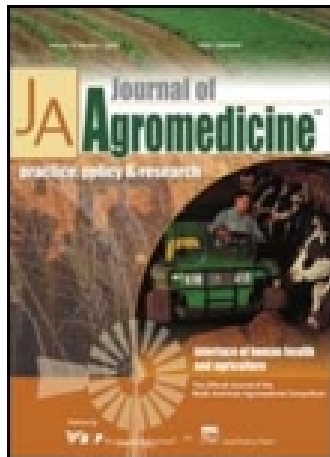


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Occupational Health Among Latino Horse and Crop Workers in Kentucky: The Role of Work Organization Factors

Jennifer E. Swanberg PhD^a, Jessica Miller Clouser MPH^b, Steven R. Browning PhD MSPH^b, Susan C. Westneat MS^b & Mary Katherine Marsh MPH^b

^a School of Social Work, University of Maryland, Baltimore, Baltimore, Maryland, USA

^b College of Public Health, University of Kentucky, Lexington, Kentucky, USA

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Occupational Health Among Latino Horse and Crop Workers in Kentucky: The Role of Work Organization Factors

Jennifer E. Swanberg, PhD
Jessica Miller Clouser, MPH
Steven R. Browning, PhD, MSPH
Susan C. Westneat, MS
Mary Katherine Marsh, MPH

ABSTRACT. Agriculture is a dangerous industry often reliant on Latino workers, a vulnerable population. Using a work organization framework, this cross-sectional study analyzes the relationship between work organization variables and the occupational health of Latino crop ($n = 49$) and horse breeding ($n = 54$) workers in Kentucky. Increased levels of abusive supervision were associated with occupational injury (odds ratio [OR] = 2.97; 95% confidence interval [CI]: 1.0–8.77) and increased awkward postures were associated with occupational illness (OR = 3.85; 95% CI: 1.06–13.98). Although not statistically significant, abusive supervision increased the odds and a high safety climate score decreased the odds of injury, illness, and missed work. These findings suggest that the supervisor-subordinate relationship may play a critical role in the occupational health of Latino farmworkers.

KEYWORDS. Agriculture, Latino farmworkers, occupational health, supervisory practices, work organization

Jennifer E. Swanberg is affiliated with the School of Social Work, University of Maryland, Baltimore, Baltimore, Maryland, USA.

Jessica Miller Clouser, Steven R. Browning, Susan C. Westneat, and Mary Katherine Marsh are affiliated with the College of Public Health, University of Kentucky, Lexington, Kentucky, USA.

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Address correspondence to: Jennifer E. Swanberg, PhD, Joanne I. Bell Professor in Critical Thinking and Social Policy Analysis, School of Social Work, University of Maryland, Baltimore, 525 West Redwood Street, Baltimore, MD 21201, USA (E-mail: jswanberg@ssw.umaryland.edu).

BACKGROUND AND SIGNIFICANCE

Dangerous Industry, Vulnerable Population

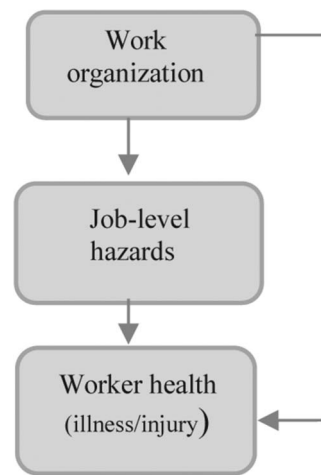
Between 2000 and 2010, the Hispanic/Latino population in the United States grew by 43%, 4 times faster than the total population.¹ In 2010, Latinos constituted 14.8% of the labor force,² although they disproportionately occupied hazardous industries such as agriculture. Nationally, the majority of crop workers³ are Latino, a figure that is estimated to be mirrored in Kentucky's thoroughbred and tobacco industries.^{4,5} Even within hazardous industries, Latinos often experience greater risk for occupational illness, injury, and fatality than non-Latino whites, and are a priority population for National Institute for Occupational Safety and Health.^{6,7}

Although systematic data regarding the degree to which Latino farmworkers experience occupational illness and injuries is limited,⁸ numerous studies demonstrate that these workers are exposed to job hazards that put them at risk for occupational illness and injuries.^{9–12} Furthermore, limited training, safety equipment, and experience reduce their ability to respond to hazards at work, whereas economic pressures limit their capacity to avoid hazardous workplaces.¹³

Research on Work Organization and Employee Health

Few studies on occupational health and safety among Latino workers in physically demanding industries have included characteristics of work organization in their scope of research.¹⁴ MacDonald et al.¹⁵ contend that occupational health researchers in general have neglected the broader organizational context of work, which may increase exposure to job-level hazards. Specifically, they argue that work organization factors may influence health directly or indirectly by increasing exposure to job-level hazards (Figure 1).¹⁵ Research reveals that work characteristics such as schedule, supervisory practices (ranging from abuse to promotion of safety climate), psychological demands, and physical demands have been

