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Poor safety climate, long work hours, and musculoskeletal discomfort among Latino horse farm workers

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ABSTRACT

This study investigated the prevalence of self-reported musculoskeletal discomfort (MSD) and work-related factors associated with elevated MSD among Latino thoroughbred farm workers. Participants ($N = 225$) were recruited using a community-based purposive sampling approach to participate in in-person interviews. Of these workers, 85% experienced MSD. MSD was divided into tertiles; the upper tertile was defined as elevated. Multivariable Poisson regression revealed associations between any elevated MSD and longer tenure on horse farms, longer work hours, and poor safety climate. Elevated neck/back MSD was associated with longer tenure, longer work hours, and poor safety climate. Elevated upper extremity MSD was associated with age and poor safety climate. Elevated lower extremity MSD was associated with longer tenure, longer work hours, and being female. Musculoskeletal discomfort is common among these workers. Improving safety climate and minimizing long work hours is recommended.

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Agricultural work involves long hours, awkward postures, and repetitive motions, which may promote pain in muscles, joints, and skeletal regions, hereafter referred to as musculoskeletal discomfort (MSD). In comparison to rural nonfarmer working populations, farmers report significantly higher levels of MSD in the hands, forearms, lower back, and hips,[1–3] as well as a greater, although nonsignificant, prevalence of neck, shoulder, and knee pain.[2] Occupational factors associated with MSD among farmers include long working hours per day; a long duration in farmwork[4]; frequent stooping, kneeling, bending, and crawling; the operation of heavy equipment[5]; equipment repair and maintenance; material handling; and repetitive motion, such as milking.[6]

Animal production is a sector of agriculture with workers that may be especially vulnerable to developing work-related MSD.[7] Between 2004 and 2007, the average incidence rate of nonfatal occupational musculoskeletal disorder cases with days away from work in the animal production sector was 40.7 per 10,000 full-time workers (disorder, as defined here, includes pinched nerve; herniated disc; meniscus tear; sprains, strains, tears; hernia; pain, swelling, and numbness; carpal or tarsal tunnel syndrome; Raynaud's syndrome; musculoskeletal system and connective tissue diseases/disorders, when the event/exposure leading to the injury/illness is overexertion and bodily reaction, unspecified; overexertion involving outside sources; repetitive motion involving microtasks; other and multiple exertions or bodily reactions; and rubbed, abraded, or jarred by vibration),[8] compared to 34.6 per 10,000 full-time workers in the agriculture, forestry, fishing, and hunting sector.[9] Although minimal research has looked specifically at thoroughbred breeding, evidence suggests that it may represent a hazardous segment of animal production. In a review of injury logs kept by thoroughbred farms, Swanberg et al[10] found sprains, strains, and tears—which may be related to MSD among workers—to be the second most common injury diagnosis reported. Common job tasks on thoroughbred farms include grooming, mucking stalls, feeding, bathing, brushing, walking, and live-breeding procedures.[10–12] Many of these tasks require sustained awkward postures[13] and forceful movements, and many must be repeated several times a day. In addition,

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thoroughbred horses are athletic, temperamental, and unpredictable,[11] and the industry requires live breeding,[12] which must be attended to by horse workers.

A large proportion of the thoroughbred industry's 460,000 full-time workers are Latino or foreign-born, and over 50% of the year-round, frontline workforce on Southeast thoroughbred farms is Latino.[10,14] Immigrant Latino workers are at a heightened risk for occupational injury, fatality, and adverse health effects compared to other worker groups.[15,16] In fact, 43% of Latino thoroughbred workers reported a work-related injury in the past year,[17] a percentage similar to that of Latino dairy workers,[18] yet higher than that of Latino back-stretch workers,[19] suggesting that Latino thoroughbred workers may experience a heightened risk of injury and related MSD.

A limited number of studies have examined MSD and associated work-related factors among Latino workers in the agriculture and livestock industries, yet among Latino farmworkers, MSD is associated with bending or stooping more than 30 hours/week,[5] and among Latino dairy workers, neck or back MSD is associated with increased worker age.[20] Preliminary studies conducted with Latino thoroughbred workers demonstrate exposure to high levels of sustained awkward postures and long work hours.[10,13,17] Such associations have not been documented among Latino livestock workers, yet among Latino poultry-processing workers, MSD was found to be associated with awkward and repetitive postures[21,22] and working overtime.[23]

