

# Evaluating Job Demands and Control Measures for Use in Farm Worker Health Surveillance

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**Abstract** Workplace stress likely plays a role in health disparities; however, applying standard measures to studies of immigrants requires thoughtful consideration. The goal of this study was to determine the appropriateness of two measures of occupational stressors ('decision latitude' and 'job demands') for use with mostly immigrant Latino farm workers. Cross-sectional data from a pilot module containing a four-item measure of decision latitude and a two-item measure of job demands were obtained from a sub-sample (N = 409) of farm workers participating in the National Agricultural Workers Survey. Responses to items for both constructs were clustered toward the low end of the structured response-set. Percentages of responses of 'very often' and 'always' for each of the items were examined by educational attainment, birth country, dominant language spoken, task, and crop. Cronbach's  $\alpha$ , when

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stratified by subgroups of workers, for the decision latitude items were (0.65–0.90), but were less robust for the job demands items (0.25–0.72). The four-item decision latitude scale can be applied to occupational stress research with immigrant farm workers, and potentially other immigrant Latino worker groups. The short job demands scale requires further investigation and evaluation before suggesting widespread use.

**Keywords** Farm workers · Immigrant · Decision latitude · Job demands · Job control · Job stress

## Background

There is substantial interest in the role of workplace psychosocial stressors in creating and exacerbating health disparities experienced by racial minorities and immigrants [1]. This interest builds from a large and growing literature on the negative health effects of psychosocial stressors in

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the workplace [2–5]. Unfortunately, the evidence base for linking workplace psychosocial stressors to health outcomes among immigrants remains under-developed [6–9]. A major impediment to advancing understanding of the potential role of workplace psychosocial stressors in health disparities is the absence of standardized measures that are understood by immigrants from different ethnic backgrounds and applicable to their jobs.

Farm workers provide an excellent model for illustrating the challenges of measuring workplace psychosocial stressors among immigrants. There are an estimated 1.4 million hired crop and nursery workers in the United States [10]. Estimates from the most recent National Agricultural Workers Survey (NAWS) indicate that the median and modal level of education among farm workers is 6 years in Mexico [11]. Low educational experience and corresponding inexperience responding to highly structured instruments (e.g., test-taking) coupled with speaking Spanish or an indigenous language, raise questions about farm workers' ability to understand and respond to standardized questions. Finally, the tasks involved in many facets of agricultural and the manual nature of the work raises basic questions about the applicability and relevance of scales used to evaluate workplace psychosocial stressors and their relationship to the health of farm workers. The challenge of administering standardized questionnaires and assessments to farm workers, and presumably to other Latino immigrants with a similar demographic profile, was recently illustrated [12, 13].

The demands-control model is among the most prominent theories of job stress [4, 14–16] in occupational health research. The original model argued that psychological strain among workers is a function of two features of the work environment: demands and control [15, 16]. Job demands are the patterned and unexpected psychological stressors that arise while carrying out job tasks and responsibilities; demands are illustrated by prolonged or frequent periods requiring intense concentration, working at a rapid speed, physically demanding work, and unrealistic production goals. Control refers to the degree of freedom workers have over which job tasks are performed. Control frequently co-exists with variety or the degree workers are able to use or develop an assortment of skills in accomplishing job tasks; consequently, Karasek and Theorell [15] advocate combining these concepts to create a second-order construct called "decision latitude". Evidence suggests that greater decision latitude is associated with better health, and greater job demands are associated with poorer health [2–4, 17–20]. Only a few studies have examined the demands and control model using modified questions in primarily Latino farm worker populations [9, 21].

The goal of this study is to determine the appropriateness of decision latitude and job demands measures for use with

immigrant Latino (mostly rural Mexican) farm workers. To achieve this goal we used data collected from a field test of a module added to the NAWS to: (1) determine the amount of variability within decision latitude and job demands ratings of farm workers, given the highly physical, low-skilled nature of many farm work jobs; (2) examine variability in decision latitude and job demands ratings by personal and job characteristics; (3) examine internal consistency of items to form scales and scale variation across personal and job characteristics; and (4) determine if decision latitude and job demands ratings are predicted by objectively different job characteristics.