FIGURE 1. Direct and indirect relationship of work organization and occupational health outcomes.



associated with occupational illness, injury, musculoskeletal symptoms, and respiratory problems (Figure 2).^{14,16}

Psychosocial Stressors and Immigrant Workers

Emerging research indicates that immigrant workers may experience psychological stressors differently than groups of workers in the same occupation. For example, Grzywacz and colleagues¹⁴ found that Latino poultry processing workers in North Carolina—despite having limited job control, working long hours in standing positions, and making frequent repetitive motions—did not report excessive psychological workloads; rather, they reported scores below the scale median. However, the same study also found that psychological workload (e.g., “how often is your job hectic”) was significantly associated with incidence of illness or injury in the past year and musculoskeletal symptoms in the past 30 days.

Within a sample of immigrant Latino crop workers in North Carolina, researchers found that psychological job demands were not associated with physical and mental health.¹⁷ These findings contrast with research conducted with other worker groups suggesting that psychological stressors increase the risk of ill-health outcomes.^{18–22} Such divergent findings may mean that immigrant workers experience

FIGURE 2. Conceptual framework: characteristics of work organization and measures of occupational health.

Conceptual Framework:

Characteristics of Work Organization and Measures of Occupational Health

| Organization of Work Concepts | | Occupational Health Outcomes |
|---|--|--|
| Organizational Practices & Policies | Job Conditions | Self-Report Illness & Injury |
| <u>Supervisory Practices</u> Safety Climate Abusive Supervision | <u>Work Schedule</u> Days worked/week Hours worked/day | <u>Occupational Illness /Injury</u> Work-related injury Work-related illness |
| | <u>Physical</u> Awkward Postures | |
| | <u>Psychosocial</u> Work-Related Stressors | |

MacDonald et al., 2008; Sauter et al., 2002; Vandenberg et al., 2002

psychological stressors differently than other worker groups—owing perhaps to the reduction in stress they might feel by having a job at all—or that these constructs are interpreted differently among different cultures.

Supervisory Practices

The supervisor-subordinate relationship can influence health outcomes through multiple pathways and evidence suggests that this relationship may be particularly influential for immigrant Latino workers. In a study that compared Latino and non-Latino white warehouse workers, management fairness and supervisor support buffered the effects of work stressors on job stress for Latino, but not for white workers.²³ Similar findings were revealed in a study comparing immigrant and nonimmigrant German post office workers, in which supervisory practices influenced psychological distress among immigrant but not native workers.²⁴ Specifically, supervisor support was negatively associated with psychological distress, and it buffered the positive association between time pressure and job distress among immigrant workers only.²⁴

Supervisory practices also manifest in the safety climate, which refers to worker

perceptions of job safety regarding management concerns, safety activities, and employee risk (e.g., providing safety training, equipment, and safety meetings). Safety climate research in industries such as construction²⁵ and manufacturing²⁶ suggests that safety climate is predictive of occupational illness or injury. Fewer studies have analyzed how safety climate may influence illness or injury outcomes among immigrant Latino workers, or in agricultural settings. Grzywacz and colleagues found trend-level evidence that manager's commitment to safety (a component of safety climate) was associated with a decrease in respiratory symptoms among immigrant Latino poultry processing workers.¹⁴ Finally, Arcury et al. found that a high safety climate score was associated with a decreased risk for musculoskeletal discomfort and working while ill or injured for migrant Latino agricultural workers.²⁷

Not only may positive supervisor practices buffer potentially negative aspects of the work environment among immigrant Latino workers, but negative supervisor behavior may also increase the risk of illness. In the previously mentioned study with Latino poultry processing workers, the analysis revealed that a one-unit

increase in abusive supervision was associated with a 13% increase in the odds of a worker reporting recent respiratory symptoms after controlling for demographic and work characteristics such as management practices, job design, and performance. Similarly, results indicated that high manager commitment to safety was associated with decreased respiratory symptoms.¹⁴

Extant literature reveals that there are multiple aspects of how work is organized, including both positive and negative supervisory behaviors that may influence occupational safety and health among immigrant Latino workers. However, little of this research has focused on agriculture.²⁷ The goal of this paper is to determine which work organization factors are associated with work-related (1) illness, (2) injury, and (3) missed work due to work-related illness or injury of Latino crop and horse workers in central Kentucky.

METHODS

Sampling and Recruitment

This cross-sectional study recruited 103 Latino farmworkers employed in the crop ($n = 49$) and horse breeding ($n = 54$) industries from October 2009 to January 2010 in four counties (Fayette, Scott, Bourbon, and Woodford) located in Central Kentucky. These counties are home to 3370 farms.²⁸ To be eligible for this study, a participant had to meet all three of the following criteria: s/he had to (1) be at least 18 years of age, (2) be employed on a crop or horse production farm for at least 15 days in the past year, and (3) self-identify as Latino.* Workers who had worked in both commodity types were asked to refer to their most recent qualifying job. Although crop workers from all crop commodities were eligible, 48 of the 49 crop workers who participated worked in tobacco production.

