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Depressive Symptoms among Latino Farmworkers across the Agricultural Season: Structural and Situational Influences

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Abstract

Immigrant Latino farmworkers confront multiple challenges that threaten their mental health. Previous farmworker mental health research has relied primarily on cross-sectional study designs, leaving little opportunity to describe how farmworker mental health changes or to identify factors that may contribute to these changes. This study used prospective data obtained at monthly intervals across one four-month agricultural season from a large sample of Latino farmworkers in NC (N=288) to document variation in depressive symptoms across the agricultural season and delineate structural and situational factors associated with mental health trajectories across time. Depressive symptoms generally followed a U-shaped distribution across the season, but there was substantial variation in this pattern. Structural stressors like marital status and situational stressors like the pace of work, crowded living conditions, and concerns about documentation predicted depressive symptoms. The pattern of results suggests that strategies to address mental health problems in this vulnerable population will require coordinated action at the individual and social level.

Keywords

Farmworkers; Depression; North Carolina; Job Demands; Stress Exposure

A substantial proportion of Latino farmworkers, particularly those in the Midwest and in the eastern US, have poor mental health. Approximately 40% of farmworkers in the upper Midwest and North Carolina have been reported to have elevated levels of depressive

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symptoms (Hiott, Grzywacz, Arcury, & Quandt, 2006; Hovey & Magaña, 2002; Hovey & Magaña, 2000), whereas only 20% of farmworkers in California had comparable levels (Alderete, Vega, Kolody, & Aguilar-Gaxiola, 1999). Lack of mental health services exacerbates the mental health challenge for Latino farmworkers, especially in the eastern US, which has only recently experienced substantial growth in the immigrant Latino population (Grzywacz, 2009). Finally, indicators of poor mental health, such as elevated depressive symptoms or heavy alcohol use are a risk factor for occupational injuries (Crandall, Fullerton, Olson, Sklar, & Zumwalt, 1997; Stallones & Xiang, 2003; Wells & Macdonald, 1999). Other negative outcomes suggest that poor mental health creates a foundation for additional health disparities in an already vulnerable population (Grzywacz, 2009; Hovey & Seligman, 2006).

Researchers have speculated for two decades that farmworkers confront multiple hardships that undermine mental health (Vega, Warheit, & Palacio, 1985); nevertheless, basic understanding of farmworker mental health remains elusive (Grzywacz, 2009). Most research is cross-sectional. Although useful for documenting the prevalence of mental health problems, cross-sectional studies are less useful for answering basic questions such as “how does farmworker mental health change across time?” or “what contributes to changes in depressive symptoms among farmworkers?”. Answers to basic questions such as these are essential for accurately characterizing the mental health of farmworkers, and for identifying potential strategies for protecting the health of this vulnerable worker population.

The goal of this study is to develop a better understanding of Latino farmworker mental health. To accomplish this goal we use prospective data obtained over a four-month period to: 1) document overall levels of farmworker depressive symptoms across an agricultural season; 2) illustrate variation in individual farmworkers’ mental health across an agricultural season; and 3) determine the extent to which structural stressors (e.g., worker status), and situational stressors (e.g., documentation concerns) contribute to variation in farmworker depressive symptoms over time.

Background

Farmworkers: An Overview

Federal statutes governing migrant health program funds define a *migrant farmworker* as someone whose principal employment is in agriculture on a seasonal basis, and who, for purposes of employment, establishes a temporary home. The migration may be from farm to farm within a state, interstate, or international. Some migrant farmworkers receive an H2A visa to perform work in US agriculture for a temporary period lasting up to 12 months. In 2008, the US Department of Labor issued 173,103 H2A visas, 94.5% of which were issued to individuals from Mexico (Department of Homeland Security, 2008). A *seasonal farmworker* is someone whose principal employment is in agriculture on a seasonal basis but does not migrate. In both cases the definition extends to employment within the past 24 months. Immediate family members (spouse, children) who reside with the farmworker often receive the same benefits as does the farmworker, such as access to health care at migrant clinics. Although out of date, the most recent estimates suggest 4.2 million farmworkers (Health Resources and Services Administration, 1990) and their dependents live in the US.

Farmworkers are an underserved population at substantially greater risk than the general population for numerous health problems (Arcury & Quandt, 2009) with few legal protections (Wiggins, 2009). Elevated rates of health problems in the farmworker community are the result of many factors. These include poverty (Carroll et al., 2005), difficulty accessing and receiving appropriate health care (Arcury & Quandt, 2007), lack of

basic necessities like drinking water and cups or clean toilets (Whalley et al., 2009), and poor quality, over-crowded, and substandard housing (Gentry, Grzywacz, Quandt, Davis, & Arcury, 2007).

