PSYCHOSOCIAL FACTORS IN A POOLED ANALYSIS OF LOW BACK PAIN PROSPECTIVE COHORTS

Matthew S. Thiese[1], Ming-Lun Lu[2], Andrew Merryweather[1], Ruoliang Tang[3], Sue Ferguson[4], Betty Malloy[5], William Marras[4], Kurt Hegmann[1], Arun Garg[3], Jay Kapellusch[3]
[1] University of Utah, [2] National Institute for Occupational Safety and Health (NIOSH), [3] University of Wisconsin-Milwaukee, [4] The Ohio State University, [5] American University

Psychosocial factors are increasingly associated with musculoskeletal disorders. This presentation assesses the relationship between multiple psychosocial measures and low back pain (LBP) while controlling for personal and occupational factors. Descriptive statistics, crude and adjusted odds ratios (OR) and 95% confidence intervals (95% CI) were calculated for relationships between psychosocial factors of poor supervisor support, poor coworker support, poor control of breaks, poor control of job tasks and poor control of job pace with personal factors (age, gender, body mass index, smoking status) and company tenure. Long company tenure, working 10 or more years, was most strongly associated with poor supervisor support (OR=5.02, 95% CI=3.05, 8.25) and poor job satisfaction (OR=2.94, 95% CI=1.80, 4.80). Female gender was statistically protective for some measures (poor supervisor support OR=0.67, 95% CI= 0.54, 0.84), while being an increased risk for others (poor control over job pace OR=1.26, 95% CI=1.00, 1.58). These results suggest that multiple psychosocial factors are associated with both personal factors and company tenure, suggesting that there may be interplay between psychosocial factors and personal factors in the relationships with musculoskeletal disorders, including low back pain.

BACKGROUND

Psychosocial factors have been related to musculoskeletal disorders, including low back pain (LBP). This growing body of evidence suggests a possible causal relationship between psychosocial factors and reporting of subjective measures of musculoskeletal disorders such as pain.

Personal factors including demographic measures (e.g. age, gender, body mass index) and occupational factors (job physical factors, hours worked, company tenure) have also been found to be associated with LBP in other studies.[1-4]

Sparse literature has reported on the relationships between psychosocial factors and both personal factors or occupational factors. The objective of this study was to combine data from several studies (i.e., LBP research consortium) and examine the relationships between psychosocial factors and both personal and occupational factors.

METHODS

Population

The LBP research consortium included 5 members: National institute of Occupational Safety and Health (NIOSH), the Ohio State University (OSU), the University of Wisconsin-Milwaukee (UWM), Texas A&M University (TAMU), and the University of Utah (UU). The consortial analyses and the underlying cohort studies were approved by their respective Institutional Review Boards prior to enrollment of study participants. Prior studies have reported methods for the underlying cohort studies [5-7].

Workers were enrolled from 82 worksites in 6 US states (IL, MI, OH, TX, UT, WI). The workers were employed across a wide variety of manufacturing and service industries, such as automobile part manufacturing, appliance manufacturing, grocery warehousing, clothing distribution centers and office work. These worksites included low, medium and high job physical demands.

Workers were enrolled regardless of a history of either current or past LBP. For the cross-sectional analyses of the pooled data, the primary exclusion was for workers who were planning on leaving the job. One site (NIOSH) required eligible workers to have been employed for at least one year in an attempt to reduce attrition due to job turnover.

Workers completed questionnaires at enrollment. These questionnaires included demographic variables, psychosocial variables and prior history of LBP.

Body mass index was measured at all but one site (OSU). Job physical variables were separately collected on-site by trained ergonomists. Job physical factors included the weight of objects lifted, frequencies lifted, horizontal distance of the lift from the L5/S1 disc, and vertical distance at the origin and destination of the lift. The job physical variables collected allow for the

calculation of composite measures of job physical demands (e.g., revised NIOSH lifting equation).[8,9]

Psychosocial Factors

Seven psychosocial variables were collected across all sites. These variables included supervisor support, coworker support, job satisfaction, worker's control over breaks, worker's control over task order, worker's control over job pace and worker's control over job variety. These variables were collected on a 3-5 Likert scale, and were subsequently dichotomized by *a priori* thresholds to group similar responses (e.g., combining "Very Much" and "Much" for control over breaks, task order and job pace).

Personal and Occupational Factors

Age, gender, BMI, smoking status and company tenure were *a priori* considered potential confounders. Continuous variables were assessed continuously and in categories to assess for non-linear relationships.

Statistical Analyses

Frequencies and percent were calculated for categorical variables. Correlations and Cronbach Alpha statistics were calculated for relationships between psychosocial variables. Logistic regression was used to calculate crude and adjusted odds ratios and 95% confidence intervals. Data were analyzed in SAS (Cary, NC).

RESULTS

A total of 1,929 workers were enrolled from 82 facilities in 6 US states and completed baseline data collection. Descriptive statistics of the population and their psychosocial responses are in Tables 1 and 2.

