

## APPENDIX

**Table A1: Measurements of musculoskeletal pain and exposures**

Factor	Items	Response options	Cronbach's $\alpha$
<b>Musculoskeletal pain</b>	During the past 3 months have you had pain in..		
	The hips	Yes/No	
	The knees	Yes/No	
	The arms and/or wrists	Yes/No	
	The neck and/or shoulders	Yes/No	
	The lower back	Yes/No	
<b>Physical work demands</b>	Do you sit?	A	0.89
	Do you walk or stand?	A	
	Do you work with your back twisted or bent forwards without supporting with your hands and arms?	A	
	Are your arms lifted to or above the shoulders?	A	
	Do you make the same arm-movements many times a minute (e.g. packing, mounting, machinework, carving)?	A	
	Do you squat or kneel when working?	A	
	Do you push or pull?	A	
	Do you carry or lift?	A	
<b>Quantitative demands</b>	Do you have time enough for your work tasks?	B	0.75
	Do you have deadlines that are difficult to keep?	B	
	Do you get unexpected work tasks that put you under time pressure?	B	
	Are you available outside normal working hours?	B	
	Do you have to work overtime?	B	
<b>Emotional demands</b>	Do you get emotionally involved in your work?	B	0.58
	Do you have to deal with the problems of e.g. clients, patients or students in your work (not problems of your colleagues)	B	
<b>Decision authority</b>	Can you influence how you solve your work tasks?	B	0.77
	Can you influence when you solve your work tasks?	B	
<b>Job insecurity</b>	Are you worried about becoming unemployed?	C	
<b>Violence</b>	Have you within the past 12 months been exposed to physical violence at your workplace?	D	

A: Almost all of the time, About  $\frac{3}{4}$  of the time, About  $\frac{1}{2}$  of the time, About  $\frac{1}{4}$  of the time, Rarely, Never. B: Always, Often, Sometimes, Seldomly, Never. C: To a very high, extent, To a high extent, To some extent, To a low extent, To a very low extent. D: Yes, daily, Yes, weekly, Yes, monthly, Yes, less frequently, No, never

**Table A2. Overview of occupational groups in the population (3-digit DISCO groups)**

<b>Job group</b>	<b>N Participants</b>
011 Commissioned Armed Forces Officers	24
021 Non-Commissioned Armed Forces Officers	17
031 Armed Forces Occupations, Other Ranks	19
111 Legislators And Senior Officials	13
112 Managing Directors And Chief Executives	73
121 Business Services And Administration Managers	94
122 Sales, Marketing And Development Managers	57
132 Manufacturing, Mining, Construction And Distribution Managers	32
133 Information And Communications Technology Services Managers	14
134 Professional Services Managers	103
142 Retail And Wholesale Trade Managers	16
200 Professionals	57
213 Life Science Professionals	29
214 Engineering Professionals (Excluding Electrotechnology)	199
215 Electrotechnology Engineers	32
216 Architects, Planners, Surveyors And Designers	34
220 Health Professionals	10
221 Medical Doctors	67
222 Nursing And Midwifery Professionals	239
226 Other Health Professionals	148
230 Teaching Professionals	7
231 University And Higher Education Teachers	124
232 Vocational Education Teachers	77
233 Secondary Education Teachers	100
234 Primary School And Early Childhood Teachers	724
235 Other Teaching Professionals	241
241 Finance Professionals	175
242 Administration Professionals	76
243 Sales, Marketing And Public Relations Professionals	48
251 Software And Applications Developers And Analysts	181
252 Database And Network Professionals	29
260 Legal, Social And Cultural Professionals	42
261 Legal Professionals	55
262 Librarians, Archivists And Curators	38
263 Social And Religious Professionals	123
264 Authors, Journalists And Linguists	41
265 Creative And Performing Artists	17
300 Technicians And Associate Professionals	11
311 Physical And Engineering Science Technicians	224
313 Process Control Technicians	6
314 Life Science Technicians And Related Associate Professionals	7
315 Ship And Aircraft Controllers And Technicians	21
321 Medical And Pharmaceutical Technicians	66
325 Other Health Associate Professionals	39
330 Business And Administration Associate Professionals	33
331 Financial And Mathematical Associate Professionals	138
332 Sales And Purchasing Agents And Brokers	157
333 Business Services Agents	47
334 Administrative And Specialized Secretaries	229

