

# BMJ Open Does employee participation in workplace health promotion depend on the working environment? A cross-sectional study of Danish workers

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## ABSTRACT

**Objectives:** To investigate if participation in workplace health promotion (WHP) depends on the work environment.

**Methods:** Questionnaire data on participation in WHP activities (smoking cessation, healthy diet, exercise facilities, weekly exercise classes, contact with health professionals, health screenings) and the work environment (social support, fatiguing work, physical, quantitative and emotional demands, job control and WHP availability setting) were collected cross-sectionally in 2010 in a representative sample (n=10 605) of Danish workers. Binary regression analyses of the association between work environment characteristics and participation in WHP were conducted and adjusted for age, gender and industry.

**Results:** WHP offered during leisure time was associated with lower participation in all measured activities compared with when offered during working hours. Low social support and fatiguing work were associated with low participation in WHP. No associations with participation in WHPs were observed for physical work or quantitative demands, work pace or job strain. However, high physical demands/low job control and high emotional demands/low job control were associated with low participation.

**Conclusions:** Lower participation in WHP was associated with programmes during leisure, low social support, very fatiguing work and high physical or emotional demands with low job control. This suggests that to obtain proper effect of health promotion in a workplace setting, a good work environment is essential.

## Strengths and limitations of this study

- Involves a large number of employees from several different occupations and industries in a representative sample of Danish employees.
- Self-reported information regarding work environment and the availability of health promotion represents the perceptions of the participants, which is known to impose risks of bias.
- The reporting of participation reflects any level of participation in health promotion within the last year.
- All data were collected concurrently and analyses performed in a cross-sectional design, which hampers interpretation of causality.

mainly related to lifestyle such as poor diet, physical inactivity and smoking,<sup>1</sup> and also due to working environment features (ie, high physical work demands)<sup>2</sup> and stress due to psychosocial job features.<sup>3 4</sup>

The workplace has therefore been suggested to be a suitable setting for health promotion. The suggestion is based on the notion that health promotion requires not just behaviour change but also a supportive environment. Thus, safe, stimulating, satisfying and enjoyable working conditions are meant to support health-promoting activities.<sup>5</sup> A recent meta-analysis concluded that workplace health promotion (WHP) is primarily effective among white-collar workers and highly selected individuals.<sup>6</sup> Many WHP studies report low participation rates<sup>7</sup> and problems with implementation and sustainability associated with the organisation of the work.<sup>8–10</sup> Thus, the workplace may only be a suitable setting for health promotion under good work environment conditions.

Most likely, WHP interventions have been initiated without ensuring proper contextual work environment. The socioecological

## INTRODUCTION

Non-communicable diseases such as diabetes, heart disease and cancer are prevalent and increasing in Western countries.<sup>1</sup> These diseases have large consequences for the individual's quality of life and function and for societal costs to healthcare and productivity loss.<sup>1</sup> The causes of these diseases are



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framework has been used theoretically to illustrate how the work environment may limit participation in WHP.<sup>11</sup> Factors that may impact individuals' participation involve structural (ie, quantitative demands, physical demands and organisation of the work)<sup>12</sup> and interpersonal factors (ie, social support).<sup>13–15</sup> For example, low job control may decrease the possibility to organise one's work to be able to participate in activities and WHP during paid working hours rather than during leisure may decrease barriers related to leisure time duties. However, it remains to be established how these factors are associated with participation in WHP.

Therefore, the aim of this study was to investigate the association between organisational, structural and interpersonal factors in the work environment and participation in WHP in a large representative sample of Danish employees. The following hypotheses were tested: (1) WHP offered within working hours is associated with higher participation than WHP offered outside working hours, (2) structural factors of the job and the work environment (high quantitative, physical and emotional work demands, low job control and fatiguing work) are associated with lower participation in WHP and (3) interpersonal factors in the working environment (ie, low social support) are associated with lower participation in WHP.

## STUDY POPULATION

In 2010, the fifth round of the Danish Work Environment Cohort Study (DWECS) was conducted.<sup>16</sup> This DWECS round featured a random sample of ~21 000 workers aged 18–59 years drawn from the Central Population Register of Denmark; of these, 53% (10 605) participated in the survey. Paper questionnaires were sent to their personal addresses and participants were asked to reply either to the paper questionnaire or to use a link for electronic response.