## Methods

Data for this analysis are from interviews collected during the spring 2006 cycle of the NAWS (N = 409). The NAWS is the primary source of data on U.S. hired farm workers. Each year since federal fiscal year 1989, NAWS interviews have been conducted with a national probability sample of field workers employed in crop agriculture, not including workers with a temporary work permit (H-2A visa). The U.S. Department of Labor (DOL), Employment and Training Administration (ETA) sponsors the NAWS, and it is fielded by a private company under contract to DOL/ETA. Data used for these analyses include those from a National Institute for Occupational Safety and Health (NIOSH)-sponsored psychosocial supplement.

### Sampling

A detailed description of the NAWS sampling, weighting, field data collection procedures and questionnaire can be found elsewhere (see <http://www.doleata.gov/agworker/naws.cfm>), but is summarized here. The goal of the NAWS sampling strategy is to select a nationally representative sample of hired crop and nursery farm workers. The NAWS uses a multi-stage sampling design to account for seasonal and regional fluctuations in the level of farm employment. The year is divided into three interviewing cycles, each lasting 4 months to capture seasonal fluctuations in the agricultural work force. The number of interviews allocated to each cycle is proportional to the crop payroll at that time of the year. Participants for this pilot were drawn from the third cycle of interviewing in March 2006. Hired crop and nursery workers were sampled from 12 regions and 17 states including eight of the ten largest states (CA, FL, OR, TX, NC, PA, IL, AZ) in terms of hired and contract farm labor expenses in crop agriculture. Collectively, hired and contract labor expenses in these 17 states comprised 90 % of \$14.2 billion of reported crop labor expenses in the U.S. Department of Agriculture 2007 Census of Agriculture.

During each interview cycle, sample selection is implemented in four levels: region, county cluster, employer, and field worker. At the highest level, the NAWS sampling scheme divides the continental United States into 12 regions. Each region in turn consists of clusters of counties that have similar farm labor usage patterns. County selection is made from a roster of randomly selected county clusters. For every cycle, in each region, a random sample of county clusters from the roster is selected. Following this, agricultural employers are selected using simple random sampling. NAWS staff compile a list of agricultural employers from public agency records. Field staff review, supplement, and update the lists annually using local information. A \$20 honorarium given to farm workers has enabled the study to achieve an estimated worker response rate of 90 %.

### Data Collection

All NAWS data are collected through questionnaires in a face-to-face interview by trained interviewers. Before approaching workers, interviewers are trained to contact the selected farm employers, explain the purpose of the survey, and obtain access to the work site in order to schedule interviews. Interviewers then go to the farm, ranch, or nursery, and select a random sample of workers using field sampling techniques. As such, the sample includes only workers actively employed in agriculture at the time of the interview. DOL obtained Office of Management and Budget approval to add the psychosocial supplement to the NAWS. Human Subjects approval was obtained as a surveillance activity through the Centers for Disease Control and Prevention/NIOSH Human Subjects Internal Review Board. Prior to collecting data, interviewers explained the purpose of the survey to the workers, asked them to participate, and obtained informed consent. Interviewers administered the questionnaire in the location and language of the worker's choice; in 2006 78 % of interviews were conducted in Spanish. The average interview length of the NAWS questionnaire is about 1 h. The instrument includes questions on sociodemographic, cultural, employment, and job characteristics from the core NAWS questionnaire. Psychosocial questions were included in the 2006 NAWS pilot questionnaire for all respondents; the refusal rate was 40 % for growers and ten percent for farm workers.

### Measures

#### *Decision Latitude and Job Demands*

The measures used were adapted and condensed from the Job Content Questionnaire [15, 16]. Evidence indicates that

partial scales with multiple items can effectively assess the same underlying constructs as the complete survey instrument [15]. Questions were selected by Spanish speaking investigators with previous experience using these scales. The supplement was translated using group translation and with native Spanish-speaking staff, and previously underwent cognitive testing and focus group analysis [12, 13].