The study employed a community-based, purposive sampling technique, and used

snowball sampling when appropriate. Both passive and active recruitment approaches were used to access this hard-to-reach group of workers. The research team partnered with bilingual media outlets to publish articles and radio interviews in Spanish describing the study. In addition, flyers were posted in a range of community venues and interviewers actively recruited study participants throughout the four-county area. A randomized sampling plan was not possible because no sampling frame, specifically a list of agricultural workers, exists for the state. Site-based sampling techniques by residential area were rejected because they may exclude workers living in rural areas or on farms and because worker camps are not common in central Kentucky. Site-based sampling by worksite was also rejected because the questions directly targeted working conditions and we did not want participants to feel their job would be at risk. Because we were gathering potentially sensitive information about workers' employment, we did not ask for the farm where workers were employed. Although it was possible that multiple workers were employed at the same farm, due to our diverse recruitment strategy and to the relatively small scale of farms in Kentucky, workers should represent a variety of farms in the region. Prior to administering the interview, participants were informed of the study's purpose, procedures, risks, and benefits. Interviewers answered participants' questions and provided an informational sheet in both Spanish and English. Oral consent was obtained from all participants before proceeding with the interview. A waiver of documentation of informed consent and other procedures for obtaining informed consent was approved by University of Kentucky's Non-Medical Institutional Review Board. Participants were given a \$10 gift card to a local Latino-owned restaurant chain or \$10 cash.

Data Collection

Three trained interviewers collected data using face-to-face interviews in Spanish. All interviewers participated in a half-day training covering interview techniques, questionnaire content, human subject protection, and research ethics. Interview content was developed from

*Although being foreign-born was not part of the eligibility criteria, only one crop worker was born in the United States; all others were born in Mexico or Central or South America.

existing Spanish translations of questions and scales, where available.^{3,14,29} Other content was translated into Spanish, back-translated into English,³⁰ and reviewed once more by a native speaker. On average, interviews lasted between 30 to 40 minutes.

Measures

Demographic Variables

Most demographic questions (Table 1) were taken from the Spanish translation of the National Agricultural Workers Survey³ and are described elsewhere.¹²

Organization of Work

This study assessed the job conditions and organizational practices and policies inherent to

crop and horse production farms. Unless otherwise noted, the following scales used frequency-based, ordinal response categories (1 = *seldom or never* to 4 = *almost always*). Work schedule was determined by probing for the number of hours typically worked per day and the number of days worked per week. Number of hours worked per day was calculated by subtracting arrival time from departure time (Table 1). Total hours worked per week was the product of hours worked per day and number of days worked per week. The awkward position scale ($\alpha = .91$) tapping physical demands of the work environment consisted of 13 of 26 items from the Dutch Musculoskeletal Questionnaire.³¹ *Work-related job stressors* ($\alpha = .739$) was measured with five items. One item was taken from the Job Content Questionnaire³² ("How often do you worry about losing your job?"). The

TABLE 1. Demographic and Work Characteristics of Latino Workers Stratified by Crop and Horse Farms (N= 103)

| Characteristic | Horse | | Crop | | χ^2 | p |
|---------------------------------|--------------------|------|---------------------|------|----------|--------|
| | n | % | n | % | | |
| Gender | | | | | | |
| Male | 50 | 94.3 | 48 | 97.9 | 0.88 | 0.35 |
| Female | 3 | 5.7 | 1 | 2.1 | | |
| Age | | | | | | |
| Mean (SD), range | 35.3 (9.7), 19–62 | | 31.9 (9.3), 18–55 | | | |
| Median, IQR | 33.0, 12.0 | | 30.0, 14.0 | | | 0.07* |
| Marital Status | | | | | | |
| Married/living as married | 36 | 67.9 | 21 | 42.9 | 6.49 | 0.01 |
| Single | 17 | 32.1 | 28 | 57.1 | | |
| Education | | | | | | |
| Less than high school | 25 | 46.3 | 21 | 42.9 | 0.12 | 0.73 |
| High school graduate or greater | 29 | 53.7 | 28 | 57.1 | | |
| Time worked at this farm | | | | | | |
| <3 months | 4 | 7.4 | 17 | 35.4 | 21.9 | <.01 |
| 3–11 months | 9 | 16.7 | 16 | 33.3 | | |
| 1–3 years | 24 | 44.4 | 8 | 16.7 | | |
| ≥4 years | 17 | 31.5 | 7 | 14.6 | | |
| Days worked/week | | | | | | |
| Mean (SD), range | 6.1 (.7), 3–7 | | 5.8 (1.0), 4–7 | | | |
| Median, IQR | 6.0, .50 | | 6.0, 2.0 | | | .17* |
| Hours worked/day | | | | | | |
| Mean (SD), range | 9.3 (1.5), 5–14 | | 11.3 (1.9), 8–15 | | | |
| Median, IQR | 9.0, .50 | | 11.0, 3.0 | | | .0001* |
| Total hours worked/week | | | | | | |
| Mean (SD), range | 56.7 (12.9), 26–98 | | 66.9 (17.7), 36–103 | | | |
| Median, IQR | 54.0, 7.8 | | 66.3, 30.1 | | | .002* |

Note. Column numbers may not sum to totals for each variable due to missing values. IQR = interquartile range.