Farmworker Mental Health

Descriptions of farmworker mental health are in short supply (Grzywacz, 2009). Only one paper documents the epidemiology of psychiatric disorders in the farmworker population, Alderete and colleagues (2000) reported that 20.6% of farmworkers in California met clinical criterion for lifetime incidence of one or more psychiatric disorders. Common classes of psychiatric disorder were anxiety disorder (12.5%), followed by substance abuse/dependence (8.7%) and mood disorder (5.7%). Farmworkers report less psychiatric disorder than Latinos who have been in the U.S. an extended period of time and U.S.-born Latinos (Alderete et al. 2000); although this comparison must be interpreted cautiously because the item structure and content contained in questionnaire items such as those in the CIDI are challenging for farmworkers (Grzywacz et al., 2009).

The remaining descriptions of farmworker mental health are regionally fragmented and cross-sectional in nature. Vega and colleagues (1985) were among the first to document that nearly 20% of California farmworkers reported levels of depressive symptoms suggesting clinically significant mental health problems. In the upper-Midwest researchers reported that 29% of farmworkers have potentially impairing levels of anxiety symptoms, and nearly four in ten farmworkers (37.8%) met caseness for depression using the Center for Epidemiologic Studies-Depression (CES-D) scale (Hovey & Magaña, 2000; 2002). Hiott and colleagues (2006) reported that 18.4% of farmworkers in North Carolina had impairing levels of anxiety and 41.6% met caseness for depression. Collectively the literature suggests that poor mental health is common among farmworkers.

Stress and Farmworker Mental Health—Farmworkers confront a myriad stressors that likely affect mental health (Grzywacz, 2009). Early evidence suggested that general stressors such as discrimination and poverty may contribute to elevated levels of psychological distress (Vega et al., 1985). More recently, stressors more specific to farmworkers such as prolonged separation from family, social marginalization, poor housing and living conditions, and documentation problems, have been associated with elevated depressive and anxiety symptoms (Grzywacz et al., 2006; Hiott, Grzywacz, Arcury, & Quandt, 2006; Hovey & Magaña, 2000, 2002; Magaña & Hovey, 2003). The mechanisms involved in these associations have not been delineated, but likely reflect affective, behavioral, and physiologic pathways (Cohen & Herbert, 1996).

The temporal structure underlying different types of stressors is an important consideration in research studying the health effects of stress (Wheaton, 1994). Some stressors, such as poverty, are chronic in nature: they produce repeated exposures to similar stressors over time. These stressors could be considered structural stressors because they are generally tied to individuals' social addresses or locations and therefore are not subject to considerable change over short periods of time. Other stressors are more labile in nature and could be considered situational stressors because exposure and appraisal can vary depending on individual circumstances, environmental conditions, or both. Wheaton's (1994) analysis of the stress universe illustrated that stressors with different underlying temporal structures have differential effects on short- and long-term health outcomes.

Stressors confronted by farmworkers can be situated into the structural versus situational classifications of stressors. Acculturation (Berry, 2004) is frequently associated with poorer mental health (Alderete, Vega, Kolody, & Aguilar-Gaxiola, 2000; Finch, Catalano, Novaco, & Vega, 2003; Vega et al., 1998). Although acculturation is conceptualized as a process,

most operationalizations of the concept such as nativity, length of time in the US and English language proficiency are all highly stable, and thereby exemplify a salient source of exposure to structural stressors by farmworkers. Issues surrounding documentation can affect mental health (Finch et al., 2003), suggesting that having an H2A guest worker visa has the potential to protect farmworker mental health. Similarly, farmworker status has the potential to shape mental health. Although migrant farmworkers or those who report following the crops confront the challenges implicit in the transient nature of their occupation, seasonal farmworkers who have settled in an area may confront greater amounts of stress due to the constant shift between high work demands and lack of family time (Hovey & Seligman, 2006). Collectively, this research suggests that structural stressors confronted by farmworkers likely contribute to distinctive mental health patterns over time.

Farmworkers also confront many “situational stressors”. Separation from family and community is a hardship for farmworkers that can undermine mental health (Grzywacz, Quandt, Arcury, & Marín, 2005; Hovey & Magaña, 2000). Although being able to maintain telephone contact with family in the country of origin protects mental health (Grzywacz et al., 2006), it can also exacerbate stressors as farmworkers learn about difficulties back home or realize that they have missed important events (Grzywacz et al., 2005). Stressors surrounding immigration, regardless of documentation status, can vary depending on attitudes in the broader community. Perceptions of discrimination have devastating effects on mental health (Pascoe & Smart Richman, 2009), but these perceptions are influenced by actual events in the local environment and individuals’ appraisals of those events.