## METHODS

Participants responded to a self-administered questionnaire with items regarding availability and participation in WHP activities as well as features of the work environment (physical work demands, physically fatiguing work, quantitative demands, emotional demands, social support from colleagues and supervisor and job control).

### Independent variables

#### WHP availability

Availability of WHP programmes was determined by the question (modified from Grosch *et al.*<sup>17</sup>) and previously reported in Jørgensen *et al.*<sup>16</sup> 'During the last year, have you been offered health promotion via your workplace?' with the response categories 'No', 'Yes, during working hours' and 'Yes, outside working hours'. The following six types of WHP were covered: smoking cessation, healthy diet, exercise facilities, weekly exercise classes,

contact with health professionals (physiotherapy, psychologist or the like) and health screenings. Availability timing (during working hours vs outside working hours (termed leisure time)) was asked for each specific activity.

#### Physical work demands

Physical work demands were measured by 10 items on the typical duration of physical postures and activities at work: 'Does your job require that...' 'you are sitting down?'; 'you are standing at the same place?'; 'you work with your back bent...forward without supporting with your arms or hands?'; 'you twist or bend your back many times per hour?'; 'you lift your arms at or above shoulder height?'; 'you do the same finger movements many times per minute (ie, typing work)?'; 'you do the same arm movements many times per minute (ie, packing work, mounting, machine feeding, cutting)?'; 'you squat or kneel, when you work?'; 'you push or pull?'; 'you lift or carry?'. Answer categories were given points corresponding to: almost all the time (100), approximately three-fourth of the time (75), approximately half of the time (50), approximately one-fourth of the time (25), seldom/very little (6), never (0). Answer categories for the item for sitting time was reversed. The sum of all physical work demand scores was calculated and categorised into quartiles of the total score.

#### Fatiguing work

Fatiguing work was measured with a question inspired by the Need for Recovery scale:<sup>18 19</sup> 'How physically exhausted generally in your body are you after a typical work day?'. The six answer categories were categorised into three levels of fatigue: not fatigued (not exhausted, a little bit exhausted), moderately fatigued (somewhat exhausted) and very fatigued (very exhausted, totally exhausted).

#### Quantitative demands

Quantitative demands were determined by three questions replied to on one scale (always, often, sometimes, rarely, never/almost never): 'How often...' '...is your work unevenly distributed, so that it piles up?'; '...do you not have time to complete all your work tasks?' and '...do you have to do overtime?'. Each answer was converted to a scale from 0 to 100 at equal 20-point increments (0=never, 100=always). The mean of these was generated by dividing the sum of the items by the number of items, and this variable was dichotomised at the median value into high/low.

#### Work pace

Work pace was determined by the question: 'How often do you have to work very fast?' (always, often, sometimes, rarely, never/almost never). The answer was converted to a scale from 0 to 100 at equal 20-point increments (0=never, 100=always) and dichotomised at the median value into high/low.

### Emotional demands

Emotional demands was measured with three questions with one answer scale (to a very high degree, to a high degree, partly, to a low degree, to a very low degree): 'To what degree...' '...is your work emotionally demanding?'; '...do you get emotionally involved in your work?' and '...do you have to deal with other people's problems at work?'. The answer was converted to a scale from 0 to 100 at equal 20-point increments (0=to a very low degree, 100=to a very high degree) and dichotomised at the median value into high/low.

### Control

Control was determined by two items regarding influence: 'Are you involved in the planning of your work (ie, how it's done or who you work with)?' (always, usually, usually not, never) and 'Do you have a large degree of influence concerning your work?' (always, often, sometimes, rarely, never/almost never). The answers were converted to a scale from 0 to 100 at equal 25-point increments (0=never, 100=always) for the question regarding involvement in planning and at equal 20-point increments for the question regarding influence (0=never/almost never, 100=always) and dichotomised at the median value into high/low.

### Job demands/control ratios

Three ratios were computed to represent the effect of qualitatively different types of job demands, relative to the degree of decision latitude available to choose how to respond to those demands. Thus the numerator varied but the denominator in each case was the job control scale above. *Psychosocial job strain* was the ratio of quantitative demands to control, dichotomised into high/low at the median value. *Physical demands and control ratio*: The ratio of physical work demands (above score from 0 to 100) to job control was calculated. *Emotional demands and control ratio*: The ratio of emotional demands in the nominator and control in the denominator.