*Wilcoxon Mann-Whitney $Pr > |z|$.

other four were created by the research team based on qualitative interviews with members of the target population.³³ The items were summed and the total score was then dichotomized.

Supervisor Practices

Supervisor abuse ($\alpha = .81$) was assessed with seven items measuring retaliatory and abusive supervision (e.g., “my supervisor could make work difficult for me”).^{29,34} Responses were coded 1 (*seldom or never*) to 4 (*almost always*), with higher scores reflecting greater supervisor abuse. *Safety climate* ($\alpha = .842$) was measured using a 9-item version of the validated 10-item Perceived Safety Climate Scale,²⁵ which had previously been used with Latino workers.¹⁴ The remaining 10th item used a different response scale and was not used. Responses were coded 1 (*strongly disagree*) to 4 (*strongly agree*), with higher scores reflecting greater supervisor commitment to safety. Items from both scales had previously been used with Latino poultry processing workers.²⁹

Health Outcomes

Self-report injury and illness was measured with three questions asking “In the past 12 months has the participant become injured due to work, sick due to work, or missed work due to a work-related illness or injury?” Responses were coded as 1 (*never*), 2 (*less than 3 times*), 3 (*4 to 7 times*) and 4 (*more than 7 times*), then recoded into a dichotomous variable—1 (*yes*), 0 (*no*).

Data Analysis

Descriptive statistics, including means, frequencies, percentages, and rates were calculated to examine the distribution of work-related injuries, illnesses, and missed work by worker type. Crude associations (unadjusted odds ratios and 95% confidence intervals) between estimated annual prevalence rates of the work-related health outcomes and potential risk factors for these health outcomes were calculated using standard bivariate analysis techniques.

Following the bivariate analysis, multivariable logistic regression analysis was

undertaken to examine the predictors of the health outcomes; the strategy advocated by Kleinbaum and Greenland was employed.^{35–37} A variable’s inclusion in the multivariable model was based on the need to control for known risk factors for the outcome (e.g., age and hours worked per week), the literature, or the necessity of examining key work practices or organization factors with respect to the health outcomes. Multivariable logistic regression models for each of the health outcomes examined the main effects of the key predictors and were kept comparable across the health outcomes to allow for comparison of results. To enhance the precision of the estimates and avoid arbitrary cut points, the scores for safety climate, work-related stressors, and supervisor abuse were categorized at the median score and modeled as dichotomous variables in the regression analysis. Age and awkward positions were originally categorized into tertiles; the first two tertile showed similar rates and were collapsed to make a dichotomous variable. Interactions were not modeled due to the limited sample size. Type of farm (horse or crop) was retained in the models to examine group differences. Important work practice variables retained in the models included workers’ awkward posture, perceived safety climate, work-related stressors, and supervisor abuse. Adjusted odds ratios (ORs) and 95% confidence intervals (CIs) were estimated and presented for the final multivariable model. All analyses were performed using SAS statistical software.³⁸

RESULTS

Demographics of Sample

The demographic characteristics of the sample, stratified by work on horse or crop farms, suggest that workers on crop farms are younger, less likely to be married or living as married, and more likely to have been employed in their position for less than 3 months in comparison with workers on horse farms (Table 1). The majority of workers (76%) on horse farms had worked for their employer for 1 year or longer in comparison with the 31% of crop workers

who had been in their positions for a year or more. A majority of workers had a high school education or greater: 54% of horse workers and 57% of crop workers. Crop laborers worked an estimated 2 hours per day more than workers on horse farms ($t(99) = 6.03, p < .0001$) and averaged 11.3 hours per day, with a range up to 15 hours. Both worker groups reported an average workweek of 6 days, although crop laborers typically worked 10.2 hours more than horse workers over the course of a week.

Organization of Work Measures by Worker Type

As evidenced in Table 2, crop and horse workers differed significantly in their appraisal of all work organization variables in the model except for safety climate. Across all other variables, including awkward postures, work-related stressors, supervisor abuse, number of hours per day, and number of hours per week, the median scores for crop workers were higher than median scores for horse workers.

Crude and Multivariable Logistic Regression Analysis

Results of the bivariate and multivariable logistic regression analysis of each of the work-related health outcomes, respectively, are given in Tables 3–5. The overall percentage of workers reporting an injury was estimated as 25 injured workers per 100 workers per year. There was a slight increase in the odds of work-related injury (OR = 1.14; 95% CI: 0.47–2.8) among crop workers in comparison with horse workers in the crude analysis; however, after controlling for age, hours of work, and the other variables in the regression model, the association was attenuated and there was no statistically significant difference by type of farm. In the multivariable model, there was a modest increase in the odds of injury among older workers (OR = 1.28; 95% CI: 0.44–3.71) and workers employed more than 55 hours per week or more (OR = 1.15; 95% CI: 0.40–3.28).