Methodological limitations of farmworker mental health research make it difficult to integrate and develop a coherent understanding of farmworker mental health. Especially problematic is the absence of research studying farmworker mental health over time (Grzywacz, 2009). Longitudinal research is needed to document the typical course of mental health across the agricultural season, and to identify factors that protect farmworker mental health. The goal of this study was to develop a better understanding of farmworker mental health. To accomplish this goal we used longitudinal data collected over a single four-month agricultural season to evaluate four hypotheses:

H1. Farmworker depressive symptoms, as one indicator of mental health, changes across the agricultural season.

H2. Depressive symptoms differ among farmworkers by individual characteristics reflecting sources of exposure to structural stressors (i.e., marital status and present location of spouse, English language proficiency, having an H2A visa, and worker status).

H3. Variation in depressive symptoms among farmworkers is associated with waxing and waning of situational stressors of the farmworker lifestyle (i.e., discrimination stress, documentation stress, separation from family stress and work intensity).

H4. Structural and situational stressors contribute independently to depressive symptoms among farmworkers.

Methods and Materials

These data used were collected in 2007 as part of a community-based participatory research project conducted in east central North Carolina. The community partners, two clinics and a farmworker service agency, were involved in every aspect of the project.. This study used a longitudinal design in which data were collected from participants up to four times at monthly intervals.

Sample

Data collection focused on 11 counties with large migrant and seasonal farmworker populations and that are served by community partner agencies. The major hand-cultivated and hand-harvested crops include tobacco, cucumbers and sweet potatoes.

Each of the partnering agencies prepared a list of farmworker camps in their service area. Camps were approached in order until 41 inhabited camps were located; all camps agreed to participate. Problems with access led to replacing three of the original camps after the start of data collection. Therefore, 44 farmworker camps participated in the study. In camps with seven or fewer residents, all farmworkers were recruited. In camps with eight or more residents, eight to ten farmworkers were recruited a first-come first-serve basis. In total, 288 farmworkers were recruited. Of all farmworkers approached, 13 chose not to participate resulting in a 95.7% participation rate.

The sample was comprised predominantly of men (91.3%), most of whom were over 30 years of age (58.9%) (Table 1). Nearly all participants were born in Mexico (94.8%) and most reported that Mexico was their permanent residence (85%). Over one-half of the sample (51.9%) had six or fewer years of formal education, and 88.5% were classified as migrant farmworkers, while the remaining were classified as seasonal farmworkers. Most participants (90.6%) lived in grower provided housing; 52.3% reported having a temporary work (H2A) visa.

Data Collection

Data collection was completed at four time points from May through September 2007, by persons fluent in Spanish. Training, quality control, and questionnaire development are detailed elsewhere (Arcury et al., 2009). Observations were obtained from 197 farmworkers at all four assessments, and another 27 farmworkers provided data at 3 observations. Data on one or two observations were provided by 63 farmworkers. Most of the participants with two or fewer observations were migrant farmworkers lacking an H2A visa.

Measures

Dependent variable—Depressive symptoms in the past week, the focal dependent variable, were assessed at each interview using a 10-item version of the Center for Epidemiologic Studies Depression (CES-D) scale (Kohout, Berkman, Evans, & Cornoni-Huntley, 1993). Analyses of data obtained in previous farmworker samples indicate the 10-item short form of the CESD has acceptable internal consistency ($\alpha = .73$ [95% CI = .70 - . 76) and that it accounts for 78.3 of the variance in scores from the full CES-D (Grzywacz, Hovey, Seligman, Arcury, & Quandt, 2006). In this study, the internal consistency of the 10 items was below the 0.70 conventional standard. Further analyses indicated the internal consistency was improved to acceptable levels (0.69 to 0.80 across the study period) if the item about sleep restlessness and the two positively phrased items (i.e., frequency of "feeling happy" and "enjoying life") were omitted. The remaining seven items were therefore summed with a possible range from 0 to 21, with higher scores indicating greater depressive symptoms.

Independent variables—Time was treated as an ordinal response variable, such that the baseline interview was coded 1, and the first through third follow-up interviews were coded 2 through 4, respectively. Both structural or relatively enduring stressors as well as situational stressors or those that can vary over time were considered in this analysis. Structural stressors are those presumed to remain relatively stable across the agricultural season. Documentation status is a dichotomous variable constructed from a single item asking whether the farmworker was currently in the US under an H2A work visa (yes=1,

no=0). Acculturation was assessed with a single English proficiency item asking the extent to which the individual understands English on a five point scale ranging from “none” to “all”. Although English language proficiency could, in theory, improve across a single agricultural season, farmworkers typically have little opportunity to obtain meaningful improvements in English. Marital status is a mutually exclusive categorical variable reflecting marital status and present living situation (i.e., unmarried, married [or living as married] but spouse not presently living with farmworker, and married and spouse presently living with the farmworker).