### Social support

Social support was measured with four questions on one answer scale (always, often, sometimes, rarely, never/almost never, not relevant): 'How often...' '...are your colleagues willing to listen to your problems at work?'; '...do you get help and support from your colleagues?'; '...is your nearest supervisor willing to listen to your problems at work?'; '...do you get help and support from your nearest supervisor?'. The answers were converted to a scale from 0 to 100 at equal 20-point increments (0=never/almost never, 100=always) and dichotomised at the median value into high/low.

### Dependent variables

#### Participation in WHP

Participation in WHP was calculated only among those who reported to have it available and was determined by the question 'Have you used it [the specific WHP activity asked for availability of]? (if you did, please mark)'. The following six WHP activities were requested: 'smoking cessation', 'healthy diet', 'exercise facilities', 'weekly exercise classes', 'contact with health professionals (physiotherapist, psychologist or the like)' and 'health screenings'.

### Covariates

Age and gender were obtained from the Central Population Register and industry from Statistics Denmark's registers. Age was categorised into the following categories: 18–29, 30–39, 40–49 and 50–59 years. Industry was categorised into: manufacturing, construction, graphics, transportation and retail, trading, service, agriculture, social and healthcare, teaching and research, finance/public administration and business administration.

### Statistical analyses

Spearman's correlation coefficients were calculated for all pairs of independent variables. Variables with high collinearity were either collapsed or presented in separate models. Binomial logistic regression models were used to estimate ORs for participation in WHP according to the work environment factors. Job strain, emotional demands/control ratio, social support, fatigue, physical work demands and availability timing were added into the same regression model to investigate their mutually adjusted associations with participation. The ratio of physical work demands/job control was investigated in a separate model with the same covariates, where it replaced the other two ratios.

All models were adjusted for age, gender and industry. Furthermore, the model investigating participation in smoking cessation was restricted to those with current/previous smoking status. Statistical analysis was performed using the SAS statistical software 9.2 for Windows. An  $\alpha$  level of 0.05 was defined as representing statistical significance.

## RESULTS

The two social support indices (ie, colleague support and supervisor support) were highly correlated ([table 1](#)) and therefore collapsed. Physical work demands and lifting and carrying were highly correlated, and therefore we moved on with the measure of physical work demands only. There were 9835 (93%) employees providing data on availability and participation of WHP included in the analyses.

A little more than half of the study population was men (54%) and the most prevalent age groups were adults aged 40–49 years (32%). Further descriptive information on

**Table 1** Correlation matrix with an overview over single measures of work environment and their correlation with each other in a representative sample of Danish workers

	Physical work	Fatiguing work	Lifting and carrying	Job control	Quantitative demands	Work pace	Emotional demands	Social support from colleagues	Social support from supervisors
Physical work demands	1	0.37	-0.68	-0.19	-0.25	0.01	0.02	0.00	-0.04
Spearman r									
p Value		<0.0001	<0.0001	<0.0001	<0.0001	0.196	0.1089	0.6939	0.0004
Fatiguing work		1	-0.34	-0.22	-0.01	0.17	0.06	-0.13	-0.15
Spearman r									
p Value			<0.0001	<0.0001	0.2515	<0.0001	<0.0001	<0.0001	<0.0001
Lifting and carrying			1	0.18	0.16	-0.04	0.06	0.06	0.07
Spearman r									
p Value				<0.0001	<0.0001	0.0005	<0.0001	<0.0001	<0.0001
Job control				1	0.09	-0.07	0.09	0.20	0.30
Spearman r									
p Value					<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Quantitative demands					1	0.33	0.20	-0.16	-0.17
Spearman r									
p Value						<0.0001	<0.0001	<0.0001	<0.0001
Work pace						1	0.15	-0.11	-0.14
Spearman r									
p Value							<0.0001	<0.0001	<0.0001
Emotional demands							1	0.01	-0.03
Spearman r									
p Value								0.4414	0.0041
Social Support from colleagues								1	0.55
Spearman r									
p Value									<0.0001
Social support from supervisor									1
Spearman r									
p Value									

p Value=level of significance.

gender distribution, age group, industry (30% unknown), work environment and availability of health promotion is presented in [table 2](#). The most prevalent available WHP was contact to health professional (33%) and the least prevalent WHP available in the population was smoking cessation (16%). Among those with WHP available, the WHP with the highest participation was healthy diet (53%) and the WHP with the lowest participation was smoking cessation (10%). Further descriptive detail regarding availability and participation is given in [table 3](#).