Self-reported supervisor abuse was associated with increased odds of injury, illness, and

TABLE 2. Distribution of Work Practice and Organization of Work Factor Measures by Crop and Horse Farms

| Measure | Horse | | Crop | | <i>p</i> |
|------------------------------|------------------------------|--------------|------------------------------|--------------|----------|
| | Mean (<i>SD</i>) or Median | Range or IQR | Mean (<i>SD</i>) or Median | Range or IQR | |
| Awkward posture score | | | | | |
| Mean (<i>SD</i>), range | 23.8 (9.1) | 13–51 | 35.8 (8.9) | 19–52 | |
| Median, IQR | 22.0 | 13.0 | 35.0 | 13.0 | .0001* |
| Safety climate score | | | | | |
| Mean (<i>SD</i>), range | 20.8 (5.5) | 10–33 | 20.0 (6.2) | 9–34 | |
| Median, IQR | 21.0 | 9.5 | 19.5 | 9.0 | .53* |
| Work-related stress score | | | | | |
| Mean (<i>SD</i>), range | 10.5 (4.1) | 5–20 | 13.0 (4.1) | 6–20 | |
| Median, IQR | 10.0 | 6.0 | 13.0 | 6.0 | .003* |
| Supervisor abuse score | | | | | |
| Mean (<i>SD</i>), range | 10.3 (3.7) | 7–24 | 12.3 (4.9) | 7–27 | |
| Median, IQR | 10.0 | 4.0 | 11.0 | 6.0 | .02* |
| Total hours work per week | | | | | |
| Mean (<i>SD</i>), range | 56.7 (12.9) | 25.5–98 | 66.8 (17.7) | 36–102.9 | |
| Median, IQR | 54.0 | 7.8 | 66.3 | 30.1 | .002* |
| Average hours worked per day | | | | | |
| Mean (<i>SD</i>), range | 9.3 (1.5) | 5–14 | 11.3 (1.9) | 8–14.7 | |
| Median, IQR | 9.0 | .5 | 11.0 | 3.0 | .0001* |

*Wilcoxon Mann-Whitney $Pr > |z|$.

TABLE 3. Injury Results: Crude and Adjusted Odds Ratios (95% CIs) of Select Risk Factors for Work-Related Injuries Among Latino Workers on Crop and Horse Farms

| Risk factor | <i>n</i> | % injured | OR | 95% CI | Adjusted OR [†] | 95% CI |
|----------------------|----------|-----------|------|-----------|--------------------------|-----------|
| Age | | | | | | |
| Under 40 | 75 | 24.0 | | | | |
| 40 and older | 28 | 28.6 | 1.27 | 0.48–3.36 | 1.28 | 0.44–3.71 |
| Hours work/week | | | | | | |
| Under 55 | 53 | 22.6 | | | | |
| 55 and over | 50 | 28.0 | 1.33 | 0.55–3.24 | 1.15 | 0.40–3.28 |
| Awkward positions | | | | | | |
| 33 or less | 65 | 23.1 | | | | |
| 34 or greater | 35 | 28.6 | 1.33 | 0.52–3.39 | 1.05 | 0.28–3.92 |
| Safety climate score | | | | | | |
| Less than 20 | 48 | 33.3 | | | | |
| 20 and greater | 55 | 18.2 | 0.45 | 0.18–1.11 | 0.62 | 0.22–1.7 |
| Work-related stress | | | | | | |
| 10 or less | 43 | 18.6 | | | | |
| Greater than 10 | 60 | 30.0 | 1.88 | 0.73–4.83 | 1.08 | 0.35–3.35 |
| Supervisor abuse | | | | | | |
| 10 or less | 55 | 14.6 | | | | |
| Greater than 10 | 48 | 37.5 | 3.53 | 1.36–9.12 | 2.97 | 1.0–8.77 |
| Work | | | | | | |
| Horse | 54 | 24.1 | | | | |
| Crop | 49 | 26.5 | 1.14 | 0.47–2.8 | 0.82 | 0.22–2.97 |

[†]The adjusted multivariable model controls for all variables listed in this table simultaneously. The Hosmer-Lemeshow goodness of fit $\chi^2 = 3.28$, $df = 8$, $p > .91$, indicating an adequate fit.