One component of the work environment that has been shown to influence the risk of MSD among Latino farmworkers is safety climate. Safety climate, or a set of unified cognitions held by workers regarding their organization's safety,[24] is demonstrated through practices such as the provision of training and equipment and communication of safety hazards.[25] Latino workers—who may have a limited understanding of English and be reluctant to voice work-related concerns[17,26] —may be particularly vulnerable to the effects of adverse safety climates.[26,27] However, a positive safety climate may have beneficial effects on workers. Among Latino migrant farm workers, a positive safety climate lessened the risk of workers developing MSD.[28] Related to this, a positive safety climate is protective against work-related injuries among Latino horse, crop, and roofing workers,[13,29] suggesting that a positive safety climate may have a similar beneficial effect on lessening MSD among Latino horse-farm workers.

Due to the dangerous work of interacting with highly unpredictable thoroughbred horses and performing often repetitive and awkward work tasks, and the high rate of occupational injury among Latino workers, Latino thoroughbred workers may be especially vulnerable to work-related MSD. Yet no studies to date have examined the prevalence and occupational factors associated with elevated MSD among Latino horse farm workers. To address this gap in knowledge, this study used data from a study that surveyed 225 Latino thoroughbred horse farm workers to determine the prevalence of MSD and the work-related factors associated with elevated MSD.

Methods

Sampling and recruitment

This cross-sectional survey was part of a larger employer- and community-engaged research project, Thoroughbred Worker Safety and Health Study. This larger study's methods are detailed elsewhere.[10,11,17] Participants were recruited to participate between October 2013 and April 2014 through a community-based purposive sampling strategy. A randomized sampling approach was rejected because there is no list of workers in the industry available. A randomized sampling approach via residence was also rejected because labor camps are not common in this industry or region and workers live in dispersed areas. Finally, a randomized sampling approach via worksite was not employed because the survey contained sensitive questions about work and researchers did not want workers to think their jobs would be in jeopardy if they answered honestly. Eligibility criteria included (1) self-identifying as Latino, (2) being over 18 years of age, and (3) having worked at a thoroughbred farm in one southeastern state for at least 9 months in the past year. Prior to administering the survey, workers were informed of the purpose, procedures, risks, and benefits of participating and were given a participation fact sheet and an opportunity to ask questions. Verbal consent was obtained before proceeding. A waiver of documentation of informed consent and all research procedures were approved by the University of Kentucky's Non-Medical Institutional Review Board (IRB). Participants were given a $15 gift card to Wal-Mart for their participation in the interview, which lasted between 1 and 1.5 hours.

Interviewer training

Four lay health promoters (*Promotoras*) recruited participants and collected survey data via face-to-face interview. Prior to collecting data, all interviewers were trained in the study's purpose, human participants' protection, and survey administration—including question-by-question details of the survey. At the end of the training, each interviewer completed 5 observed pilot

interviews. After half of the interviews were complete, study personnel observed an additional interview to ensure continued fidelity to the study protocol. In addition, all interviewers met weekly with the project manager, who reviewed completed surveys and addressed any questions or complications. Questionnaire content was adapted from translated standardized measures where available.[21,28,30] Other content was translated into Spanish by a native Spanish speaker, reviewed by a second native Spanish speaker, and further reviewed by the 4 interviewers, all of whom were native Spanish speakers with previous experience with Latino horse farm workers. A cultural consultant with the IRB reviewed and approved the final questionnaire.

Measures

Musculoskeletal discomfort

Musculoskeletal discomfort (MSD) consisted of items from the National Institute for Occupational Safety and Health Body Discomfort Interview Guide and included pain experienced in the past 12 months as a result of one's horse farm work to any of the following 11 body parts: neck, shoulders, elbows, wrists, hands, upper back, lower back, upper legs, knees, lower legs, and ankles/feet.[31] For each body part where pain was experienced, data were collected on the frequency of pain in the past year (1 = at least once; 2 = every month; 3 = every week; 4 = every day) and the severity of pain (1 = mild; 2 = moderate; 3 = severe; 4 = unbearable). If a worker did not report discomfort or pain in a body part, frequency and severity were recorded as 0. For each body part, frequency was multiplied by severity, and the products were summed for the 11 body parts. According to the sums, the workers were divided into tertiles, and those in the highest tertile were regarded as having elevated MSD; those in the first and second tertiles were regarded as having low MSD.[28] Tertiles were used in order to distinguish between workers who experienced either mild or infrequent pain. This analytic approach has been used previously among migrant farmworkers.[27] Using this approach, we identified workers with elevated MSD in the following body regions: neck/back (neck, upper back, lower back), upper extremity (shoulders, elbows, wrists, hands), and lower extremity (upper legs, knees, lower legs, ankles/feet).