### The association between work environment and participation

The results of the regression models are presented in [table 4](#) and are described below.

#### Availability timing

Availability timing of WHP during working hours versus leisure time was highly associated with participation in

**Table 2** Descriptive information regarding distribution of age, gender, industry and work environment in a representative sample of Danish workers

N=9835	n	Per cent
Gender (%)		
Women	3925	45.9
Men	4627	54.1
Age (%)		
18–29 years	1429	16.7
30–39 years	1944	22.7
40–49 years	2703	31.6
50–59 years	2476	29.0
Industry (%)		
Manufacturing (%)	910	10.6
Construction (%)	244	2.9
Graphics (%)	64	0.7
Transportation and retail (%)	621	7.3
Trading (%)	243	2.8
Service (%)	392	4.6
Agriculture (%)	57	0.7
Social and healthcare (%)	1683	19.7
Teaching and research (%)	684	8.0
Finance/public administration (%)	629	7.4
Business administration (%)	425	5.0
Unknown	2600	30.4
High emotional demands	4940	51.6
High emotional demands/control ratio	4641	49.9
Low social support	4306	45.8
High physical work demands	4769	50.0
High job strain	4639	49.7
High quantitative demands	5146	53.6
High work pace	6477	67.7
High physical work demands/control	4581	49.9
Low control	5723	60.1
Fatigue (%)		
No	5971	62.3
Moderate	2594	27.1
Very	1023	10.7

**Table 3** Availability and participation during the past year for six different categories of health promotion among a representative sample of Danish workers

	Availability		Participation	
	n	Per cent	n	Per cent
Smoking cessation	1600	16.3	156	9.8
Healthy diet	1948	19.8	1027	52.7
Exercise facilities	3263	33.2	919	28.2
Weekly exercise	1784	18.1	457	25.6
Contact to health professional	3230	32.8	1260	39.0
Health check	1676	17.0	752	44.9

WHP. WHP offered during leisure time was associated with lower participation in all measured WHP activities compared with when offered during working hours (OR (CI)=0.70 (0.60 to 0.82)) for contact with the health professional, 0.34 (0.26 to 0.43) for health screening, 0.75 (0.62 to 0.90) for exercise facilities, 0.56 (0.43 to 0.73) for weekly exercise, 0.27 (0.20 to 0.36) for healthy diet and 0.54 (0.34 to 0.85) for smoking cessation.

#### Physical work demands

Having high physical work demands was not associated with WHP participation with ORs ranging from 0.91 to 1.00 for most WHP activities. There were only weak, non-significant associations with higher participation in healthy diet (OR=1.23 (95% CI 0.97 to 1.54)) and lower participation in health check (OR=0.81 (95% CI 0.66 to 1.01)).

#### Physical fatigue after work

Being moderately fatigued after work (compared with no fatigue) was associated with higher participation in contact with the health professional (OR=1.25 (95% CI 1.03 to 1.51)) and smoking cessation (OR=1.74 (95% CI 1.06 to 2.87)), but not with participation in other WHP activities. Being very fatigued after work was associated with lower participation in weekly exercise sessions (OR=0.54 (95% CI 0.31 to 0.94)) referencing those not being fatigued.

#### Quantitative demands

Reporting high quantitative demands at work was not significantly associated with participation in WHP activities, with ORs ranging from 0.83 to 1.13.

#### Work pace

Reporting high work pace was not significantly associated with participation in WHP activities with ORs ranging from 0.88 to 1.02.