335 Government Regulatory Associate Professionals	62
341 Legal, Social And Religious Associate Professionals	41
343 Artistic, Cultural And Culinary Associate Professionals	19
351 Information And Communications Technology Operations And User Support Technicians	35
352 Telecommunications And Broadcasting Technicians	24
400 Clerical Support Workers	75
411 General Office Clerks	298
412 Secretaries (General)	42
413 Keyboard Operators	26
421 Tellers, Money Collectors And Related Clerks	9
422 Client Information Workers	43
431 Numerical Clerks	79
432 Material Recording And Transport Clerks	60
441 Other Clerical Support Workers	114
511 Travel Attendants, Conductors And Guides	21
512 Cooks	14
513 Waiters And Bartenders	12
514 Hairdressers, Beauticians And Related Workers	14
515 Building And Housekeeping Supervisors	83
516 Other Personal Services Workers	11
522 Shop Salespersons	161
523 Cashiers And Ticket Clerks	28
524 Other Sales Workers	66
531 Child Care Workers And Teachers' Aides	201
532 Personal Care Workers In Health Services	396
541 Protective Services Workers	70
611 Market Gardeners And Crop Growers	21
700 Craft And Related Trades Workers	27
710 Building And Related Trades Workers (Excluding Electricians)	11
711 Building Frame And Related Trades Workers	88
712 Building Finishers And Related Trades Workers	45
713 Painters, Building Structure Cleaners And Related Trades Workers	15
721 Sheet And Structural Metal Workers, Moulders And Welders, And Related Workers	30
722 Blacksmiths, Toolmakers And Related Trades Workers	86
723 Machinery Mechanics And Repairers	69
732 Printing Trades Workers	18
741 Electrical Equipment Installers And Repairers	70
742 Electronics And Telecommunications Installers And Repairers	4
751 Food Processing And Related Trades Workers	29
752 Wood Treaters, Cabinet-Makers And Related Trades Workers	7
754 Other Craft And Related Workers	10
811 Mining And Mineral Processing Plant Operators	3
812 Metal Processing And Finishing Plant Operators	15
813 Chemical And Photographic Products Plant And Machine Operators	7
814 Rubber, Plastic And Paper Products Machine Operators	27
815 Textile, Fur And Leather Products Machine Operators	4
816 Food And Related Products Machine Operators	39
817 Wood Processing And Papermaking Plant Operators	10
818 Other Stationary Plant And Machine Operators	29
821 Assemblers	57
831 Locomotive Engine Drivers And Related Workers	9
832 Car, Van And Motorcycle Drivers	5

833 Heavy Truck And Bus Drivers	93
834 Mobile Plant Operators	19
900 Elementary Occupations	6
911 Domestic, Hotel And Office Cleaners And Helpers	150
912 Vehicle, Window, Laundry And Other Hand Cleaning Workers	6
931 Mining And Construction Labourers	93
932 Manufacturing Labourers	47
933 Transport And Storage Labourers	65
941 Food Preparation Assistants	39
961 Refuse Workers	3
962 Other Elementary Workers	12
999 Job Group Not Registered	507

**Table A3. Descriptives for continuous exposure measurements**

	INDIVIDUAL LEVEL MEASUREMENT			JOB EXPOSURE MATRIX			Intraclass coefficient (ICC)
	Mean	SD	Range	Mean	SD	Range	
<b>Physical work demands</b>							
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
<b>Quantitative demands</b>							
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
<b>Emotional demands</b>							
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
<b>Decision authority</b>							
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