Decision latitude was measured with four items asking 'In your current farm work job, how often...' (1) do you have a lot of say about what happens on your job?" (2) does your job require a high level of skill?" (3) do you have the freedom to decide how to do your farm work?" and (4) does your job require you to be creative?" Questions 1 and 3 reflected 'control' while questions 2 and 4 reflected 'variety.' Job demands was measured with two items asking 'In your current farm work job, how often...: (1) does your job in farm work require you to work very hard?" and (2) are you asked to do an excessive amount of work?" The response-set for both the decision latitude and job demands items was: 0 = 'Never' or 'Nunca'; 1 = 'Sometimes' or 'A Veces'; 2 = 'Very often' or 'Muy seguido' and 3 = 'Always' or 'Siempre'.

Several personal and occupational characteristics were used to examine discriminative validity for evaluating the decision latitude and job demands measures. Three personal characteristics with the potential to create systematic sources of response patterns were examined. First, we focused on educational attainment as an indicator of the participants' ability to understand relatively abstract concepts, and respond to structured interview items. Second, to capture possible cultural variation in item interpretation we considered country of birth (i.e., U.S., Mexico, Other), and third, as an additional indicator of cultural variation in interpretation, we examined language preference for conversing (i.e., English, Spanish, Indigenous language).

Our analyses also focused on job characteristics rated by two substantive experts as likely to have objectively different decision latitude and job demands characteristics. Semi-skilled jobs included all machine operations including preparing and harvesting crops, as well as jobs that involve more decision making and are self-paced such as irrigator and pesticide applicator. The remaining jobs, generally, done by hand were divided into pre-harvest, harvest, and post-harvest; Pre-harvest tasks are related to cultivation and involve pruning and caring for trees, hoeing, thinning, weeding of plants and transplanting when done or assisted by hand as well as caring for seedlings and plants in greenhouses. All of these tasks involve care for the crop so as to ensure future harvest. These jobs are sometimes done individually and in crews, but rarely are they machine-paced. Harvesting jobs are generally performed in crews, under tight supervision and are frequently machine-paced. Post-harvest tasks usually require intense

fine motor activity in sorting, packing, labeling, bunching and care for product presentation. They can be machine-paced and are often done in an assembly line-like setting located near or in the fields.

Differences in decision latitude and job demands may also be found in type of crop (field crops, fruits and nuts, horticulture, vegetables, and miscellaneous and multiple crops). For example, tree fruit and nut crops often involve tasks that require working with ladders and implements, such as pruning shears, and consideration such as how and where to place the ladder and which and how much growth should be removed in order to maximize the current year's harvest while preserving next year's yield. Vegetable crops generally involve tasks that require stooping and bending, and the required level of care and technique on the part of the worker that is typically determined by the cultivation or harvesting method. Horticultural crops often involve tasks that require workers to be cross-trained to regularly perform multiple activities, such as soil preparation, transplanting, and plant propagation. Field crops, except tobacco, are highly mechanized and the pace of work is often set by the speed of the planter or harvester.

## Data Analysis

Frequency counts and percentages were calculated for each item for the overall sample and selected subsamples. Counts and percentages were then calculated for those participants responding 'very often (*muy seguido*)' or 'always (*siempre*)' for each scale item by the three characteristics hypothesized to affect response patterns (education, country of birth, spoken language preference). Additionally we examined variation in the percentage of 'very often' or 'always' responses for each scale item by task and crop category to further assess discriminative validity. Chi square tests were used to determine significance. Cronbach's  $\alpha$  with 95 % confidence intervals were calculated to evaluate the internal consistency of the decision latitude and job demands scales. Eisinga et al. [22] recommend the use of Spearman-Brown coefficients for two item scales therefore these were also calculated. Finally we developed two multivariate logistic regression models based on the discriminative characteristics presented in this study to examine variation in dichotomous measures of decision latitude and demand by personal characteristics and job characteristics. The four decision latitude items were summed as were the two demands items, and then both summary scores were dichotomized. High decision latitude was defined as a score of  $>3$ ; and high job demands was a score of  $\geq 1$ . Personal characteristics included sex, marital status, educational attainment, country of birth, dominant spoken language, and documentation to work in the U.S. Job characteristics included