#### Emotional demands

Reporting of emotional demands at work was associated with higher participation in contact with health

**Table 4** Binary regression mutually controlled for gender, age and industry on the association between work environment and participation in workplace among a representative sample of Danish workers

	Contact with health professional						Health check		Exercise facilities		Weekly exercise		Healthy diet		Smoking cessation*			
	Estimate	95% CI		Estimate	95% CI		Estimate	95% CI		Estimate	95% CI		Estimate	95% CI				
		Lower	Higher		Lower	Higher		Lower	Higher		Lower	Higher		Lower	Higher	Lower	Higher	
Emotional demands (high)	<b>1.25</b>	<b>1.00</b>	<b>1.58</b>	1.04	0.76	1.41	0.99	0.77	1.26	0.91	0.64	1.30	1.20	0.90	1.61	0.51	0.25	1.04
Physical work demands (high)	0.98	0.83	1.16	1.23	0.97	1.54	0.96	0.81	1.15	0.91	0.70	1.17	0.87	0.66	1.07	1.00	0.62	1.62
Quantitative demands (high)	1.03	0.88	1.21	0.99	0.79	1.24	0.97	0.82	1.16	0.83	0.65	1.07	1.13	0.92	1.39	0.87	0.55	1.37
Work pace (high)	1.01	0.85	1.20	0.88	0.70	1.12	0.92	0.76	1.11	0.96	0.73	1.25	1.02	0.83	1.26	0.91	0.56	1.49
Social support (low)	1.12	0.95	1.31	0.99	0.79	1.24	<b>0.81</b>	<b>0.68</b>	<b>0.96</b>	<b>0.86</b>	<b>0.67</b>	<b>1.11</b>	<b>0.86</b>	<b>0.70</b>	<b>1.06</b>	<b>1.07</b>	<b>0.67</b>	<b>1.70</b>
Emotional demands/control (high)	<b>0.72</b>	<b>0.57</b>	<b>0.91</b>	0.86	0.62	1.17	0.96	0.75	1.24	0.90	0.63	1.29	<b>0.65</b>	<b>0.48</b>	<b>0.87</b>	1.10	0.54	2.21
Physical work demands/control (high)†	0.96	0.82	1.12	1.15	0.93	1.41	0.95	0.80	1.11	0.95	0.75	1.20	<b>0.80</b>	<b>0.66</b>	<b>0.97</b>	0.97	0.64	1.47
Job strain (ratio (high/low)) (high)	0.95	0.81	1.11	0.99	0.79	1.25	1.03	0.87	1.22	0.83	0.65	1.07	1.10	0.90	1.36	0.93	0.58	1.51
Availability setting (leisure time)‡	<b>0.70</b>	<b>0.60</b>	<b>0.82</b>	<b>0.34</b>	<b>0.26</b>	<b>0.43</b>	<b>0.75</b>	<b>0.62</b>	<b>0.90</b>	<b>0.56</b>	<b>0.43</b>	<b>0.73</b>	<b>0.27</b>	<b>0.20</b>	<b>0.36</b>	<b>0.54</b>	<b>0.34</b>	<b>0.85</b>
Moderately fatigued	<b>1.25</b>	<b>1.03</b>	<b>1.51</b>	0.93	0.72	1.21	1.06	0.87	1.29	0.93	0.70	1.24	1.00	0.78	1.28	<b>1.74</b>	<b>1.06</b>	<b>2.87</b>
Very fatigued	1.20	0.90	1.60	0.86	0.54	1.38	0.79	0.57	1.11	<b>0.54</b>	<b>0.31</b>	<b>0.94</b>	1.16	0.78	1.73	1.53	0.70	3.34

Significant (p&gt;0.05) associations are highlighted (bold); borderline significant associations are highlighted (italics).

\*Only among smokers and previous smokers.

†Separate model controlled for gender, age, control and industry.

‡Reference=working hours.

professionals (OR=1.25 (95% CI 1.0 to 1.58)). For the other WHP activities, the ORs were non-significant between 0.99 and 1.20. There was a stronger, but also non-significant association between high emotional demands and lower participation in smoking cessation (OR=0.51 (95% CI 0.25 to 1.04)), indicating lower participation.

### Demands/control ratios

*Demands and control ratios:* High job strain was not associated with participation in any WHP activities, with ORs ranging from 0.83 to 1.10. A high ratio of physical demands to job control was associated with lower participation in healthy diet (OR=0.80 (95% CI 0.66 to 0.97)). The physical demands/job control ratio was not associated with other WHP activities, with ORs ranging from 0.95 to 1.15.