Situational stressors are those that can change because of individual circumstances or environmental conditions across the agricultural season. In this study we focused on a housing-related stressor (crowding), a work-related stressor (pace of work), and three psychosocial stressors inherent in migrant farm work. Our measure of crowding was based on a single question asking about personal space (i.e., “Do you have your own place to put your personal belongings?” (no=1, yes=0)). Work-related stress was assessed using 4 items from the job demand subscale of the Job Content Questionnaire (Karasek & Theorell, 1990). The items were modified so that individuals reported about experiences in the past week (e.g., “In the past week, including today, how many days did your job require you to work very fast?”). Response options ranged from “none” (0) to “5 or more” (3). Pace of work was constructed by summing responses, with higher scores indicating greater pace of work (α ranged from 0.64 to 0.70).

Three psychosocial stressors inherent in farm work were assessed at each interview using key stressors identified by Hiott and colleagues (Hiott, Grzywacz, Davis, Quandt, & Arcury, 2008) from the Migrant Farmworker Stress Inventory (Hovey & Magaña, 2002). Documentation stress was assessed with three items (e.g., “I worry about being deported”). Discrimination stress was assessed with four items (e.g., “I have been taken advantage of by my employer, supervisor, or landlord”). Separation from family was assessed with five items tapping hardships resulting from physical separation from family members (e.g., “My life has become more difficult because my partner is not with me”). Response options to all stressor items ranged from “have not experienced” (0) to “extremely stressful” (4). Scores for each psychosocial stressor variable were computed by summing relevant items. The estimated internal consistency for documentation stress (α = 0.88 to 0.90), discrimination stress (α = 0.62 to 0.67), and separation from family (α = 0.69 to 0.80) were acceptable across the observation period.

Analysis

Descriptive statistics were used to examine the distributions of the individual-level variables, including depressive symptoms. For continuous variables, standard errors (SEs) were presented together with the means to reflect the inflation of variance due to the clustering of farmworkers within camps. For categorical variables, counts and percentages were calculated. Next, a generalized estimating equations (GEE) approach was used to fit a mixed-effect model to examine the temporal trend in depressive symptoms. A GEE approach is valuable because it can accommodate the nested structure of the data, and because it can accommodate unbalanced data across time resulting from incomplete follow-up of study participants (Fitzmaurice, Laird, & War, 2004).

A set of preliminary analyses were undertaken to ensure that the effect of time was appropriately modeled. Three orthogonal polynomial terms (i.e., linear, quadratic, and cubic) were used to capture the effect of the four time periods in our study. The cubic trend was insignificant in all cases and was not included in subsequent analyses. Then for each stressor we fit simple models to evaluate its effect on the pattern of change in depressive symptoms over time. Each simple model is a mixed model that includes the main effect of

the stressor, the linear and quadratic trends of time, as well as the corresponding interaction terms. The results of these analyses are reported to help explain the presence of time interaction effects in the final multivariate models. Finally, multivariate models were developed based on the results of the simple models while adjusting for the effects of age, gender, and years in the US. Regression coefficients and the associated SEs were reported. We note that in all of the mixed models we allowed random intercepts at both the camp level and the individual level and random slopes for the linear and quadratic time trends at the individual level. The estimated random effects are presented for the multivariate models. All data analyses were performed by SAS 9.2 (SAS Institute, Cary, NC) and p-values of less than 0.05 were considered statistically significant.

Results

Consistent with Hypothesis 1, depressive symptoms across the agricultural season follow a U-shaped pattern (Table 1). The population average depressive symptoms, obtained using a GEE approach, is illustrated by the heavy dark line in the center of Figure 1. The average farmworker had a score of 3.47 at the beginning of the agricultural season, which then dropped to a low of 1.42 by the third assessment point, and rose to an average of 1.94 at the end of the season. However, plots of randomly selected individual farmworkers, also on Figure 1, illustrate substantial between-person variation. Some farmworkers follow the general pattern evidenced by the population average, others have consistently low depressive symptoms, and still others have progressively worse symptoms.

Mean scores on the seven most internally consistent depression questions do not fully reveal the potential significance of the depressive symptoms reported by farmworkers in this sample. Based on a cut-point of 10 obtained from the 10-item version of the short form CES-D (Grzywacz et al., 2006), one-quarter of the sample (n = 69) met potential caseness for clinically significant depressive symptoms at some point during the agricultural season. Consistent with the average scores illustrated in Figure 1, nearly one-fifth (18.5%) of participants met the cut-off point at the beginning of the agricultural season, whereas fewer than 5% of participants met potential caseness for depression during the middle months of the season and 7.8% met caseness at the close of the agricultural season.