**Table 1** Characteristics of the farm worker sample (NAWS, 2006)

Characteristic	N	%
Sex		
Male	318	77.7
Female	91	22.2
Country of birth		
Mexico	294	71.9
U.S.	96	23.5
Other	19	4.6
Age (years)		
18–24	107	26.2
25–29	61	14.9
30–39	92	22.5
40 or more years	149	36.4
Education (years)		
0–6	207	50.6
7–9	89	21.8
10 or more years	113	27.6
Marital status		
Not married	156	38.1
Married, away from spouse	77	18.8
Married, with spouse	176	43.0
Dominant spoken language (most comfortable conversing in)		
English	96	23.5
Spanish	298	72.9
Indigenous language	15	3.7
Years working in U.S. agriculture (years)		
1 or less	54	13.2
2–3	49	12.00
4–7	89	21.8
8 or more years	217	53.1
Worker type		
Migrant worker	105	25.7
Settled worker	304	74.3
Documentation to work in U.S.		
No	218	53.3
Yes	191	46.7

were years working in U.S. agriculture, type of employer (grower/nursery/packing house vs. farm labor contractor), task, crop, and wages in quartiles. Both personal and job characteristics were included in each model. The models were assessed using the c-statistic goodness of fit test.

## Results

Participants were predominantly men (78 %) from Mexico (72 %) (Table 1). Although a substantial proportion of participants were younger than 25 years of age, the

**Table 2** Frequency of responses to individual decision latitude and job demands items (NAWS, 2006)

Scale items	Total	Never		Sometimes		Very often		Always	
		<i>Nunca</i>	<i>N</i> %	<i>A. veces</i>	<i>N</i> %	<i>Muy Seguido</i>	<i>N</i> %	<i>Siempre</i>	<i>N</i> %
En su trabajo de campo actual (FW), ¿cuán seguido...	N								
Decision latitude									
do you have a lot of say about what happens on your job?	404	154	38.1	174	43.1	47	11.6	29	7.2
... <i>le dan oportunidad para expresar su opinión sobre lo que pasa en el trabajo?</i>									
does your job require a high level of skill?	405	176	43.5	146	36.1	60	14.8	23	5.7
... <i>su trabajo requiere que tenga mucho conocimiento y habilidad (o destreza)?</i>									
do you have freedom to decide how to do your job?	405	166	41.0	146	36.1	57	14.1	36	8.9
... <i>tiene usted libertad de decidir cómo hacer su trabajo?</i>									
does your job require being creative?	401	195	48.6	143	35.7	37	9.2	26	6.5
... <i>su trabajo requiere que usted pueda improvisar o ser creativo?</i>									
Job demands									
does your job require working hard?	406	163	40.2	204	50.3	26	6.4	13	3.2
... <i>su trabajo de campo es muy?</i>									
are you asked to do excessive work ?	406	281	69.2	111	27.3	9	2.2	5	1.2
... <i>le piden (exigen) que trabaje en?</i>									

majority of farm workers were 30 or more years of age, with 36 % being 40 or older. Participants had little formal education; one-half of the sample reported 0–6 years of education. Most farm workers (43 %) were married and accompanied with their spouse, but over one-third of the sample was unmarried, and 19 % were married, but unaccompanied by their spouse. The vast majority of participants reported Spanish as their dominant/comfortable conversing language (73 %), and half reported working in U.S. agriculture for eight or more years. One-quarter migrated for work, and almost half lacked legal documents to work in the U.S.

Responses to the decision latitude items were clustered towards the bottom of the scale (Table 2). Only 15 % of farm workers responded ‘Very often’ or ‘Always’ to any of the decision latitude items. ‘Never’ was the modal response to all items except for ‘Having a lot to say on the job’. This item had the highest percentage saying ‘Sometimes’ (43 %). The other three items had slightly more than one-third of respondents (36 %) responding ‘Sometimes’. Almost half of respondents said their job ‘Never’ required creativity. Almost one quarter of respondents (23 %) answered ‘Never’ to all 4 questions, scoring 0 on the composite scale. Item non-response for the decision latitude scale was 1.3 %.

Responses to the job demands questions were also clustered at the low end of the response set (Table 2). Despite the physical nature of many farm work jobs, 40 %

of respondents said their job ‘Never’ required working hard, and 69 % said they were ‘Never’ asked to do excessive work. Less than 10 % said they ‘Very often’ or ‘Always’ worked hard; and less than 5 % said they ‘Very often’ or ‘Always’ were asked to do excessive work. Forty percent of respondents answered ‘Never’ to both questions scoring 0 on the composite scale. Item nonresponse for the job demands scale was 0.73 %.