Potential predictors for MSD

Predictor variables include age group, gender, education, years working on horse farms, hours worked per week, safety climate, and physical demands. Except for sex and education, for all variables, workers were divided into two groups, dichotomized at the median.

Demographics. Most demographic questions, including educational attainment and language acquisition, were taken from the Spanish translation of the National Agricultural Workers Survey.[30] *Age* in years was collected as a continuous variable and dichotomized into two age groups, ≥ 35 years and < 35 years; sex was collected as a dichotomous variable (female and male).

Educational attainment. The highest level of education completed was collapsed into two categories: low (≤ elementary school) and higher (> elementary school). *Elementary school* is defined as grades 1–6 to match the educational system most common in Mexico.

Work-related variables. *Years working on horse farms*, recorded as a continuous variable, was divided into long tenure (> 9.1 years) and short tenure (≤ 9.1 years). *Hours worked per week* was calculated by multiplying the respondents' number of *hours worked per day* and their *days worked per week*, both recorded as continuous variables. This was then dichotomized into long (> 48 hours) and short (≤ 48 hours); 48 hours signifies both the median work hours per week and the length of a typical work week for this worker group.[10]

Safety climate was measured using Gillen's 10-item Perceived Safety Climate Scale,[25] which has been adapted by other researchers with Latino worker populations.[21,28] The scale is composed of 10 items with a higher score indicating greater climate of workplace safety. Items 1 through 9 used the same response categories measuring level of agreement with each statement (1 = strongly disagree; 4 = strongly agree). Item 9, "The possibility of being injured at work in the next 12 months is very likely" was reverse coded to match the direction of the rest of the scale. Item 10 was composed of 3 answer categories measuring the extent to which supervisors cared about workers' safety with answer categories (1 = only interested in doing the job fast and cheaply; 2 = they could do more to make your job safe; 3 = they do as much as possible to make your job safe). To sum across all 10 items, response categories for question 10 were made comparable by recoding the low and high extremes into 1 and 4, respectively, and the intermediate value into 2.5. The scale range was 10–40 with a Cronbach's α of 0.81. Scores were divided at the scale median into good safety climate (≥ 23) and poor safety climate (< 23).

Physical demands were measured via the Dutch Musculoskeletal Questionnaire,[32] a 20-item scale measuring how often workers exerted themselves through various mechanisms (eg, "working in a twisted position for long periods of time," "moving loads more than 50 lbs"). Response categories were a 5-point Likert-type scale (0 = never to 4 = almost always) and were summed with greater totals

equaling greater physical demands. The scale range was 0–80 with a Cronbach's α of 0.86. Workers were then divided into 2 groups at the median score representing low (<41) and high physical demands ($\geq$ 41).

Statistical analysis

The characteristics of workers with and without any elevated musculoskeletal discomfort (MSD) were compared using a chi-square test. To identify variables associated with elevated MSD, we performed modified Poisson regression (PROC GENMOD) to calculate prevalence ratio (PR) and 95% confidence interval (CI).[33] First, we performed bivariate analyses (Model 1) to examine the relationship between each variable and any elevated MSD outcome; next, we added age group and sex in the regression models as covariates to examine the influences of age and sex on effect estimates (Model 2); we further added all other relevant variables (education, years working on horse farms, hours worked per week, safety climate, and physical demands) in the models (Model 3) as covariates to examine the adjusted relationships between the predictor variables and MSD outcomes.

All statistical tests were two sided and were performed using SAS 9.3.[34] A p value $\leq$ .05 was considered statistically significant.

Results

A total of 225 Latino workers participated in the study (response rate was not possible to calculate due to the combination of active and passive methods of recruitment); 86% were men, 40% had an elementary school education or less, and the average age was 35 years (range 18–65). On average, workers had worked on horse farms for 11 years (range 0.8–39 years) and worked an average of 48 hours per week (range 24–72 hours). Eighty-five percent of the sample reported the presence of work-related musculoskeletal discomfort (MSD) in at least one body part in the past year; 66% reported MSD in the neck/back region; 68% reported the presence of MSD in the upper extremity region; and 60% reported the presence of MSD in the lower extremity region. As per research protocol, the upper tertile of workers experiencing MSD (32%) were considered to have had some form of elevated MSD in the past year. Among those workers reporting elevated MSD in the past year, the following ranges were reported: MSD in at least one body part, range 19–101; neck/back MSD, range 6–44; upper extremity MSD, range 7–28; lower extremity MSD, range 6–40.