TABLE 4. Illness Results: Crude and Adjusted Odds (95% CIs) of Work-Related Illness Among Latino Workers on Crop and Horse Farms

| Risk factor | <i>n</i> | % ill | OR | 95% CI | Adjusted OR [†] | 95% CI |
|----------------------|----------|-------|------|------------|--------------------------|------------|
| Age | | | | | | |
| Under 40 | 75 | 28.0 | | | | |
| 40 and older | 28 | 21.4 | 0.70 | 0.25–1.97 | 0.78 | 0.24–2.51 |
| Hours work/week | | | | | | |
| Under 55 | 53 | 24.5 | | | | |
| 55 and over | 50 | 28.0 | 1.19 | 0.49–2.88 | 0.62 | 0.20–1.92 |
| Awkward positions | | | | | | |
| 33 or less | 65 | 13.9 | | | | |
| 34 or greater | 35 | 48.6 | 5.88 | 2.23–15.45 | 3.85 | 1.06–13.98 |
| Safety climate score | | | | | | |
| Less than 20 | 48 | 33.3 | | | | |
| 20 and greater | 55 | 20.0 | 0.50 | 0.21–1.22 | 0.57 | 0.20–1.65 |
| Work-related stress | | | | | | |
| 10 or less | 43 | 13.9 | | | | |
| Greater than 10 | 60 | 35.0 | 3.32 | 1.21–9.14 | 1.78 | 0.54–5.88 |
| Supervisor abuse | | | | | | |
| 10 or less | 55 | 18.2 | | | | |
| Greater than 10 | 48 | 35.4 | 2.47 | 0.99–6.1 | 1.21 | 0.41–3.58 |
| Work | | | | | | |
| Horse | 54 | 14.8 | | | | |
| Crop | 49 | 38.8 | 3.64 | 1.42–9.37 | 1.63 | 0.41–6.49 |

[†]The adjusted multivariable model controls for all variables listed in this table simultaneously. The Hosmer-Lemeshow goodness of fit $\chi^2 = 9.10$, $df = 7$, $p > .25$, indicating an adequate fit.

TABLE 5. Missed Work Results: Crude and Adjusted Odds (95% CIs) of Missed Work Due to Work-Related Illness or Injury Among Latino Workers on Crop and Horse Farms

| Risk factor | <i>n</i> | % miss work | OR | 95% CI | Adjusted OR [†] | 95% CI |
|----------------------|----------|-------------|------|-----------|--------------------------|-----------|
| Age | | | | | | |
| Under 40 | 75 | 21.3 | | | | |
| 40 and older | 28 | 21.4 | 1.0 | 0.35–2.89 | 1.01 | 0.32–3.16 |
| Hours work/week | | | | | | |
| Under 55 | 53 | 18.9 | | | | |
| 55 and over | 50 | 24.0 | 1.36 | 0.53–3.49 | 0.89 | 0.29–2.68 |
| Awkward positions | | | | | | |
| 33 or less | 65 | 16.9 | | | | |
| 34 or greater | 35 | 31.4 | 2.25 | 0.86–5.90 | 1.21 | 0.33–4.41 |
| Safety climate score | | | | | | |
| Less than 20 | 48 | 29.2 | | | | |
| 20 and greater | 55 | 14.6 | 0.42 | 0.16–1.10 | 0.47 | 0.16–1.37 |
| Work-related stress | | | | | | |
| 10 or less | 43 | 14.0 | | | | |
| Greater than 10 | 60 | 26.7 | 2.24 | 0.79–6.31 | 1.29 | 0.39–4.27 |
| Supervisor abuse | | | | | | |
| 10 or less | 55 | 14.6 | | | | |
| Greater than 10 | 48 | 29.2 | 2.42 | 0.91–6.41 | 1.78 | 0.60–5.28 |
| Work | | | | | | |
| Horse | 54 | 14.8 | | | | |
| Crop | 49 | 28.6 | 2.3 | 0.87–6.10 | 1.97 | 0.52–7.55 |

[†]The adjusted multivariable model controls for all variables listed in this table simultaneously. The Hosmer-Lemeshow goodness of fit $\chi^2 = 2.78$, $df = 7$, $p > .90$, indicating an adequate fit.

missed work due to injury or illness in all multivariable analyses; however, it was only significant for injury. The strongest association of supervisor abuse was with work-related injury; workers who reported high levels of supervisor abuse were at a significant 3-fold increased odds (OR = 2.97; 95% CI: 1.0–8.77) of injury in the adjusted analysis.

A high score for awkward positions was associated with a statistically significant increased odds of work-related illness (OR = 3.85; 95% CI: 1.06–13.85) in the multivariable model, although no significant associations were evident for injury or missed work.

A high safety climate score was a protective factor for work-related injury, work-related illness, and missed work due to injury or illness; a finding that was consistent across the three outcomes but not statistically significant. The impact of a high safety climate score showed its most marked difference for missed work due to injury or illness with a prevalence rate difference of 14.6 injured workers per 100 per year between farms with a high versus low safety climate score.

Our results yielded no statistically significant relationship between work-related stress and any of the three outcome variables, although the effect size was larger for work-related illness (OR = 1.78; 95% CI: 0.54–5.88) and missed work due to illness or injury (OR = 1.29; 95% CI: 0.39–4.27) than for injury (OR = 1.08; 95% CI: 0.35–3.35).