Table 1. Demographic Data at Baseline

Variable		N (%)
Gender	Male	1446 (75.0%)
	Female	483 (25.0%)
Age	Less than 25	356 (18.5)
	25-29	340 (17.7)
	30-34	299 (15.5)
	35-39	232 (12.1)
	40-44	204 (10.6)
	45-49	178 (9.3)
	50-54	181 (9.4)
	55-59	83 (4.3)
	60 or more	52 (2.7)
Smoking	Less than 100 Cigarettes in their life	957 (49.6)
	Smoked in the Past but Quit	404 (20.9)
	Current Smoker	568 (29.5)
BMI	Normal Weight (BMI <25.0 kg/m^2)	624 (32.6)
	Overweight (BMI 25.0-29.99 kg/m^2)	675 (35.3)
	Stage I Obesity (BMI 30.0-34.99 kg/m^2)	382 (20.0)
	Stage II Obesity (BMI 35.0-39.99 kg/m^2)	144 (7.5)
	Stage III Obesity (BMI ≥ 40.0 kg/m^2)	89 (4.7)
Company tenure	< 3 Months	115 (6.0)
	3 to 11 Months	331 (17.3)
	12 to 35 months	458 (23.9)
	3.0 to 4.9 years	284 (14.8)
	5.0 to 9.9 years	386 (20.1)
	10 or more years	343 (17.9)

*Not all data add up due to some missing data.

Table 2. Descriptive Statistics for Psychosocial Variables

Psychosocial Variable		N (%)
Supervisor Support	Almost Always*	935 (49.0)
	Some of the Time	758 (39.8)
	Hardly Ever	214 (11.2)
Coworker Support	Almost Always*	817 (42.8)
	Some of the Time	915 (47.9)
	Hardly Ever	178 (9.3)
Job Satisfaction	Very Satisfied*	592 (31.0)
	Somewhat Satisfied	975 (51.0)
	A Little Satisfied	272 (14.2)
	Not at all Satisfied	72 (3.8)
Control over Breaks	Very Much*	169 (9.5)
	Much*	260 (14.6)
	Moderate Amounts	434 (24.4)
	A Little	361 (20.3)
	Very Little	558 (31.3)
Control over Task Order	Very Much*	274 (15.4)
	Much*	392 (22.0)
	Moderate Amounts	483 (27.2)
	A Little	253 (14.2)
	Very Little	377 (21.2)
Control of Job Pace	Very Much*	363 (20.2)
	Much*	443 (24.6)
	Moderate Amounts	444 (24.7)
	A Little	228 (12.7)
	Very Little	322 (17.9)
* indicates reference group used for logistic regression		

Spearman correlations between the psychosocial variables were generally weak, with most falling below r = 0.5.

The one exception was the correlation between Control order and Control pace (r = 0.54). Cronbach Alpha was calculated for measures with r>0.4 and the highest alpha was 0.65, suggesting some agreement but not to the generally accepted

threshold of 0.70.[10] Therefore, none of these factors were combined into a larger single metric.

Table 3. Adjusted Odds Ratios and 95% Confidence Intervals for Relationships between Psychosocial Variables and both Personal Factors and Company Tenure