#### Personal Characteristics

First we examined variability in item response across personal characteristics as potential sources of difference in item understanding. Percentages for responses of ‘very often’ and ‘always’ to each item by educational attainment, country of birth, and primary language spoken are presented in Table 3.

#### Decision Latitude

Farm workers who reported having higher education and being born in the U.S. had higher percentages of indicating “very often” and “always” to each decision latitude item. In addition, a greater percentage of farm workers whose dominant spoken language was English in contrast to those whose dominant language was Spanish reported ‘very often’ or ‘always’ for 3 of the 4 decision latitude items.

**Table 3** Variability in percent of responses of ‘very often’ and ‘always’ for decision latitude and job demands items by personal characteristics (education, birth country, and language) (NAWS, 2006)

Scale items	Total	Educational attainment (years)			Country of birth				Language	
		0–6	7–9	10+	U.S.	Mexico	Other <sup>a</sup>	English	Spanish	Indigenous
Sample size	409	207	89	113	96	294	19	96	298	15
Decision latitude										
Having a lot to say on job	18.81	13.24	14.77	32.14	35.79	13.79	10.53	35.79	14.29	0.00
Job requires high skill	20.49	18.14	15.73	28.57	28.42	17.53	26.32	27.37	18.98	6.67
Freedom to make decisions	22.96	16.18	19.10	38.39	44.21	16.49	15.79	45.26	16.95	0.00
Job requires being creative	15.71	10.89	10.34	28.57	28.42	11.85	10.53	29.47	11.68	6.67
Job demands										
Job requires working hard	9.61	7.84	5.62	15.93	12.50	8.93	5.26	13.54	8.81	0.00
Asked to do excessive work	3.45	2.94	5.62	2.65	2.08	4.12	0.00	2.08	4.07	0.00

<sup>a</sup> Represents country of birth other than the U.S. or Mexico

### Job Demands

Response patterns for educational attainment were less clear by educational attainment. A greater percentage of farm workers having 10 or more years of education in contrast to those with less education reported ‘very often’ or ‘always’ for the item ‘my job requires working hard.’ Responses to the item ‘asked to do excessive work’ did not differ by education. Neither country of birth, nor dominant language spoken were significantly associated with either job demand item.

### Job Characteristics

The second approach to evaluating differential response patterns was consideration of the consistency and correspondence of farm worker ratings across jobs with known variability in decision latitude and job demands. To examine the relationship between scale items and job characteristics, we compared the percent of farm workers responding ‘very often’ or ‘always’ to each item by crop and task categories (Table 4).

### Decision Latitude

Farm workers performing semi-skilled tasks had higher percentages of responses of ‘very often’ or ‘always’ to each decision latitude item compared to pre-harvest, harvest, and other tasks. Counter to our expectation, farm workers who worked in field crops had higher percentages of responses of ‘very often’ or ‘always’ to 3 of the 4 decision latitude items compared to those working on other crops.

### Job Demands

For the item ‘job requires working hard’ farm workers performing semi-skilled tasks had a higher percentage of

responses of ‘very often’ or ‘always’ compared to pre-harvest. Percentages between tasks for the item ‘asked to do excessive work’ were not significantly different. Farm workers who worked in field crops had higher percentages of responses of ‘very often’ or ‘always’ to the item ‘job requires working hard’ than those in working in other crops. The percentages of responses of ‘very often’ or ‘always’ did not significantly differ by crop for the item ‘asked to do excessive work’.

The Cronbach’s  $\alpha$  for the decision latitude scale showed good internal consistency ( $\alpha = 0.85$ ; 95 % CI 0.72–0.99) (Table 5). When stratified by potential sources of differential response patterns, with the exception of those born elsewhere (not in the U.S. or Mexico,  $\alpha = 0.65$ ), Cronbach’s  $\alpha$ s ranged from 0.81 to 0.90. The overall Cronbach’s  $\alpha$  for job demands was 0.69 (95 % CI 0.48–0.91). Stratification by educational attainment, birth country, and dominant spoken language yielded Cronbach’s  $\alpha$ s of 0.55–0.72 (with the exception of born other than in the U.S. or Mexico,  $\alpha = 0.25$ ). Results for the Spearman-Brown coefficient for the job demands scale were equal to, or slightly higher than Cronbach’s  $\alpha$ s.