Finally, crop workers may be at increased odds of work-related illness (OR = 1.63; 95% CI: 0.41–6.49) and missed work due to illness (OR = 1.97; 95% CI: 0.52–7.55) in comparison with workers on horse farms. Since these estimates include adjustment for the longer hours of work and the age of the workers on crop farms, the finding is likely related to exposures to different tasks, underlying health status of the workers, or differences in work conditions in these two diverse farm types.

DISCUSSION

The goals of this paper were to explore the relationship between work organization

variables and the occupational health of Latino crop and horse breeding workers in Kentucky. Five primary findings emerged from our analyses.

First, our findings reveal evidence that the supervisor-subordinate relationship is important to worker health. We found a positive association between abusive supervision and ill-health outcomes, despite the relative infrequency of reported abuse. This result is consistent with studies with Latino poultry processing workers.^{14,29} One key difference is that the present study found a much larger effect size that yielded an elevated risk for injuries, illness, and missed work. This relationship, which was statistically significant for injury, may reflect a difference in assignment to dangerous job tasks where injury is more likely.

Our findings also revealed evidence of a relationship between worker health and safety climate, which is largely defined by management's commitment to safety. Overall, mean safety climate scores were relatively low (below the scale midpoint), which is similar to scores reported by migrant Latino farmworkers²⁷ and Latino poultry processing workers.¹⁴ However, safety climate scores were negatively associated—though not statistically significant—with illness, injury, and missed work. Taken together, the present study adds to an emerging body of research that indicates that poor supervisory practices pertaining to a range of work-related matters may increase the odds of occupational ill-health outcomes among Latino and immigrant workers.^{14,24}

Second, we found a relationship between awkward positions and odds of illness among this study's sample. Although an obvious explanation for this relationship is not apparent, this finding resonates with findings among Latino poultry processing workers that found trend-level evidence ($p < .10$) suggesting an association between posture and repetitive movements and recent respiratory symptoms.¹⁴ It is possible that in this case, awkward postures may serve as a proxy for exposure to respiratory and other hazards through certain job tasks. For example, in horse work, the task of mucking the stalls is characterized by a combination of stooping and shoveling soiled bedding material

that is often composed of straw, woodchips, or sawdust. In tobacco work, the activities of harvesting, hanging, and stripping tobacco involve stooping, reaching, and carrying heavy loads, but also expose workers to nicotine, excessive heat, dusty barns, and other exposures that could lead to various respiratory and other illnesses.³⁹ Thus, it is possible that it is other characteristics inherent to the work that explain the relationship with awkward postures and work-related illness.

A third finding relates to the effect of long work hours on illness, missed work, and injury. The structure of these jobs call for long work days and weeks—in excess of the 42-hour average work week cited by a national sample of hired farmworkers.³ Interestingly, working over 55 hours a week seemed to offer a mildly protective effect for work-related illness and missed work, although it slightly increased the odds of work-related injury. Although the positive association between working hours and injury makes intuitive sense, the inverse association with work-related illness and missed work (albeit not statistically significant) may seem surprising. It is possible that a variation of the “healthy worker survivor effect” could in part explain the difference because one needs to be relatively healthy and industrious to work over 55 hours per week, a trait that may also reduce susceptibility to illness or missing work.⁴⁰ Alternatively, economic factors for the worker or the farm owner may motivate the long weeks pressuring workers to minimize concerns about health-related symptoms.

Fourth, no relationship was found between work-related stressors and any of the three health outcomes. Although our measure was created by the research team based on qualitative interviews with the study population and does not represent a validated scale, we contend that it measures work-related stresses that are relevant to a local Latino farmworker population. As such, the finding that it lacked a significant association with injuries, illness, or missed work lends additional support to the premise that work-related psychological stress might be experienced differently among immigrant worker groups than other worker populations,^{14,17} although this should be further explored in future research.

Another important finding from our study of Latino horse and crop workers is that an estimated one in four workers reported a work-related injury in the past 12 months. This rate is similar to those reported among immigrant Latino poultry processing workers using similar definitions and rate calculations to ours.^{14,41} As context, in 2009, the same year these data were gathered, the illness and injury rate for Kentucky agriculture was 7.8 per 100 full-time equivalent (FTE) workers⁴² (42) and the national agriculture injury rate was 5.3 per 100 FTE workers.⁴³ Even the National Agriculture Workers Survey (NAWS), which does not require an employee to report an injury to a supervisor, found significantly lower injury rates than our sample: 4.3 per 100 FTE, 6.9 among US Hispanics, and 4.2 among Mexicans.⁴⁴ There are a few distinctions between our calculations and standardized rate calculations that should be noted. First, our study did not require missed work-time or medical attention for an injury to be counted, nor did it require a worker to have reported an injury to a supervisor for it to be counted in our survey.⁸ In this way, it captures injuries that may be lost in traditional surveillance strategies and which may cause chronic pain or lead to more severe injury incidents.

