. P., Gallo, L. C., . . . Zee, P. C. (2014). Depression, anxiety, antidepressant use, and cardiovascular disease among Hispanic men and women of different national backgrounds: Results from the Hispanic Community Health Study/Study of Latinos. *Annals of Epidemiology, 24,* 822–830. http://dx.doi.org/10.1016/j.annepidem.2014.09.003

Received July 5, 2017
Revision received February 13, 2018
Accepted March 3, 2018 ■