Poor Supervisor Support		Adjusted Odds Ratio and 95% CI
Gender	Male	1.00 (Reference)
	Female	0.67 (0.54, 0.84)*
Age (per Year)		0.97 (0.96, 0.98)*
Body Mass Index (per kg/m2)		1.00 (0.98, 1.01)
Company Tenure	< 3 Months	1.00 (Reference)
	3 to 11 Months	2.23 (1.40, 3.53)*
	12 to 35 months	2.60 (1.66, 4.06)*
	3.0 to 4.9 years	3.58 (2.22, 5.77)*
	5.0 to 9.9 years	4.28 (2.68, 6.84)*
	10 or more years	5.02 (3.05, 8.25)*
Poor Coworker Support		
Gender	Male	1.00 (Reference)
	Female	1.04 (0.84, 1.29)
Age (per Year)		1.00 (0.99, 1.01)
Body Mass Index (per kg/m2)		1.00 (0.98, 1.01)
Company Tenure	< 3 Months	1.00 (Reference)
	3 to 11 Months	1.18 (0.77, 1.82)
	12 to 35 months	1.34 (0.88, 2.02)
	3.0 to 4.9 years	1.79 (1.14, 2.80)*
	5.0 to 9.9 years	1.87 (1.21, 2.90)*
	10 or more years	1.75 (1.10, 2.78)*
Poor Control over Job Breaks		
Gender	Male	1.00 (Reference)
	Female	0.77 (0.59, 0.99)*
Age (per Year)		1.015 (1.004, 1.027)*
Body Mass Index (per kg/m2)		0.978 (0.968, 0.99)*
Company Tenure	< 3 Months	1.00 (Reference)
	3 to 11 Months	0.92 (0.55, 1.55)
	12 to 35 months	0.88 (0.53, 1.44)
	3.0 to 4.9 years	0.92 (0.54, 1.58)
	5.0 to 9.9 years	0.85 (0.51, 1.44)
	10 or more years	0.89 (0.51, 1.57)
Poor Control over Job Pace		
Gender	Male	1.00 (Reference)
	Female	1.261 (1.003, 1.582)*
Age (per Year)		1.00 (0.99, 1.01)
Body Mass Index (per kg/m2)		1.00 (0.99, 1.02)
Company Tenure	< 3 Months	1.00 (Reference)
	3 to 11 Months	0.94 (0.61, 1.46)
	12 to 35 months	1.10 (0.72, 1.68)
	3.0 to 4.9 years	1.14 (0.73, 1.80)
	5.0 to 9.9 years	1.16 (0.75, 1.80)
	10 or more years	1.31 (0.81, 2.10)
Poor Control over Job Task Order		
Gender	Male	1.00 (Reference)
	Female	1.21 (0.96, 1.54)
Age (per Year)		1.014 (1.002, 1.023)*
Body Mass Index (per kg/m2)		0.99 (0.98, 1.01)
Company Tenure	< 3 Months	1.00 (Reference)
	3 to 11 Months	0.92 (0.58, 1.44)
	12 to 35 months	0.78 (0.51, 1.21)
	3.0 to 4.9 years	0.87 (0.54, 1.40)
	5.0 to 9.9 years	1.01 (0.64, 1.60)
	10 or more years	0.97 (0.60, 1.59)
Poor Job Satisfaction		
Gender	Male	1.00 (Reference)
	Female	0.83 (0.66, 1.04)
Age (per Year)		0.97 (0.96, 0.98)*
Body Mass Index (per kg/m^2)		0.987 (0.971, 0.997)*
Company Tenure	< 3 Months	1.00 (Reference)
	3 to 11 Months	1.25 (0.80, 1.96)
	12 to 35 months	1.75 (1.13, 2.71)*
	3.0 to 4.9 years	2.04 (1.27, 3.27)*
	5.0 to 9.9 years	2.20 (1.39, 3.48)*
	10 or more years	2.94 (1.80, 4.80)*

Poor job satisfaction, supervisor and coworker support were most strongly associated with both demographic factors and company tenure. Increased company tenure was associated with poor supervisor support, poor coworker support and poor job satisfaction. It is worth mentioning that there was an increasing trend in the adjusted ORs for the above poor psychosocial variables with the increased company tenure. Contrary to company tenure, age was not associated with these psychosocial variables. Additionally, females were significantly more likely to report poor control over job pace but less likely to report poor supervisor support or poor control over breaks.

DISCUSSION

These data suggest support meaningful relationships between psychosocial factors and both demographic factors and company tenure. These psychosocial factors are not meaningfully correlated nor have a high Cronbach Alpha, suggesting that they are independent factors which should not be combined.

Three psychosocial variables (job satisfaction, supervisory and co-worker support) were skewed to high scales (very much/always and somewhat/some of the time) with a combined percentage varying from approximately 82-90% of the study population. The increased scale levels of the psychosocial variables are not consistent with data from the Quality of Work Life (QWL) national surveys conducted during the study period. Data from the QWL surveys conducted in 2002, 2006 and 2010 showed a consistent percentage of the same psychosocial variables ranging from 45-53%.[11]

Female workers were less likely to report poor supervisory support, poor control over job breaks and

poor job satisfaction. However, they were more likely to report poor control over job pace, which was a physical job-based psychosocial strain. These findings suggest that female workers might be more susceptible or reactive to the pace of the job. Additionally, inconsistent findings suggest that psychosocial strain might be experienced differently between genders.

Results suggest that age may be a protective factor against some psychosocial strain measures including poor supervisory support and job satisfaction. However, prolonged company tenure tended to increase risk or psychosocial strain, perhaps suggesting that age alone is not protective in companies with troubled cultures. Longitudinal research is needed to investigate these speculations..

Although workers were enrolled from a variety of worksites, where high physical demand jobs and low physical demand jobs were included, workers in high physical demand jobs (e.g., warehouse workers who pick and select orders to compile pallets for shipping to grocery stores) were disproportionately included in this study. Future analyses will attempt to control for measured job physical demands.

These data are cross-sectional and cannot demonstrate temporality. Further research is needed to explore these relationships, in particular the effects of interactions of demographic and occupational factors on the development of psychosocial strain.

CONCLUSION

Multiple psychosocial factors were related to gender, age, body mass index and company tenure. These results suggest that many psychosocial factors are associated with both demographic and occupational factors, suggesting that there may be interplay between psychosocial factors and personal factors in the relationships with musculoskeletal disorders, including low back pain. Gender may play an important role in developing different types of psychosocial strain but may be protective for other psychosocial factors. Despite older age being protective for certain factors, long company tenure was most often associated with negative psychosocial factors, including poor supervisor support, poor coworker support, and poor job satisfaction.

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