A high ratio of emotional demands to job control was associated with a lower participation in contact with health professionals (OR=0.72 (95% CI 0.57 to 0.91)) and healthy diet (OR=0.65 (95% CI 0.48 to 0.87)). This ratio was not significantly associated with any of the other WHP activities with ORs ranging from 0.86 to 1.10.

### Social support

Low social support was significantly associated with lower participation in exercise facilities (OR=0.81 (95% CI 0.68 to 0.96)). Low social support was not associated with participation in other WHP activities, with ORs ranging from 0.86 to 1.12.

## DISCUSSION

In this study of a large representative sample of Danish employees, several characteristics of the work environment were associated with employee participation in WHP. In particular, WHP activities available only during leisure time had markedly lower odds of participation. Adverse work environment factors (ie, low social support and fatiguing work) were also associated with low participation. High demands at work (ie, physical, emotional and quantitative demands) did not seem to be independent a barrier for participation. However, in combination with low control, high physical and emotional work demands seemed to limit participation in WHP. In the following, the results are discussed and compared with previous studies on participation in WHP.

The most dominating factor associated with participation proved to be timing and/or setting of the availability of the WHP activity (ie, during working hours or during leisure time). For all types of health promotion initiatives, being available only in leisure time meant a much lower probability for participation than for availability during working hours. A previous qualitative study suggested that accessibility of WHP was important for WHP participation and suggested that this may be due to the WHP during paid work hours, which signals a

stronger management commitment.<sup>12</sup> Moreover, having variable working hours has been shown to impact participation positively.<sup>10 20</sup> Another explanation is that it is simply more feasible for the workers to fit the participation into everyday life (eg, obligations to children or a second job may hamper participation outside working hours). The latter explanation is in line with previous explanations for participation in WHP. For example, the socioecological framework suggests that higher order structural factors are overarching determinants for WHP participation.<sup>11</sup> In the settings approach suggested by the Ottawa Charter for Health Promotion strategy, location and provider of health promotion were mentioned as important prerequisites for implementation.<sup>5</sup> However, these additional features were not measured in this study. Furthermore, state-of-the-art implementation techniques also take timing into consideration when mapping barriers and facilitators for implementation of a health education initiative.<sup>21</sup> Thus, timing seems to be a highly important structural factor to consider when planning and implementing WHP.

The actual production demands at work (emotional, quantitative and physical) were not independently associated with lower participation in WHP. This is in contradiction to previous studies suggesting that a high physical work demands limit smoking cessation and weight loss.<sup>14 15</sup> However, when combined with a concurrent low level of control, high physical work demands was associated with lower participation in WHP, which is in line with one previous study, indicating lower success in efforts for smoking cessation with high physical job strain.<sup>22</sup> Specifically, high physical demands combined with low control lowered the odds of participation in healthy diet, and the combination of high emotional demands and low control lowered the odds of contact with health professionals and healthy diet.

The demand–control model is known to be associated with health and well-being and built originally on the concept that high demands and low control could increase the risk of reduced participation in society.<sup>4</sup> The current study expands that understanding of participation in a way that is logical and plausible but not previously documented. Furthermore, this study established a physical demand–control ratio as previously suggested by Sanderson *et al.*<sup>22</sup> and Schoenfisch and Libscomb.<sup>23</sup> In addition, an emotional demand–control ratio was established. Similar to the other demand–control ratios, the ratio of emotional demands to control was calculated with emotional demands in the nominator and control in the denominator. The authors are not aware of previous studies that have done this. The association between high emotional demands/control ratio and low participation in contact with health professionals is particularly interesting because emotional demands independently increased the odds of participating in contact with health professionals. One explanation is that high emotional demands at work generate a need to seek help from health professionals<sup>16</sup> and thus elevates

participation propensity, but that low control in the job limits the opportunities for participation and thus lowers participation. However, previously, negative affections have been shown to be highly associated with the self-reporting of psychological job demands, so the results should be interpreted with caution and the finding tested in future studies.