Bivariate trend models (not shown) produced limited preliminary evidence that depressive symptoms across the agricultural season differed by individual characteristics reflecting structural sources of stressor exposure. There was no evidence that depressive symptoms differed by whether farmworkers had an H2A visa, by worker status (i.e., migrant versus seasonal), or by level of acculturation as measured by ability to understand English. Unmarried farmworkers had the highest depressive symptoms across the season, while married and accompanied farmworkers had the lowest depressive symptoms. Further, these simple models suggest that the linear trend for depressive symptoms differed by marital status. Each of the situational stressors was significantly associated with depressive symptoms in the expected direction. In terms of crowding, depressive symptoms at each observation were lower for those who have a place to store their personal belongings. Each of the stressors inherent with farm work was significantly associated with depressive symptoms in the expected direction; when levels of stress were higher than usual, depressive symptoms were also elevated. There was no evidence that the temporal trends in depressive symptoms (linear or quadratic) differed by levels of stress.

Multivariate analyses of structural stressors arising from individual characteristics yielded limited support for Hypothesis 2. Marital status was the only significant predictor of depressive symptoms across the agricultural season in a model containing all of the structural stress variables (Table 2). Depressive symptoms at baseline were lower for

married farmworkers who have an accompanying spouse compared to unmarried farmworkers (Figure 2). However, the linear decline in depressive symptoms during the first half of the season was attenuated for married farmworkers, both those who are unaccompanied and those who are accompanied by their spouses, compared to unmarried farmworkers. There were no observed differences in depressive symptoms between workers with or without an H2A visa, by English language fluency, or between migrant and seasonal farmworkers.

Consistent with Hypothesis 3, each type of farmworker stressor was independently associated with depressive symptoms (Table 3). In terms of crowding, perceived crowding at each observation was associated with higher depressive symptoms while having personal space was associated with lower depressive symptoms. When concerns over documentation and immigration as well as discrimination and marginalization were greater than usual, depressive symptoms increased. Likewise, depressive symptoms were elevated when concerns about being separated from family and the pace of work were greater than usual.

Both enduring individual characteristics and situational stressors were independently associated with depressive symptoms among farmworkers across the agricultural season (Table 4). Elevated depressive symptoms across the season among unmarried farmworkers relative to those who are married, both those with an accompanying spouse and the unaccompanied, persisted in this final model. Likewise, each of the situational stressors was independently associated with depressive symptoms such that depressive symptoms were elevated at times when stressors were greater than usual. Significant “between-camp” and “between-person” differences in average depressive symptoms persisted despite the large number of enduring and situational stressors included in the model. Likewise, the estimated random effects for the linear and quadratic trends suggest that there is explainable variation in those model parameters.

Discussion

Understanding of depression and other manifestations of mental health in the farmworker population remains severely limited, despite its implications for health disparities (Grzywacz, 2009). Indicators of poor mental health such as elevated depressive symptoms likely contribute to occupational injuries (Crandall et al., 1997; Lyman et al., 1999; Stallones & Xiang, 2003; Wells & Macdonald, 1999) and suicidal behavior (Hovey, 2000), yet farmworkers have little access to mental health services and they have limited power to improve the very conditions that threaten their well-being and the well-being of their families (Grzywacz, 2009). This study marks one of the first longitudinal studies of farmworker mental health.

Depressive symptoms among farmworkers in general follow a clear and discernible pattern across the agricultural season. Depressive symptoms are at their highest in the beginning of the agricultural season, but then steadily decline until the later stages of the season when they begin to increase. One-quarter of the farmworkers in this sample reported depressive symptoms that could be clinically significant, most of which occurred at the beginning of the season. This level of caseness is lower than that reported in other samples in the eastern US (Grzywacz et al., 2006; Hiott et al., 2008), but higher than the 20% rate documented among farmworkers in California (Alderete, Vega, Kolody, & Aguilar-Gaxiola, 1999)). Nevertheless, nearly one in ten cases of elevated depressive symptoms were reported at the close of the agricultural season. The U-shaped pattern is compelling because it suggests that settling into farm work may be difficult for farmworkers, particularly those who are unmarried and unaccompanied. The elevated levels of depressive symptoms at the beginning of the season may reflect the emotional difficulty associated with leaving family and friends

behind to seek agricultural work in the U.S. (Grzywacz et al., 2006; Ward, 2008). Whatever the source of emotional difficulty, farmworkers appear to recover quickly.

Nevertheless, there is also substantial heterogeneity in depressive symptoms across the agricultural season. Although the general pattern of depressive symptoms was U-shaped, Figure 1 clearly illustrates several distinct patterns of depressive symptoms among farmworkers. Our results offer some insight into why the U-shaped pattern is more pronounced for some: unmarried farmworkers have substantially greater depressive symptoms at the beginning of the agricultural season than married farmworkers, whereas the increase in depressive symptoms at the end of the season is only observed for married farmworkers who are separated from their spouse. Additionally, our final model suggests that depressive symptoms, in general, are lower for farmworkers with an H2A visa than for those without. Future research will need to replicate these findings and explore other explanations for varying levels of depressive symptoms across the season.

