Example of exposure assessment in a large cohort study on musculoskeletal disorders

Bongers PM[A], **Heederik D**[B]

[A] NIA TNO, P.O. Box 75665, 1070 AR Amsterdam, the Netherlands

[B] Department of Environmental Sciences, Environmental and Occupational Health Group, Wageningen Agricultural University, The Netherlands

The Dutch prospective study on the determinants of musculoskeletal disorders (n=1763) is the first study in this field that quantified physical load at the workplace on a large scale. Baseline assessment of physical load was based on videorecordings and force measurements at the workplace and observations of posture, movement and force exertion from these recordings afterwards. The literature and results of our pilot study did not justify estimation of the physical load based on group measurements only. Therefore, four 14-minute videorecordings of each individual were taken random during one day. During these measurements all workers were classified in homogeneous workergroups. To date, one third of the recordings for each of the homogeneous groups has been analyzed. These data allow the evaluation of the variance components within and between individuals for an individual and group strategy for assessment of physical load. This gives insight in the trade off of each strategy expressed in two parameters: power of the study (standard error of the slope of the e-r relationship) and underestimation of the exposure response relationship (bias).
Preliminary analyses of the variability in physical load of the first half of the population (n=887, n=191 videos analyzed) shows that the within person variability is considerably lower than the between person variability. I.e. for duration of flexed trunk (> 30°), the within person variability was responsible for only 27% of the total variability (variance ratio of 0.6). Table 1 shows the parameters for contrast, precision and attenuation in this population when 3 grouping strategies are used. This table shows that for each grouping, even for the individual strategy, no or only little attenuation of the Odds Ratio is expected. At the conference these data will be presented for the total population. In addition the consequences of the different variance components will be further evaluated by calculating associations between physical load and the health outcomes (signs/symptoms of musculoskeletal disorders).

Table 1 Parameters for contrast (ϵ), precision ($\langle\dot{\eta}\rangle$) and attenuation (@) for different groupings and the number of groups (g), the standard deviation within the groups (S_{wg}) and between the groups (S_{bg}) for trunkflexion (> 30°)

grouping based on:	g	S_{wg}	S_{bg}	ϵ	$\langle\dot{\eta}\rangle$	@
1. physical load	19	1.39	7.75	0.97	2.37	1.00
2. activities/worktasks	15	1.39	8.41	0.97	2.27	1.00
3. mean trunkflexion	10	1.18	13.08	0.99	3.43	1.00
4. broad categories of physical load	6	1.49	13.16	0.99	3.64	1.00
5. individuals	191	-	-	-	1.69	0.96