Results of multivariate regression analyses examining associations of high decision latitude and high psychological demands scores with personal and job characteristics are presented in Table 6. Multivariate logistic regression models included characteristics presented in Tables 1, 2, 3, and 4, which included personal characteristics (sex, marital status, educational attainment, country of birth, and dominant spoken language) along with job characteristics (documentation to work in the U.S., years in U.S. agriculture, migrant worker, working for grower/nursery/packing house vs. farm labor contractor, crop, task, and wage). Logistic regression results showed that scale-score based decision latitude was not significantly associated with personal characteristics including sex, marital status,

**Table 4** Variability in percent of responses of ‘very often’ and ‘always’ for decision latitude and job demands items across tasks and crops (NAWS, 2006)

Scale items	Tasks					Crops				
	Pre-harvest	Harvest	Post-harvest	Semi-skilled	Other	Field crops	Fruits and nuts	Horticulture	Vegetables	Miscellaneous and multiple
Sample size	96	35	26	78	174	60	95	160	80	14
Decision latitude										
Having a lot to say on job	13.54	5.71	16.00	29.49	20.00	40.00	10.53	17.42	12.50	35.71
Job requires high skill	15.63	2.86	11.54	38.46	20.00	31.67	15.79	21.15	16.25	21.43
Freedom to make decisions	17.71	8.57	19.23	35.90	23.53	50.00	10.53	23.72	15.00	28.57
Job requires being creative	12.63	0.00	12.50	26.92	15.98	46.67	3.16	15.79	7.50	14.29
Job demands										
Job requires working hard	3.13	8.57	8.33	17.95	9.83	21.67	8.60	8.18	2.50	21.43
Asked to do excessive work	0.00	2.86	4.17	1.28	6.36	0.00	3.23	5.66	0.00	14.29

**Table 5** Estimated internal consistency (Cronbach’s  $\alpha$ ) and 95 % confidence intervals (CI) for decision latitude and job demands by educational attainment, birth country, and dominant language spoken (NAWS, 2006)

	Decision latitude		Job demands	
	Alpha	95 % CI	Alpha	95 % CI
Total sample	0.85	(0.72–0.99)	0.69	(0.48–0.91)
Educational attainment (years)				
0–6	0.83	(0.69–0.98)	0.72	(0.53–0.92)
7–9	0.87	(0.76–0.99)	0.71	(0.50–0.92)
10 or more years	0.82	(0.65–0.98)	0.59	(0.30–0.88)
Birth country				
U.S.	0.85	(0.71–0.95)	0.67	(0.44–0.90)
Mexico	0.82	(0.67–0.98)	0.70	(0.50–0.91)
Other <sup>a</sup>	0.65	(0.41–0.98)	0.25	(0.00–0.77)
Language				
English	0.81	(0.65–0.98)	0.66	0.41–0.91
Spanish	0.84	(0.69–0.98)	0.69	0.45–0.91
Indigenous	0.90	(0.86–0.94)	0.55	0.27–0.83

<sup>a</sup> Represents country of birth other than the U.S. or Mexico

educational attainment, country of birth, and dominant spoken language ( $p > 0.05$ ). However it was significantly associated with most job characteristics including years working in U.S. agriculture ( $p = 0.0181$ ), working for a grower/nursery/packing house versus farm labor contractor ( $p = 0.0485$ ), and wages ( $p = 0.0170$ ). In contrast, using the same model, we found that scale-score based job demands was significantly associated with educational attainment of the farm worker ( $p \leq 0.0001$ ), and only one

job characteristic—number of years working in U.S. agricultural jobs ( $p \leq 0.0001$ ). This suggests that job demands scale scores were not associated with more objective aspects of the job. The c-statistic for the full model for decision latitude was 0.83 (very good) and for job demands, the c-statistic was 0.72 (acceptable fit).