Social support was positively associated with participation in WHP. This is in line with previous studies reporting that social support is a motivator for participation in health promotion.<sup>12 24</sup> Moreover, social support is a well-known important factor for well-being at work.<sup>25</sup> Furthermore, the socioecological framework supports the contribution of social support as an interpersonal factor determining participation.<sup>11</sup> In this study, low social support was associated with low participation in exercise facilities. Exercise facilities do not necessarily include any personal contact with colleagues or other social obligation. Therefore, colleague and supervisor support may become particularly important for participation in such initiatives. Thus, this finding indicates that when offering exercise facilities at the workplace, inclusion of some component of social support should be considered.

One single adverse factor—being moderately fatigued after work—was associated with higher participation in contact with health professionals and smoking cessation. Being fatigued is not per se a feature of the work environment, but rather a short-term indicator of its effect on the person.<sup>26</sup> The simple fact of acknowledging that one is fatigued may distinguish those who are more willing to seek assistance. Thus, fatigue after work may motivate for individual counselling due to an individually perceived need. Previous analyses of data from the same cohort indicated that some groups of unhealthy employees (ie, individuals with elevated body mass index) do choose to participate in WHP presumably based on their individual motivation to promote their health.<sup>16</sup> Thus, even though this study indicates that higher order factors in the work environment and organisation are important for participation in WHP, individual motivation may still be an important mediator.<sup>13</sup> However, reporting of being very fatigued after work was associated with lower participation in weekly exercise. An interpretation of this finding is that high fatigue after work is an important barrier for exercising.

## STRENGTHS AND WEAKNESSES

This study has strengths since it involves a large number of employees from several different occupations and industries in a representative sample of Danish employees. However, the study also includes limitations. First, the self-reported information regarding work environment represents the perceived environment of the participants, which is known to impose risks of bias. For example, negative affect is shown to impact the reporting of psychological work demands.<sup>27</sup> Likewise, negative affect may be associated with participation in WHP. Such reporting biases

would render the analyses vulnerable to confounding and reporting bias, which would increase the risk of finding false associations between adverse work environment and low participation. Therefore, the results should be interpreted in the light of this limitation. Second, the self-reported information regarding availability of health promotion represents the perceived availability of health promotion at the workplace. Therefore, it is possible that some workers have health promotion available without being aware of it, and that those aware of health promotion offers may be a selected group of workers. Third, the reporting of participation reflects any level of participation within the last year and thus there may be some misclassification since those participating only once may not be distinguishable from those not participating. In addition, the impact of work environment features on the frequency or intensity of the individual's participation cannot be determined in this study. Finally, all data were collected concurrently and analyses performed in a cross-sectional design. This hampers interpretation of causality. For example, it is possible that participation in WHP can positively impact the perception of the work environment.

### Conclusion and implications for clinicians and policymakers

Adverse work environment factors such as low social support and very fatiguing work were associated with lower employee participation in WHP. High physical, quantitative and emotional demands were not associated with low participation, but high demands in combination with low control lowered the odds for participation in WHP. These findings suggest that to obtain proper implementation and effects of WHP, initiatives for ensuring a good work environment is essential. Furthermore, the probability for participation in WHP seems to be elevated when the activities are offered during paid working hours. Therefore, a supportive work environment seems to be an important foundation for employees' participation in WHP.