This is the first study to demonstrate the potential mental health implications of farmworkers' workload, measured here as the pace of work. These results are consistent with the general occupational stress literature (Bonde, 2008), and they suggest that depressive symptoms may be an occupational health issue. Moreover, the results suggest that common strategies for accommodating excessive workload such as regular breaks or better aligned staffing may protect farmworker mental health. Use of longitudinal data further elevates the value of our results linking stressors to depressive symptoms: no other studies of farmworkers have linked within-person variation in stressor exposure to within-person variation in depressive symptoms.

The within-person variation in depressive symptoms over time highlights the lability of depressive symptoms and the potential influence of temporal location within the agricultural season, both of which raise implications for interpreting and designing farmworker mental health research. Apparently different levels of depressive symptoms across studies may be an artifact of differences in points during the agricultural season the data were collected. The robust linear and quadratic temporal effects require studies designed to explain why depressive symptoms decline early in the season and increase later in the season. The U-shaped pattern of depressive symptoms could reflect the initial stress of migration, including disorientation from physical relocation, starting a new job, and possible acculturative stressors. These stressors diminish and become manifest in terms of fewer depressive symptoms over time. However, the later upturn in symptoms may reflect the anticipation of homeward migration or it could reflect the cumulative burden of the season. Future research using comprehensive models such as that offered by Ward (2008) will be needed to fully understand the observed trends in farmworker mental health.

Variation in the patterns of depressive symptoms also calls for research across the so-called "migrant streams". Recognizing that substantially more farmworkers on the east coast follow the crops and are unmarried relative to farmworkers on the west coast (Arcury & Quandt, 2009), our results suggest that east coast farmworkers confront more risk factors for depression than their west coast counterparts. Similarly, in light of the strong association between pace of work and depression, variation in the length (and presumably intensity) of the agricultural season on the east coast relative to the west coast may present added threats to farmworker mental health. Potential differences in stressor exposures across the "streams" warrants research to determine what mental health services are needed by farmworkers in different regions (Grzywacz, 2009).

These results should be interpreted in light of study limitations. This study was conducted in one specific region of the country, and results may not generalize beyond eastern North

Carolina. Results are based on self-reported data where situational stressors and depressive symptoms were assessed at the same time. Although we attempted to minimize the threat that depressed affect may account for both appraisals of stressors and reports of depressive symptoms by "person-centering" each observation, the possibility exists that common-method variance is contributing to our results. Additionally, the observed pattern of depressive symptoms may be an artifact of using the same instrument across time: participants may have become familiar with the instrument and underreported their symptoms. Our results need to be replicated in other samples using other instruments. Finally, this study focused only on depressive symptoms. More research is needed examining other aspects of mental health such as clinically significant disorders as well as positive psychological functioning.

Limitations notwithstanding, this study makes a significant contribution to the literature. It is the first longitudinal study of farmworker mental health. We document a discernible pattern of depressive symptoms across the agricultural season and illustrate the substantial between-person variation in depressive symptoms. The overall pattern of results suggests that both enduring attributes of individual farmworkers and situational stressors shape depressive symptoms. Future research should build upon these results to develop a better understanding of farmworker mental health so that targeted interventions can be created to protect this vulnerable worker population and promote health equity.

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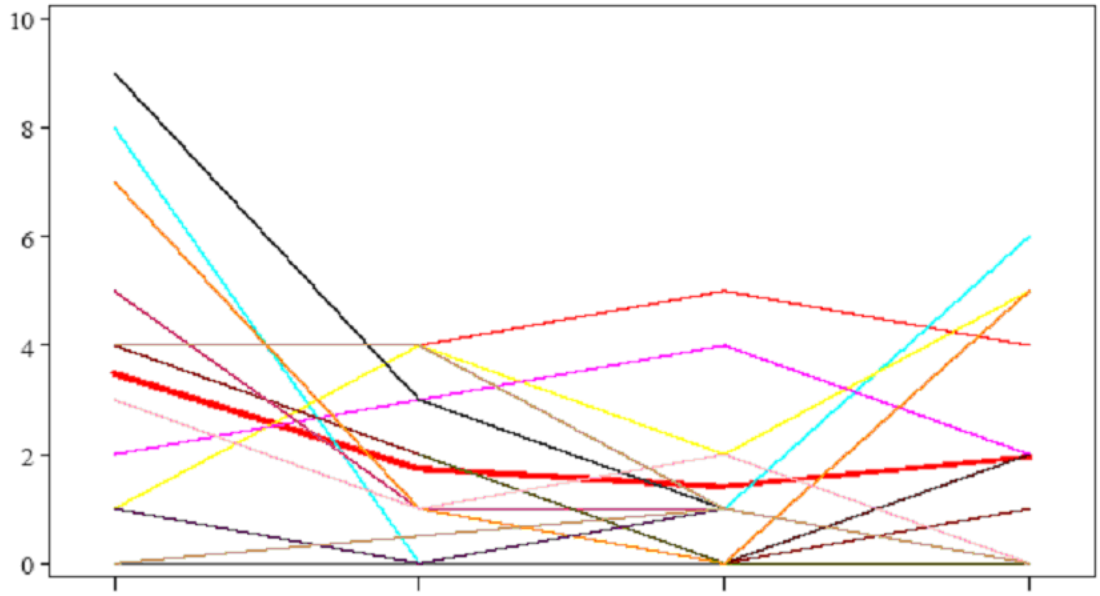