## Discussion

The job demands-control model is widely used in occupational stress research. Although there have been some applications of the demands-control model to health-related outcomes among immigrant workers [9, 21], the widespread application of this popular model remains encumbered by the absence of careful measurement evaluation. Indeed, in their recent summary of the literature, Landsbergis et al. [1] reported that measurement evaluation of common instruments in the occupational stress literature is an essential step in advancing understanding of occupational health disparities. This study was designed to meet that call, and in doing so it makes two primary contributions to the literature.

The item-set intended to measure decision latitude (i.e., the ‘control’ element of the demands-control model) performed well. Farm workers’ responses to each of the decision latitude items clustered at the low end of the response continuum, which was expected given previous qualitative analyses of these items [12]. Further, bivariate differences in responses to individual items behaved as expected: individuals with greater educational attainment

**Table 6** Logistic regression models for decision latitude and job demands, odds ratios (OR) and 95 % confidence intervals (CI) (NAWS, 2006)

Characteristics	Decision latitude		Job demands	
	OR	95 % CI	OR	95 % CI
Sex				
Men versus women	1.11	(0.57, 2.15)	0.81	(0.44, 1.48)
Marital status				
Not married versus married living with spouse or family	0.92	(0.42, 2.02)	1.05	(0.51, 2.18)
Married and not living with spouse or family versus married with living with spouse or family	0.61	(0.34, 1.12)	0.94	(0.54, 1.63)
Educational attainment (years)				
7–9 versus $\leq 6$	1.34	(0.69, 2.58)	1.02	(0.52, 1.81)
$\geq 10$ versus $\leq 6$	1.96	(0.84, 4.57)	<b>2.67</b>	<b>(1.17, 6.10)</b>
Country of birth				
Born in Mexico versus born in U.S.	1.03	(0.14, 7.59)	2.59	(0.35, 19.43)
Born in other <sup>a</sup> country versus born in U.S.	1.54	(0.18, 13.01)	4.19	(0.48, 36.73)
Dominant language spoken				
Spanish versus English	0.11	(0.01, 2.23)	0.15	(0.01, 1.69)
Indigenous versus English	0.50	(0.07, 3.68)	0.53	(0.07, 4.00)
Documentation				
Has documentation to work in U.S versus not having	1.39	(0.72, 2.68)	0.78	(0.41, 1.48)
Years working in U.S. agriculture				
2–3 versus $\leq 1$	<b>2.87</b>	<b>(0.80, 10.22)</b>	<b>3.15</b>	<b>(1.27, 7.83)</b>
4–7 years versus $\leq 1$	<b>5.27</b>	<b>(1.62, 17.82)</b>	<b>5.12</b>	<b>(2.05, 2.81)</b>
$\geq 8$ versus $\leq 1$	<b>5.79</b>	<b>(1.84, 18.22)</b>	<b>8.04</b>	<b>(3.27, 19.74)</b>
Migrant worker—yes migrate versus no (settled)	1.17	(0.59, 2.30)	1.61	(0.85, 3.04)
Type of employer				
Grower/nursery/packing house versus farm-labor contractor	<b>2.84</b>	<b>(1.01, 7.99)</b>	1.96	(0.83, 4.63)
Crop				
Fruits and nuts versus field crops	0.26	(0.10, 0.68)	0.43	(0.18, 1.06)
Horticulture versus field crops	0.37	(0.14, 1.00)	0.41	(0.17, 1.02)
Vegetables versus field crops	0.48	(0.17, 1.38)	0.69	(0.26, 1.83)
Miscellaneous and multiple versus field crops	0.88	(0.21, 3.73)	1.46	(0.30, 6.98)
Task				
Pre-harvest versus semi-skilled	0.75	(0.32, 1.79)	0.91	(0.42, 1.96)
Harvest versus semi-skilled	0.39	(0.11, 1.45)	1.13	(0.39, 3.27)

**Table 6** continued

Characteristics	Decision latitude		Job demands	
	OR	95 % CI	OR	95 % CI
Post-harvest versus semi-skilled	0.46	(0.14, 1.48)	0.83	(0.29, 2.37)
Other versus semi-skilled	0.54	(0.23, 1.27)	0.84	(0.39, 1.81)
Wages				
Quartile 2 versus Quartile 1	<b>2.24</b>	<b>(1.04, 4.29)</b>	1.49	(0.76, 2.92)
Quartile 3 versus Quartile 1	<b>2.56</b>	<b>(1.15, 5.69)</b>	1.92	(0.93, 3.96)
Quartile 4 versus Quartile 1	<b>3.73</b>	<b>(1.64, 8.50)</b>	1.16	(0.55, 2.44)