Compared to those with low MSD, workers with elevated MSD were older, had worked longer on horse farms, and worked more hours per week. There were no significant differences by sex, education, safety climate, and physical demands at work (Table 1).

Table 2 shows the prevalence ratios (PRs) and 95% CIs for elevated MSD in relation to selected factors, derived from 3 models with different covariates. In the bivariate analyses, age, years working on horse farms, and hours worked per week were significantly associated with any elevated MSD. After adjustment for covariates

Table 1. Characteristics of the Latino workers stratified by status of having elevated musculoskeletal discomfort.

		Elevated MSD		
Factor	Total (%) (n = 225)	No (68%) (n = 153)	Yes (32%) (n = 72)	p value
Age (years)				.004
≥ 35	110 (49.3)	64 (42.4)	46 (63.9)	
< 35	113 (50.7)	87 (57.6)	26 (36.1)	
Sex				.259
Male	193 (85.8)	134 (87.6)	59 (81.9)	
Female	32 (14.2)	19 (12.4)	13 (18.1)	
Education				.744
Elementary school or below (low)	91 (40.4)	63 (41.2)	28 (38.9)	
Over elementary school (higher)	134 (59.6)	90 (58.8)	44 (61.1)	
Years working on horse farms				.001
> 9.1 years	112 (49.8)	65 (42.5)	47 (65.3)	
≤ 9.1 years	113 (50.2)	88 (57.5)	25 (34.7)	
Hours worked per week				.004
> 48 hours	49 (21.8)	25 (16.3)	24 (33.3)	
≤ 48 hours	176 (78.2)	128 (83.7)	48 (66.7)	
Safety climate				.220
Bad (< 23.0)	103 (49.0)	66 (46.2)	37 (55.2)	
Good (≥ 23.0)	107 (51.0)	77 (53.8)	30 (44.8)	
Physical demand at work				.320
High (≥ 41)	111 (49.3)	72 (47.1)	39 (54.2)	
Low (< 41)	114 (50.7)	81 (52.9)	33 (45.8)	

Note. MSD = musculoskeletal discomfort. Data are presented as proportion of workers in each subgroup stratified by status of MSD; p values indicate the comparisons between the two groups in the selected characteristics. Sample size does not equal 225 for age and safety climate due to incomplete survey data.

Table 2. Prevalence ratios and 95% confidence intervals of having elevated musculoskeletal discomfort in relation to selected factors ($N = 208$).

	Model 1		Model 2		Model 3	
Factor	PR	95% CI	PR	95% CI	PR	95% CI
Age group (≥ 35 vs < 35 years)	1.82	1.21, 2.72	1.85	1.24, 2.76	1.55	0.96, 2.49
Sex (female vs male)	1.33	0.83, 2.13	1.44	0.91, 2.27	1.47	0.91, 2.38
Education (low vs higher)	0.94	0.63, 1.39	0.88	0.60, 1.29	0.79	0.54, 1.16
Years working on horse farms (> 9.1 vs ≤ 9.1 years)	1.90	1.26, 2.85	1.65	1.04, 2.61	1.87	1.14, 3.05
Hours worked per week (> 48 vs ≤ 48 hours)	1.80	1.24, 2.61	1.78	1.26, 2.52	1.72	1.19, 2.48
Safety climate (poor vs good)[†]	0.78	0.52, 1.16	0.70	0.48, 1.04	1.50	1.01, 2.21
Physical demand (high vs low)[‡]	1.21	0.83, 1.78	1.19	0.82, 1.73	1.12	0.76, 1.65

Note. PR = prevalence ratio; CI = confidence interval. Model 1 was based on univariate analyses; Model 2 was adjusted for age group and sex; Model 3 was adjusted for all other variables in the table.
[†]Good safety climate is defined as a scale sum ≥ 23. Poor safety climate is defined as a scale sum < 23.
[‡]High physical demand is defined as a scale sum ≥ 41. Low physical demand is defined as a scale sum < 41.

in Model 3, longer tenure on horse farms (PR = 1.87; 95% CI: 1.14, 3.05), hours worked per week (PR = 1.72; 95% CI: 1.19, 2.48), and poor safety climate (PR = 1.50; 95% CI: 1.01, 2.21) were significantly associated with any elevated MSD.