Figure 1.
Depression scores across the agricultural season for the overall population, and for randomly selected individuals.

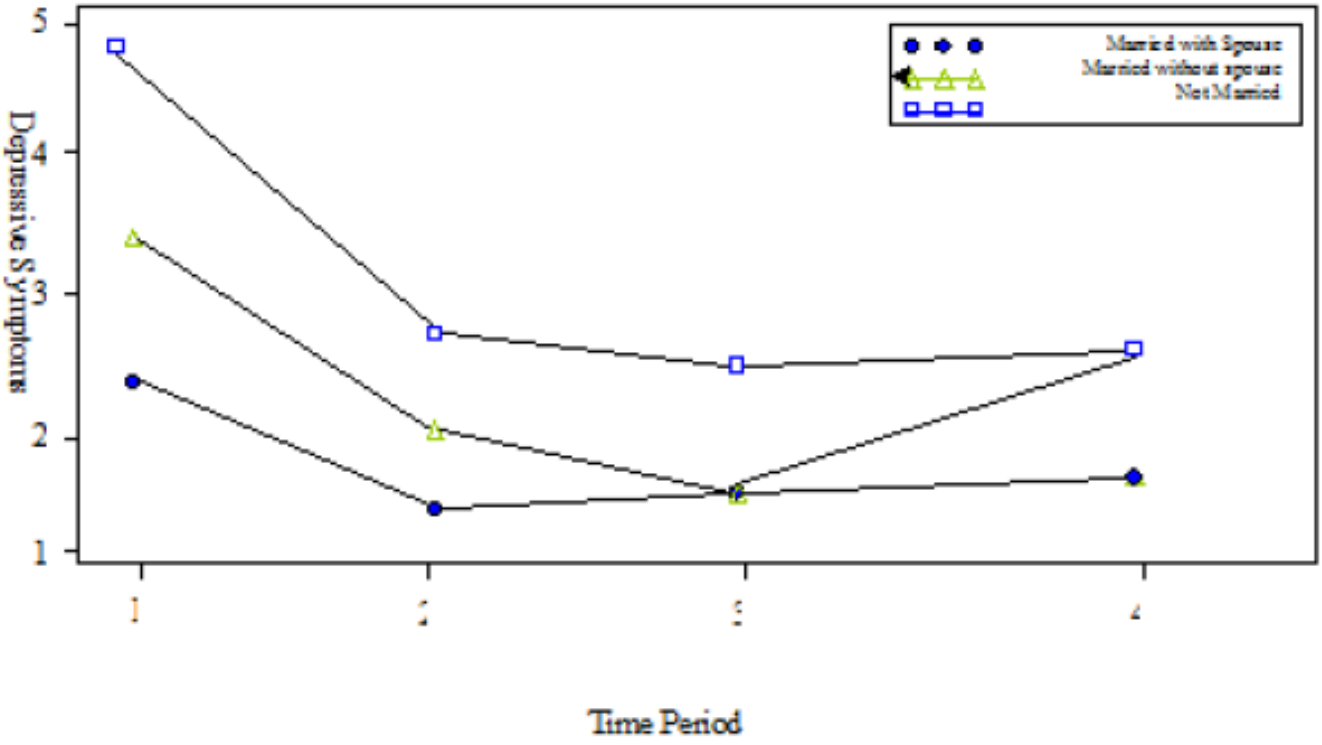

Figure 2.
Depression across the agricultural season by marital status.