Values in bold are those that are significant at  $p < .05$

Both personal characteristics and job characteristics are included in each model

C-statistic for decision latitude is 0.831 and c-statistic for job demands is 0.723

<sup>a</sup> Other represents country of birth other than the U.S. or Mexico

and whose jobs were characterized as ‘semi-skilled’ reported greater decision latitude than those with less education and more manual jobs. More impressive, results of multivariate analyses indicated that objective features of the job (e.g., years working in U.S. agriculture) along with employment arrangements (e.g., wages, working for grower/nursery/packing house versus contractor) were the only significant predictors of decision latitude. These results combined with an acceptable internal consistency suggest that decision latitude can be reliably and validly measured with items used in the current study. These robust measurement properties also allow greater confidence in interpreting results from previous studies suggesting that greater decision latitude has protective effects on occupational health outcomes for immigrant workers in labor intensive occupations like farm work [9, 21].

The second main finding of this analysis is that the items intended to measure psychological demands (i.e., the ‘demands’ element of the demands-control model) performed comparatively poorly. Like the decision latitude items, responses to the individual demands items clustered toward the low end of the response continuum. However, unlike the decision latitude items, there was no clear pattern in bivariate differences observed in responses to individual items. For example, although previous research suggests that individuals with higher levels of education report greater psychological demands (see Landsbergis et al. [1] for review), we did not observe a consistent pattern for those responding ‘very often’ or ‘always’ for the

two job demands items. Although 'Job requires working hard' had a higher percentage of farm workers with 10 or more years of education, this did not hold for the second job demands item. Further, results from multivariate analyses indicated that educational attainment remained a significant predictor of psychological demands, whereas most objective features of the job or the employment situation, except for years working in U.S. agriculture, generally had non-significant associations. This pattern suggests the two-item measurement set is capturing some real variation in job-based psychological demands, but that there may be substantial and systematic sources of response patterns, perhaps due to differences in item interpretation. This explanation is consistent with the low internal consistency observed in this study, as well as with results of previous qualitative research suggesting substantial ambiguity in the meaning of demands items [12]. Regardless of the source of the problem, the results of this study suggest that the items used in the current study that were intended to measure psychological demands may not be suitable for use with Latino immigrant workers. Further, recognizing that systematic response patterns tend to attenuate associations [23], researchers who use existing items to measure psychological demands should interpret results cautiously; particularly non-significant results because they may reflect an artifact of elevated response bias.

The results of this study must be interpreted in light of its limitations. Foremost is the absence of a gold-standard criterion for evaluating the construct and discriminative validity of the scales measuring job demands and decision latitude. Thus, further research will require the development of alternative strategies for validating measures of farm worker psychosocial workplace characteristics. The number of farm workers who reported that their primary spoken language was an indigenous language, for example, was very small ( $n = 15$ ), suggesting that the pattern of results observed for this subgroup should be interpreted cautiously. Future research with larger samples, from across each of the, so called, 'migrant streams', where there is a greater variety of tasks and crops would provide additional insight into these factors that may impact farm worker occupational stress.

The results of this study contribute to the small but growing literature devoted to farm worker occupational health. This is the first study to evaluate instruments intended to measure exposure to workplace psychosocial stressors by immigrant Latino workers. Data were collected from workers employed in crop and nursery agriculture, a sector that may be representative of many jobs occupied by immigrant Latino workers with low levels of education because the work is labor intensive and likely provides little opportunity for workers to exercise control over their tasks while also being exposed to other workplace

stressors. The overall pattern of results suggests that farm workers and presumably other Latino immigrants understand and respond appropriately to items intended to measure decision latitude. By contrast, the two-item job demands measure generally behaved poorly. Researchers can, therefore, feel comfortable applying the decision latitude items to studies focused on occupational stress among immigrant Latino workers. However, more theoretical and empirical attention needs to be given to measures of psychological demands before strong conclusions can be made about the importance of this concept to the health of immigrant Latinos.

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