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### REFERENCES

1. Joint WHO/FAO Expert Consultation on Diet NatPoD. *Diet, nutrition and the prevention of chronic diseases*. Geneva: World Health Organization, 2003.
2. Holtermann A, Mortensen OS, Burr H, *et al*. Physical demands at work, physical fitness, and 30-year ischaemic heart disease and all-cause mortality in the Copenhagen Male Study. *Scand J Work Environ Health* 2010;36:357–65.
3. Kristensen TS. Job stress and cardiovascular disease: a theoretic critical review. *J Occup Health Psychol* 1996;1:246–60.
4. Theorell T, Karasek RA. Current issues relating to psychosocial job strain and cardiovascular disease research. *J Occup Health Psychol* 1996;1:9–26.
5. [No authors listed]. The Ottawa Charter for Health Promotion. *WHO Reg Publ Eur Ser* 1992;44:1–7.
6. Rongen A, Robroek SJW, van Lenthe FJ, *et al*. Workplace health promotion: a meta-analysis of effectiveness. *Am J Prev Med* 2013;44:406–15.
7. Robroek SJW, van Lenthe FJ, van EP, *et al*. Determinants of participation in worksite health promotion programmes: a systematic review. *Int J Behav Nutr Phys Act* 2009;6:26.
8. Jorgensen MB, Faber A, Jespersen T, *et al*. Implementation of physical coordination training and cognitive behavioural training interventions at cleaning workplaces—secondary analyses of a randomised controlled trial. *Ergonomics* 2012;55:762–72.
9. Hunt MK, Lederman R, Potter S, *et al*. Results of employee involvement in planning and implementing the Treatwell 5-a-Day work-site study. *Health Educ Behav* 2000;27:223–31.
10. Kilpatrick M, Blizzard L, Sanderson K, *et al*. Factors associated with availability of, and employee participation in, comprehensive workplace health promotion in a large and diverse Australian Public Sector setting: a cross-sectional survey. *J Occup Environ Med* 2015;57:1197–206.
11. Linnan LA, Sorensen G, Colditz G, *et al*. Using theory to understand the multiple determinants of low participation in worksite health promotion programs. *Health Educ Behav* 2001;28:591–607.
12. Persson R, Cleal B, Bihal T, *et al*. Why do people with suboptimal health avoid health promotion at work? *Am J Health Behav* 2013;37:43–55.
13. Hall JL, Kelly KM, Burmeister LF, *et al*. Workforce characteristics and attitudes regarding participation in Worksite Wellness Programs. *Am J Health Promot* 2016. [Epub ahead of print 5 Jan 2016].
14. Albertsen K, Hannerz H, Borg V, *et al*. Work environment and smoking cessation over a five-year period. *Scand J Public Health* 2004;32:164–71.
15. Hannerz H, Albertsen K, Nielsen ML, *et al*. Occupational factors and 5-year weight change among men in a Danish national cohort. *Health Psychol* 2004;23:283–8.
16. Jorgensen MB, Villadsen E, Burr H, *et al*. Does workplace health promotion in Denmark reach relevant target groups? *Health Promot Int* 2015;30:318–27.
17. Grosch JW, Alterman T, Petersen MR, *et al*. Worksite health promotion programs in the U.S.: factors associated with availability and participation. *Am J Health Promot* 1998;13:36–45.
18. Garde AH, Albertsen K, Nabe-Nielsen K, *et al*. Implementation of self-rostering (the PRIO-project): effects on working hours, recovery, and health. *Scand J Work Environ Health* 2012;38:314–26.
19. de Croon EM, Sluiter JK, Frings-Dresen MHW. Need for recovery after work predicts sickness absence: a 2-year prospective cohort study in truck drivers. *J Psychosom Res* 2003;55:331–9.
20. Nabe-Nielsen K, Garde AH, Clausen T, *et al*. Does workplace health promotion reach shift workers? *Scand J Work Environ Health* 2015;41:84–93.
21. Bartholomew LK, Parcel GS, Kok G. Intervention mapping: a process for developing theory- and evidence-based health education programs. *Health Educ Behav* 1998;25:545–63.

22. Sanderson DM, Ekholm O, Hundrup YA, *et al.* Influence of lifestyle, health, and work environment on smoking cessation among Danish nurses followed over 6 years. *Prev Med* 2005;41: 757–60.
23. Schoenfisch AL, Lipscomb HJ. Job characteristics and work organization factors associated with patient-handling injury among nursing personnel. *Work* 2009;33: 117–28.
24. Wyatt KM, Brand S, Shyby-Pepper J, *et al.* Understanding how healthy workplaces are created: implications for developing a national health service healthy workplace program. *Int J Health Serv* 2015;45:161–85.
25. Gunnarsdottir S, Bjornsdottir K. Health promotion in the workplace: the perspective of unskilled workers in a hospital setting. *Scand J Caring Sci* 2003;17:66–73.
26. Sluiter JK, de Croon EM, Meijman TF, *et al.* Need for recovery from work related fatigue and its role in the development and prediction of subjective health complaints. *Occup Environ Med* 2003;60(Suppl 1): i62–70.
27. Clausen T, Andersen LL, Holtermann A, *et al.* Do self-reported psychosocial working conditions predict low back pain after adjustment for both physical work load and depressive symptoms? A prospective study among female eldercare workers. *Occup Environ Med* 2013;70:538–44.

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