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Prediction of musculoskeletal pain by work related psychosocial factors using self-reports versus JEMs

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ORIGINAL ARTICLE

Physical work demands and psychosocial working conditions as predictors of musculoskeletal pain: a cohort study comparing self-reported and job exposure matrix measurements

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ABSTRACT

Objectives Determining exposure to occupational factors by workers' job titles is extensively used in epidemiological research. However, the correspondence of findings regarding associations to health between job exposure matrices (JEMs) and individual-level exposure data is largely unknown. We set out to examine the prospective associations of physical work demands and psychosocial working conditions with musculoskeletal pain, comparing JEMs with individual-level self-reported

Key messages

What is already known about this subject?

Job exposure matrices (JEMs) for physical work demands and psychosocial working conditions have been developed previously, but little is known regarding the correspondence between results obtained when analysing associations to health outcomes measuring working conditions using JEMs compared with individual-level measures

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Background

- Job exposure matrices are measures of average working conditions within job groups
- Useful for studying effects of working conditions in populations without exposure data, e.g. registerbased studies
- Recently a number of new job exposure matrices have been constructed for physical demands and psychosocial working conditions
- Little is known regarding longitudinal associations to health outcomes compared to individual level measurements

Aims

- To construct a job exposure matrix by aggregating self-reported survey-data on physical work demands and psychosocial working conditions
- To examine if longitudinal associations between working conditions and pain are similar when measuring working conditions using job exposure matrix compared to self-reported individual level exposure measurements

Methods

Data

The Work and health in Denmark study 2012 and 2014 (n= 8,132)

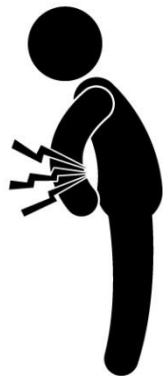
Exposures

- Physical work demands: sitting, walking or standing, working with the back twisted or bent, arms lifted above the shoulders, repetitive arm movements, squatting kneeling, pushing or pulling, and carrying or lifting
- Summary score ranging 8-48
- Psychosocial working conditions: Quantitative and emotional demands, decision authority, job insecurity and work-related violence
- Scales were constructed ranging 1-5 by the mean of items (except job insecurity and violence)
- We further constructed dichotomized exposure measures classifying approximately 10% of respondents as highly exposed

Methods

Outcome

- Pain during the past 3 months in “hips”, “knees”, “arms and/or wrists”, “neck and or/shoulders” and “lower back”
- Each item answered yes or no, summary score: 0-5



Statistical models

Job exposure matrices

- Predicted average levels (/predicted probabilities) of exposure according to job group (DISCO-08) and age, stratified by sex
- using random intercept multilevel models in proc glimmix

Performance of the job exposure matrices

- Intraclass coefficients (ICC): proportion of variance in exposure explained by job group
- ROC-curve analysis: area under the curve in independent sample

Longitudinal associations

- Pain at follow up as a function of baseline pain, working conditions, age, education, stratified by sex
- Longitudinal associations were analysed using linear multilevel models with random job group effect

Results: JEM performance, continuous

	Individual level measure			JEM level measure			
	Mean	SD	Range	Mean	SD	Range	Intraclass coefficient (ICC)
Physical work demands							
Men	19.03	7.65	8-48	19.09	5.38	9.78-34.96	0.52
Women	18.11	6.95	8-48	18.10	5.08	9.89-32.87	0.52
Quantitative demands							
Men	3.06	0.69	1-5	3.06	0.20	2.44-3.72	0.10
Women	2.90	0.70	1-5	2.90	0.23	1.96-3.55	0.14
Emotional demands							
Men	2.75	1.03	1-5	2.75	0.45	1.77-4.00	0.21
Women	3.24	1.04	1-5	3.24	0.62	1.76-4.28	0.36
Decision authority							
Men	4.18	0.78	1-5	4.18	0.22	3.17-4.74	0.09
Women	4.17	0.74	1-5	4.17	0.15	3.47-4.57	0.07

Results: JEM performance, dichotomous

	Individual level measure	JEM level measure	
	Percent exposed	Range predicted probability	Area Under the Curve (AUC)
High Physical work demands			
Men	10.8	< 0.001 – 0.86	0.85
Women	10.5	< 0.001 – 0.78	0.87
High Quantitative demands			
Men	11.1	< 0.001- 0.50	0.62
Women	13.1	< 0.001-0.53	0.64
High emotional demands			
Men	7.3	< 0.001-0.55	0.69
Women	4.2	< 0.001-0.34	0.64
Low decision authority			
Men	5.3	< 0.001- 0.63	0.67
Women	4.4	< 0.001-0.47	0.63
Job strain			
Men	23.6	< 0.001-0.71	0.56
Women	12.6	< 0.001-0.54	0.58
High job insecurity			
Men	12.7	< 0.001-0.64	0.59
Women	13.7	< 0.001-0.53	0.64
Violence			
Men	3.4	< 0.001 -0.85	0.84
Women	8.0	< 0.001-0.81	0.86

Results: working conditions and pain

	Individual level measure		JEM level measure	
CONTINUOUS EXPOSURES	Difference in mean number of painful body regions	P-value	Difference in mean number of painful body regions	P-value
Physical work demands, per 1 point increase of score (8-48)				
Men	0.03	<0.001	0.03	<0.001
Women	0.02	<0.001	0.02	<0.001
Quantitative demands, per 1 point increase of score (1-5)				
Men	-0.00	0.9291	-0.49	<0.001
Women	-0.00	0.9895	-0.26	0.0105
Emotional demands, per 1 point increase of score (1-5)				
Men	0.01	0.9436	-0.07	0.1937
Women	0.04	0.0483	0.05	0.1353
Decision authority, per 1 point increase of score (1-5)				
Men	-0.12	<0.001	-0.44	<0.001
Women	-0.06	0.0251	-0.18	0.1924
Associations are adjusted for baseline musculoskeletal pain, age and education.				

Results: working conditions and pain

DICHOTOMOUS EXPOSURES ¹	Individual level measure		JEM level measure	
	Difference in mean number of painful body regions	P-value	Difference in mean number of painful body regions	P-value
High physical work demands				
Men	0.35	<0.001	0.81	<0.001
Women	0.32	<0.001	0.70	<0.001
High quantitative demands				
Men	0.01	0.9062	-0.71	0.0020
Women	0.04	0.4404	-0.53	0.0131
High emotional demands				
Men	0.07	0.3229	0.05	0.8332
Women	0.00	0.9900	0.69	0.1392
Low decision authority				
Men	0.27	0.0012	1.04	0.0002
Women	0.16	0.0913	0.54	0.2292
Job strain				
Men	0.07	0.0756	-0.20	0.3052
Women	0.07	0.2202	0.10	0.7264
High job insecurity				
Men	0.08	0.1931	0.80	0.0009
Women	0.07	0.1915	0.27	0.3046
Violence				
Men	0.18	0.0866	0.09	0.7041
Women	0.16	0.0280	0.67	<0.001

Associations are adjusted for baseline musculoskeletal pain, age and education.

Summary

- In most cases we found similar associations between working conditions and pain, regardless of measuring exposures using Individual level self-report or job exposure matrices
- If there was an individual level association this was also found in the JEM level analysis
- Notable dissimilarities: quantitative demands showed negative association at JEM level and no association at individual level
- Results were similar using continuous and dichotomized exposure measures

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