When stratified by different body parts (Table 3), elevated MSD in neck and back was significantly associated with longer tenure on horse farms (PR = 1.52; 95% CI: 1.01, 2.29), greater number of hours worked per week (PR = 1.64; 95% CI: 1.15, 2.36), and poor safety climate (PR = 1.56; 95% CI: 1.09, 2.24); elevated MSD in upper extremities was significantly associated with older age (PR = 1.60; 95% CI: 1.06, 2.42) and poor safety climate (PR = 2.63; 95% CI: 1.70, 4.06); and elevated MSD in lower extremities was significantly associated with longer tenure on horse farms (PR = 1.53; 95% CI: 1.01, 2.31), greater number of hours worked per week (PR = 1.45; 95% CI: 1.02, 2.05, and being female (PR = 1.71; 95% CI: 1.15, 2.53).

Comment

A large proportion of Latino thoroughbred workers sampled (85%) reported work-related MSD in at least 1 body part in the past year. This result is consistent with data collected from both horse farms and Latino thoroughbred workers, demonstrating that sprains, strains, and tears accounted for a high proportion of injuries experienced by this worker group.[10,17] It is also consistent with research conducted with Swedish riding instructors, finding that 91% had experienced musculoskeletal symptoms in at least one region during the past year,[35] and with research among dairy workers indicating similarly high prevalences (76%, 84%, and 85%, respectively) of US, Swedish, and German dairy workers who experienced musculoskeletal symptoms in at least 1 body part in the past year.[36,37] Findings suggest that horse work is strenuous and may contribute to occupational-related MSD, which may lead to high costs to farms through days lost and/or presenteeism—where a sick or injured worker may come to work but not be functioning at full capacity. It also presents a possible financial and quality-of-life burden to workers.

Consistent with similar studies conducted with Latino migrant farmworkers and Latino poultry-processing workers,[21,28] poor safety climate was found to be significantly associated with elevated MSD in this study. We found poor safety climate was associated with over 2.5 times the likelihood of upper extremity pain and 1.5 times the likelihood of neck/back or any elevated MSD. These results suggest a poor safety climate may be

Table 3. Prevalence ratios and 95% confidence intervals of having elevated musculoskeletal discomfort in three body regions associated with selected factors ($N = 208$).

	Neck/back		Upper extremity		Lower extremity	
Factors	PR	95% CI	PR	95% CI	PR	95% CI
Age group (≥ 35 vs < 35 years)	1.03	0.69, 1.54	1.60	1.06, 2.42	1.06	0.72, 1.58
Sex (female vs male)	1.34	0.83, 2.15	1.40	0.87, 2.25	1.71	1.15, 2.53
Education (low vs high)	0.70	0.49, 1.01	1.10	0.76, 1.59	0.76	0.53, 1.10
Years working on horse farms (> 9.1 vs ≤ 9.1 years)	1.52	1.01, 2.29	0.90	0.59, 1.36	1.53	1.01, 2.31
Hours worked per week (> 48 vs ≤ 48 hours)	1.64	1.15, 2.36	1.23	0.82, 1.86	1.45	1.02, 2.05
Safety climate (poor vs good)[†]	1.56	1.09, 2.24	2.63	1.70, 4.06	1.30	0.91, 1.86
Physical demand (high vs low)[‡]	1.24	0.86, 1.77	0.99	0.68, 1.43	0.95	0.67, 1.35

Note. PR = prevalence ratio; CI = confidence interval.
[†]Good safety climate is defined as a scale sum ≥ 23. Poor safety climate is defined as a scale sum < 23.
[‡]High physical demand is defined as a scale sum ≥ 41. Low physical demand is defined as a scale sum < 41.

influential in the development of elevated MSD among Latino thoroughbred workers. These results are consistent with a trend analysis that shows that safety climate is an important predictor of musculoskeletal disorders across industries.[38] Interventions to improve the safety climate on thoroughbred farms—including enhanced training, communication of hazards and safety information, and provision of personal protective equipment—may prove fruitful in reducing the burden of MSD in this population. As training is often informal on thoroughbred farms,[11,13] workers may not consistently be shown safe work techniques or praised for safe conduct. Standardizing training and emphasizing proper ergonomics may help to reduce MSD in this population.