Table 1

Descriptive statistics for individual-level variables, including depressive symptoms

	M	SE	Range	N	%
Depressive Symptoms					
Time 1 (n=254)	3.47	0.27	19	249	
Time 2 (n=233)	1.79	0.21	13	231	
Time 3 (n=230)	1.42	0.21	15	229	
Time 4 (n=230)	1.94	0.22	10	230	
Individual Characteristics					
Work Visa					
No				137	47.74
Yes				150	52.26
Worker Type					
Seasonal				32	11.95
Migrant				255	88.85
Understand English					
None				91	31.71
Very little				131	45.64
Some				49	17.07
Most				11	3.83
All				5	1.74
Marital status					
Not married				35	12.20
Married, away from spouse				184	64.11
Married, with spouse				67	23.34
Individual Experiences					
Personal space (yes = 1)					
Time 1				234	92.13
Time 2				216	92.70
Time 3				221	96.09
Time 4				220	95.65
Documentation & Immigration					

	M	SE	Range	N	%
Time 1	3.98	0.65	12	253	
Time 2	4.07	0.72	12	233	
Time 3	2.97	0.66	12	230	
Time 4	3.14	0.65	12	230	
Discrimination & Marginalization					
Time 1	10.29	0.45	20	251	
Time 2	10.13	0.57	20	232	
Time 3	10.26	0.63	20	230	
Time 4	11.38	0.62	20	227	
Separation from Family					
Time 1	2.50	0.33	16	252	
Time 2	1.54	0.33	12	233	
Time 3	1.55	0.37	15	230	
Time 4	1.57	0.39	12	230	
Pace of Work					
Time 1	4.00	0.35	12	252	
Time 2	3.28	0.28	11	233	
Time 3	3.52	0.27	12	229	
Time 4	4.27	0.36	9	230	

Table 2

Multivariate model of the effects of baseline characteristics on depressive symptoms across the agricultural season.

	b	SE
Work visa (versus not)	−0.54	0.29
Migrant worker (versus seasonal)	0.36	0.37
Understand English	0.13	0.13
Married with accompanying spouse (versus not married)	−1.47***	0.39
Married with accompanying spouse*linear trend	0.31*	0.13
Married with accompanying spouse*quadratic trend	−0.42	0.29
Married without accompanying spouse (versus not married)	−0.47	0.28
Married without accompanying spouse*linear trend	0.23*	0.09
Married without accompanying spouse*quadratic trend	−0.13	0.20
Intercept	2.32**	0.69
Linear trend	−0.44***	0.08
Quadratic trend	0.69***	0.17
Random effects		
Intercept for camp	0.40**	0.16
Intercept for individual	0.75***	0.24
Linear	0.07*	0.04
Quadratic	0.36*	0.19
Residual	4.49***	0.42

* $p < .05$

** $p < .01$

*** $p < .001$ (two tailed)

Models control for the effects of age, gender, and years in the US.

Table 3

Multivariate associations of situational or time-varying stressors with depressive symptoms across the agricultural season.

	b	SE
Crowding		
Personal space (yes = 1)	−1.04**	0.37
Documentation & Immigration‡	0.18***	0.05
Discrimination & Marginalization‡	0.20***	0.05
Separation from Family‡	0.05***	0.03
Pace of Work‡	0.16***	0.03
Intercept	3.17***	0.58
Linear trend	−0.22***	0.04
Quadratic trend	0.43***	0.08
Random effects		
Intercept for camp	0.47**	0.18
Intercept for individual	1.00***	0.24
Linear trend	0.07*	0.03
Quadratic effect	0.29*	0.17
Residual	3.97***	0.37

* $p < .05$

** $p < .01$

*** $p < .001$ (two tailed)

Models control for the effects of age, gender, and years in the US.

‡Stressor variables are “person-centered” such that an individual’s value at each time point reflects the observed value subtracted from the individual’s average across all observations.

Table 4

Association of baseline characteristics and situational stressors with depressive symptoms across the agricultural season.

	b	SE
Structural Stressors		
Work visa (versus not)	−0.52	0.29
Migrant worker (versus seasonal)	0.33	0.37
Understand English	0.14	0.13
Married with accompanying spouse (versus not married)	−1.45***	0.39
Married with accompanying spouse*linear trend	0.33**	0.13
Married with accompanying spouse*quadratic trend	−0.16	0.19
Married without accompanying spouse (versus not married)	−0.47	0.28
Married without accompanying spouse*linear trend	0.21*	0.09
Married without accompanying spouse*quadratic trend	−0.16	0.19
Situational Stressors		
Crowding		
Personal space (yes = 1)	−1.03**	0.37
Documentation & Immigration‡	0.17***	0.05
Discrimination & Marginalization‡	0.21***	0.05
Separation from Family‡	0.05*	0.03
Pace of Work‡	0.15***	0.03
Intercept	3.29***	0.78
Linear trend	−0.40***	0.08
Quadratic trend	0.57***	0.16
Random effects		
Intercept for camp	0.40**	0.16
Intercept for individual	0.91***	0.23
Linear trend	0.06*	0.03
Quadratic effect	0.23	0.16
Residual	4.04***	0.38

Models control for the effects of age, gender, and years in the US.

‡Stressor variables are “sample mean-centered” such that an individual’s value at each time point reflects the observed value subtracted from the sample mean at each observation.