On the other hand, we dichotomized workers' number of injuries—originally reported as a range—in order to facilitate logistic regression and assess risk at the level of the worker. Although this analysis enables us to determine the number of workers who suffered an injury in the past 12 months, it does not account for multiple injuries that could have occurred to a single worker, and thus underestimates the injury burden in our sample. One final distinction from traditional surveillance data is that our rate is not calculated based on the tenure (total length of exposure) of a worker at a horse/crop farm. Both horse breeding and tobacco work involve seasons that extend further than most crop agriculture, which may increase the exposure of these workers to risk of injury compared with other agricultural workers even if they may be comparable to each other. However, we did not calculate our injury percentage as a rate based on exposure to the work environment, as is done in other surveillance mechanisms.

Finally, results indicate that crop workers experience an elevated rate of work-related illness and missed work due to work-related illness or injury compared with horse workers. As no data were collected on the specifics of these illnesses or the circumstances around missed work, many questions remain regarding the reasons for crop workers' increased vulnerability. Our results indicate that crop workers experienced harder physical work, increased awkward postures, more work-related and environmental stressors, and longer workdays.¹² In addition, crop workers experienced less tenure, received less supervisor support, and were less likely to have access to employer-sponsored health insurance, workers' compensation, or safety equipment. Continued improvement in occupational health surveillance systems for agriculture is essential to help guide prevention efforts for occupational illness and injury among immigrant farmworkers.

Strengths and Limitations

One of the study's strengths is its focus on this hard-to-sample, vulnerable worker population for which there are limited data on hours, work environment, and health status. It also includes work organization factors that previous research indicates may be particularly relevant to the occupational health of this population—e.g., supervisory practices—but about which little is known. Our findings support the notion that the supervisor-subordinate relationship, particularly abusive supervision and safety climate, which show consistency across the three health outcomes, are important aspects of the work environment that may influence occupational injury or illness.

This is a cross-sectional study based on a convenience sample of Latino farmworkers residing in a four-county area in central Kentucky. Consequently, it is possible that participants in the sample may be demographically different than nonparticipants (perhaps better educated, documented, etc.). Although the results may not be generalizable to Latino workers employed in other farm operations, our sample has demographic characteristics (e.g., age, nativity, marital status) that are comparable with other hired

farmworker groups.³ Nonetheless, our study contributes to the very limited research on work organization and occupational health and safety among Latinos working in US agriculture.

The relatively small size of our sample did not permit an examination of a larger number of variables in the models and the results remain imprecise. Further, it precluded us from running separate regressions for each worker group while including a meaningful number of variables in each model. Consequently, worker type was added as a separate variable. Despite the differences in job tasks between the two worker groups, worker type did not show strong independent effects on any of the three outcome variables.

An additional limitation of this study is the use of self-reported responses, which may have impacted the results obtained during the face-to-face interviews. Health-related outcomes were self-reported and were not validated or confirmed through any additional records or by other persons, nor were detailed data obtained on the circumstances of reported injuries or illnesses. Future studies should collect this contextual information in order to reveal a broader insight into the circumstances around illness and injury events.

The limitations and potential recall bias associated with the abuse, stress, safety climate, and awkward postures scores need to be considered. Workers who report injuries or illness may be inclined to also reveal higher levels of stress, abuse, or poor labor conditions. The bias may be differential and increase the overall reported measures of association. Also, since the health outcomes covered a 12-month period but workers may have been in the current job for less time, the injury/illness may have occurred at another location or under other conditions. Finally, as these data are cross-sectional, we cannot infer causality. It is possible, for example, that being injured made a worker susceptible to abusive supervisory behavior rather than vice versa.

CONCLUSION

Research that has studied the relationship between psychosocial aspects of the work

environment among Latino workers in physically demanding industries has been sparse and inconclusive.^{14,17,23} Although the hazards of tobacco production are documented,^{39,45,46} the hazards of horse breeding are less understood, with little research having been conducted in the United States⁴⁷ or with immigrant workers. The results from this project represent a step toward filling the gap in our knowledge about the influence of work organization on worker health among diverse populations in diverse industries. The findings from this pilot study have revealed similar reports of injury incidence and supervisor abuse as reported in other highly vulnerable populations.¹⁴ Additionally, strong associations between work organization variables and ill-health outcomes were found. Results from this small, pilot study provide preliminary evidence that management practices may be a key organizational feature to investigate in future health and safety research.

One recommendation for such research may include a larger, more formalized sampling scheme, including cluster sampling of farms by size or commodity. Such a technique would enable a multilevel analysis to better understand the various components that are a function of the individual and those that are a function of the workplace. In addition, given that organizational practices, policies, and climate operate at a higher level of organization than the individual, it would be appropriate to solicit information from an owner/manager's perspective related to the provision of resources as well as management's perspectives on workplace culture, supervisor behavior, and communication.

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