Increased number of work hours per week was associated with an increased likelihood of elevated neck/back MSD, elevated lower extremity MSD, and any elevated MSD. Such an association has been noted among Latino farm and poultry workers,[5,23] as well as among riding instructors.[35] The median cut point for our analyses, 48 hours a week, represents a typical work week for workers in this industry.[17] Opportunities for working extra shifts are prevalent in most agricultural industries when the demand for labor can heighten dramatically during the busy season. As agriculture is exempt from labor laws governing work hour limits,[39] the custom for many operations is to look to one's current staff when labor demand is high. However, this practice may be particularly problematic for immigrant workers who may feel powerless to decline extra hours or for whom the promise of extra wages may outweigh the risk of MSD.

Older workers reported higher likelihood of upper extremity MSD, and workers with longer tenure on horse farms reported a higher likelihood of neck/back pain or any elevated MSD than those with a shorter tenure. These findings are consistent with research conducted with other Latino farmworkers among whom older age was associated with MSD and longer employment was associated with pain in the hip, knees, neck, hands, and fingers.[5,21,22] Pointing to one possible explanation, Löfqvist and Pinzke[40] performed a task analysis on riding instructors and stable hands and found that mucking, bedding preparation, and sweeping—3 tasks that are repeated daily by grooms on horse farms[26]—involved a high number of awkward back postures. Given the relatively long tenure of workers at horse farms—an average of 11 years—if work is performed improperly, the adverse effects may accumulate over the duration of employment to cause MSD.

Despite the finding that longer tenure increased workers' likelihood of MSD, physical job demands were not associated with MSD of any kind. One potential explanation for this result is that workers in this generally young worker group (average age of 35) may be fit and accustomed to the physicality of the job. Another explanation is that turnover rates among workers exposed to higher levels of physical job demands and emerging physical pain may be higher than those with less exposure and less pain,[41] resulting in a healthy worker survivor population. This may be particularly true because workers in our study had to be employed at their current farm for 9 months, thus potentially excluding workers with shorter employment duration and emerging MSD. Alternatively, perhaps our measure of physical demands, which has been widely used in other industries,[21,22,42] did not fit the specific tasks required in horse work. Future research should use objective measures, such as task analysis,[40] to assess the physical burden of workers' tasks rather than relying on self-report data.

Finally, females reported a higher likelihood of elevated MSD in lower extremities than males, which is consistent with other studies in which female pig farmers,[43] female dairy workers,[44] and female general farmworkers,[45] reported higher rates of musculoskeletal pain than males. Looking specifically at Latino farmworkers, Xaio et al[5] found that females reported a higher prevalence of chronic pain in the low back, hips, neck, hands, and fingers than male Latino workers. Further research is needed to determine the implications of such gender differences in reported pain for Latina horse-worker health and safety.

This study's results should be interpreted in light of its limitations. A purposive, community-based sampling methodology was utilized to gather data from a small sample of Latino horse farm workers. Due to the small sample size and the potential for selection bias, the characteristics of this sample may not be generalizable. Further, this is a cross-sectional study, and thus temporal relationships of elevated MSD with predictor variables are not certain and causality cannot be ascertained. In addition, we relied upon self-report measures of exposures and musculoskeletal discomfort experienced in the past 12 months, which may introduce recall bias where workers may not accurately remember the frequency of exposures or experiences of discomfort. Furthermore, our measure of musculoskeletal discomfort is not a diagnostic tool for musculoskeletal disorders, but is a measure of perceived severity and frequency of pain, which may vary according to the pain tolerance of the worker. Finally, detailed information on job tasks performed was not collected, which would be helpful in isolating specific job exposures associated with elevated MSD. Despite its limitations, this study provides important information about the relationships of several work-related exposures with musculoskeletal discomfort in a vulnerable worker group.

Conclusions

This study assessed the work factors associated with elevated MSD among an understudied vulnerable population: Latino thoroughbred farm workers. Our findings revealed that similar to other horse handlers, musculoskeletal discomfort is common among this worker group. Further, demographic variables such as age and being female increased the likelihood of elevated MSD in certain body regions. Work-related variables associated with elevated MSD included longer tenure (> 9.1 years) working on horse farms, longer work hours per week (> 48 hours), and poor safety climate. According to our findings, standardizing worker orientation and training is recommended to improve safety climate. Training should incorporate proper ergonomic techniques, be linguistically and culturally relevant, and be repeated. In addition, farms should manage workers' hours or employ more staff to minimize the frequency of long hours as well as ensure that workers take adequate breaks throughout the day. Further research should assess workers' tasks in order to accurately assess the specific aspects of the work environment that lead to elevated MSD.

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