Comparison Between a Self-Reported Job Exposure Matrix (JEM CONSTANCES) to an Expertise-Based Job Exposure Matrix (MADE) for Biomechanical Exposures

To the Editor:

Job exposure matrices are becoming more and more widely used,[1] including use for estimation of biomechanical exposures.[2] In the context of providing exposure data available for international research, an international team created an employment exposure matrix from the first available data from the Constances cohort, called "JEM Constances."[3] As part of ongoing efforts to compare different JEMs,[4] we compared similar exposure variables from JEM Constances to those assigned in a JEM used for public health purposes in the same country, the French "MADE" ("*Matrice Associant Difficultés physiques au travail et Emploi*," French for "difficult physical conditions and job matrix").[5,6] We studied the correlation and the agreement of exposure estimates for different job titles between these two matrices.

Briefly, the Constances cohort created a JEM based on self-reported exposures to 27 different biomechanical factors at the level of the job, using the French

"professions et catégories socioprofessionnelles (PCS) 2003" national job codes.[3] The MADE matrix coded 17 different exposures using consensus estimates from occupational health experts, using the same PCS codes.[5] The relevant variables were crossed to obtain Spearman correlation coefficients for JEM Constances and MADE, using the PCS 2003 code as a unit and using the subject by applying the two matrices on available data on Constances cohort. Three categories for variables of both JEM Constances and MADE were also obtained based on the tertiles of the distribution using Constances cohort. Thus, a calculation of a Kappa agreement was also performed with similar units.

The results on the selected variables are fairly good (Table 1) except for exposures to the neck and to work in cold

TABLE 1. Correlation and Agreement Between JEM-Constances (Self-Report Assessed in Constances Cohort) and MADE (Expert Based Matrix)

Variables JEM Constances	Variables MADE	Spearman Rhos, Job Code as Units	Spearman Rhos, Subject as Unit	Kappas, Job Code as Unit	Kappas, Subject as Unit
Physical intensity	Effort	0.84	0.69	0.79	0.66
	Very heavy lifting	0.80	0.68	0.75	0.67
	Static strength	0.87	0.84	0.82	0.83
	Heavy lifting	0.85	0.79	0.82	0.78
	Dynamic strength	0.85	0.78	0.81	0.77
Working with repetition	Repetition	0.73	0.73	0.66	0.73
Kneeling or squatting	Kneeling or squatting	0.72	0.63	0.65	0.55
	Very heavy lifting	0.72	0.63	0.65	0.55
	Heavy lifting	0.78	0.75	0.72	0.67
Carry loads 10–25 kg	Very heavy lifting	0.81	0.71	0.74	0.76
	Heavy lifting	0.55	0.83	0.74	0.87
Carry loads >25 kg	Very heavy lifting	0.81	0.72	0.77	0.71
	Heavy lifting	0.85	0.82	0.82	0.81
Using vibrating tool	Vibrating tool use	0.79	0.62	0.70	0.63
Using computer screen	Computer use	0.86	0.87	0.78	0.79
Using keyboard or scanner	Computer use	0.85	0.88	0.78	0.78
Bending neck	Cervical constraints	0.51	0.30	0.45	0.31
Working with arms above shoulder	Shoulder abducted >90°	0.74	0.53	0.70	0.54
Working with arms abducted	Shoulder abducted >90°	0.81	0.72	0.76	0.77
Bending elbow	Elbow contraints	0.85	0.69	0.80	0.72
Rotating forearm	Turn the hand (eg, screwing)	0.84	0.76	0.77	0.70
	Press base of hand	0.81	0.69	0.77	0.68
	Grip	0.82	0.69	0.71	0.65
Bending wrist	Turn the hand (eg, screwing)	0.86	0.75	0.78	0.73
	Press base of hand	0.83	0.69	0.77	0.72
	Grip	0.84	0.72	0.71	0.69
Pressing base of hand	Turn the hand (eg, screwing)	0.79	0.61	0.72	0.54
	Press base of hand	0.79	0.52	0.72	0.47
	Grip	0.80	0.65	0.68	0.52
Finger pinching	Turn the hand (eg, screwing)	0.80	0.72	0.74	0.66
	Press base of hand	0.76	0.63	0.72	0.56
	Grip	0.76	0.53	0.64	0.46
Working outdoors	Work in cold environment (<10 °C)	0.55	0.50	0.49	0.50

environment (less than 10 °C), where some coefficients were lower than 0.5.

These results confirm that a matrix based on a self-reported assessment exposure matrix and one based on expert estimates of exposure provide similar overall results. Although the statistical analyses were simple, using only an overall evaluation of correlation and agreement between the two approaches, the demonstration of broadly similar results using two different exposure methods may aid the comparison of studies using different exposure methods.

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REFERENCES

1. Siemiatycki J, Lavoué J. Availability of a New Job-Exposure Matrix (CANJEM) for epidemiologic and occupational medicine purposes. *J Occup Environ Med*. 2018;60: e324–e328.
2. Evanoff B, Zeringue A, Franzblau A, Dale AM. Using job-title-based physical exposures from O*NET in an epidemiological study of carpal tunnel syndrome. *Hum Factors*. 2014;56:166–177.
3. Evanoff BA, Yung M, Buckner-Petty S, Roquelaure Y, Descatha A, Dale AM. The CONSTANCES job exposure matrix based on self-reported exposure to physical risk factors: development & evaluation. *Occup Environ Med*. 2019;76:398–406.
4. Evanoff BA, Yung M, Buckner-Petty S, Roquelaure Y, Descatha A, Dale AM. Cross-national comparison of two general population job exposure matrices for physical work exposures. *Occup Environ Med*. 2019;76: 567–572.
5. Descatha A, Despréaux T, Petit A, et al. [Development of a French Job exposure matrix "MADE" for biomechanical exposure evaluation]. *Santé Publique*. 2018;30:333–337.
6. Kerbrat J, Descatha A. [The recognition of health consequences of difficult working conditions in France and its evaluation with the use of a job-exposure matrix]. *Arch Mal Prof Environ*. 2018;79:493–500.