**Table A4. Descriptives for dichotomous exposure measurements**

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

**Table A5. Job groups with highest and lowest levels of exposure for men and women**

<b>MEN</b>	<b>Highest level job groups, age, predicted level of exposure</b>	<b>Lowest level job groups, age, predicted level of exposure</b>
<b>Physical work demands</b>	711210 Bricklayers, 18, 35.4 816010 Industrial butcherwork (excluding poultry),18, 33.9 611320 Gardeners, 18, 33.1	4312 Statistical, Finance and Insurance clerks, 64, 9.7 263100, Economists, 64, 10.2 241310, Financial Analysts, 18, 10.4
<b>Quantitative demands</b>	121320, Administrative management in the public sector, 38, 3.8 112010, Upper Managing directors, 38, 3.6 133020, Information and Communications Technology Services Managers, 38, 3.6	831100, Locomotive Engine Drivers, 64, 2.4 931200, Civil Engineering Labourers, 64, 2.5 931330, Bricklaying Labourers, 64, 2.5
<b>Emotional demands</b>	234300, Pedagogues, 38, 4.0 235700, Special-pedagoues, 38, 4.0 234120, Primary School Teachers, 38, 4.0	931330, Bricklaying Labourers, 18, 1.7 814 Rubber, Plastic and Paper Products Machine Operators, 18, 1.7 816010 Industrial butcherwork (excluding poultry), 18, 1.9
<b>Decision authority</b>	112010, Upper Managing directors, 64, 4.7 134500, Education Managers, 64,4.7 132300, Construction Managers, 64,4.6	831100, Locomotive Engine Drivers, 18, 3.0 441210, Mail Carriers, 18, 3.2 816010, Industrial butcherwork (excluding poultry),, 18, 3.2
<b>WOMEN</b>	<b>Highest level job groups, age, predicted level of exposure</b>	<b>Lowest level job groups, age, predicted level of exposure</b>
<b>Physical work demands</b>	8160 Food and Related Products Machine Operators, 18, 35.3 814220 Plastic Products Machine Operators,18, 31.2 6113 Gardeners; Horticultural and Nursery Growers, 18, 30.9	251120, IT-systems designers and business process analytics, 64, 9.7 251220, consultants and programmers in software development, 64, 9.9 261900, Legal professionals not elsewhere classified, 64, 10.1
<b>Quantitative demands</b>	142010 Retail Trade Managers, 37, 3.6 134500 Education Managers, 37, 3.5 2611 Lawyers, 37, 3.5	531110, Child Care Workers, 64, 2.0 422600, Receptionists (general), 64, 2.2 422300, Telephone Switchboard Operators, 64, 2.3
<b>Emotional demands</b>	2357 Special-pedagoues, 54, 4.3 222200 Midwifery Professionals, 54, 4.3 235720 Special-pedagoues, activation etc., 54, 4.3	821900, Assemblers not elsewhere classified, 64, 1.7 251220, consultants and programmers in software development, 64, 2.0 818990,stationary plant and machine operators not elsewhere classified, 64, 2.0
<b>Decision authority</b>	2265 Dieticians and Nutritionists, 64, 4.6 231010 University and Higher Education Teachers and Researchers, 64,4.6 121100, Finance Managers, 64,4.6	541, Protective Services Workers, 18, 3.4 441210, Mail Carriers, 18, 3.4 8160, Food and Related Products Machine Operators, 18, 3.5

Note that all estimates for the exposures are job group specific but in some cases round off to similar estimates.



**Table A6. Job groups with highest and lowest levels of heterogeneity for men and women**

	<b>MEN</b>		<b>WOMEN</b>	
	<b>Most heterogeneous job groups, SD</b>	<b>Least heterogeneous job groups, SD</b>	<b>Most heterogeneous job group, SD</b>	<b>Least heterogeneous job group, SD</b>
<b>Physical work demands</b>	962900 Elementary Workers Not Elsewhere Classified, 13.2 9621 Messengers, Package Deliverers And Luggage Porters, 11.4 524 Other Sales Workers, 11.0	311 Physical And Engineering Science Technicians, 0.7 26110 Lawyers, 0.8 833260 Truck Drivers With Dangerous Goods, 1.0	432200 Production Clerks, 10.9 911260 Serviceworkers Different Sectors (Cleaning), 8.7 532190 Other Care Work In Institutions And Hospitals, 8.7	243 Sales, Marketing And Public Relations Professionals , 0.8 122100 Sales And Marketing Managers, 1.0 422200 Contact Centre Information Clerks, 1.1
<b>Quantitative demands</b>	422100, Travel Consultants And Clerks, 1.3 931230 Cabling Labourers, 1.2 833260 Truck Drivers With Dangerous Goods, 1.1	311 Physical And Engineering Science Technicians, 0 (all observations are the same) 441220 Sorting Clerks, 0.2 721300 Sheet Metal Workers 0.2	300000 Technicians And Associate Professionals, 1.2 334320 Interior Designers And Decorators, 1.1 341 Legal, Social And Religious Associate Professionals, 1.0	233020 Secondary Education Teachers, 0.23 333900 Business Services Agents Not Elsewhere Classified, 0.3 8160 Food And Related Products Machine Operators, 0.3
<b>Emotional demands</b>	933 Transport And Storage Labourers, 1.7 524 Other Sales Workers, 1.5 9621 Messengers, Package Deliverers And Luggage Porters, 1.5	26110 Lawyers, 0.3 931330 Bricklaying Labourers, 0.3 2310 University And Higher Education Teachers, 0.4	9312 Civil Engineering Labourers, 1.8 815 Textile, Fur And Leather Products Machine Operators, 1.7 932900 Manufacturing Labourers Not Elsewhere Classified, 1.7	234110, Education At Basic Level, Young And Adults 0.2 233020 Secondary Education Teachers, 0.3 235400 Other Music Teachers, 0.3
<b>Decision authority</b>	833260, Truck Drivers With Dangerous Goods, 1.4 962900, Elementary Workers Not Elsewhere Classified 1.3 933 Transport And Storage Labourers, 1.3	311 Physical And Engineering Science Technicians, 0 (all observations are the same) 532 Personal Care Workers In Health Services, 0.3 611320 Gardeners, 0.3	962 Other Elementary Workers, 2.1 932100 Hand Packers, 1.3 8160 Food And Related Products Machine Operators, 1.3	611390 Gardeners Not Elsewhere Specified, 0.2 4312 Statistical, Finance And Insurance Clerks, 0.3 524600 Food Service Counter Attendants, 0.3