Psychosocial Work Environment Predictors of Short and Long Spells of Registered Sickness Absence During a 2-year Follow Up

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Objective: *The objective of this study was to investigate the impact of psychosocial work environment factors on short and long absence spells.* ***Methods:*** *Questionnaire data on work environment exposures and registered absence data during 2-year follow up were analyzed with Poisson regression for 1919 employees from the private and public sector.* ***Results:*** *Short spells (1–10 working days) were predicted by low supervisor support, low predictability, and low meaning at work among men and high skill discretion among women. Long spells (>10 days) were predicted by low decision authority, low supervisor support, and low predictability among men and high psychologic demands and low decision authority among women. The variables predictability and meaning at work were developed for this study.* ***Conclusion:*** *Specific psychosocial work environment factors have both common and different effects on short and long absence spells. Effects also differ by gender.* (J Occup Environ Med. *2006;48:591–598*)

During the last few decades, a large number of studies have reported associations between psychosocial working environment factors and absence from work. However, in a recent review, Allebeck and Mastekaasa found that only a limited number were of adequate quality.[1] Among the 20 acceptable studies on psychosocial factors, almost all studies used the demand–control–support model.[2,3] Control was almost equivocally found to be associated with lower absence, whereas the findings were inconsistent for demands and support. In those studies that separated job control in its two components decision authority and skill discretion, the former was a far more consistent predictor than the latter. Also, physical work environment factors were found to be associated with absence. The authors concluded that the evidence for an impact of psychosocial work environment factors on sickness absence is still limited and that more good research is needed.

It was further noted in the review that several researchers assume that longer absences are more associated with health problems than shorter absences and that therefore adverse and potential health-hazardous working conditions should better predict long than sport spells. The review comprised 10 studies that included different absence durations. In four of these studies, psychosocial work environment factors showed indeed a tendency to better predict long than

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short spells, whereas the six others observed no clear trend.

Similar results have been reported in other articles that were not mentioned in the review. Two articles from the Whitehall II study showed mixed results, in which job control in women and skill discretion in both genders were more strongly associated with longer spells, whereas demands and support were more associated with short spells.[4,5] The Finnish Raisio study found that lack of job control was a stronger predictor of certified absence spells of more than 3 days compared with shorter noncertified absences.[6] In the French GAZEL cohort, decision latitude and social support at work had very similar effects on short, intermediate, and long spells in men, but in women, decision latitude had strongest effect on intermediate spells (8–21 days), whereas demands affected short spells (1–7 days) more strongly.[7]

The purpose of the present study is to do a specific analysis on the impact of psychosocial work environment factors on the number of short- and long-term absence spells in a cohort of 1919 Danish employees followed up for 2 years. In previous papers based on the same cohort,[8–10] we have analyzed the impact of individual and workplace-level aggregated psychosocial work environment factors on the number of registered absence days. However, we have not previously studied the effect on absence spells or if the specific factors have different impacts on short and long absences.

A further aim of this study is to adjust the analyses not only for demographic variables and health behaviors, but also physical work environment factors that have not been included in most previous research on psychosocial factors and absence.

Study Population and Methods

This article is based on data from the Intervention Project on Absence and Well-being (IPAW)—a controlled intervention study.[8] The present paper does not report effects of intervention, which will be analyzed at a later stage. However, because interventions were intended to improve psychosocial work environment and thereby increase well-being and reduce absence, we compare analyses with and without adjustment for intervention assignment. Predictors and covariates were measured by the baseline questionnaire and the absence data were derived from the organizations' absence registries during a 2-year follow-up period.

Respondents and Worksites

IPAW includes 52 Danish worksites with 2730 employees at baseline (excluding temporary contracts). Of these, 22 were assigned for interventions to improve the psychosocial work environment and thereby promote employees' well-being and reduce absence rates. The remaining 30 worksites are controls matched on type of work for comparison and having either relatively high (n = 14) or low absence (n = 16) at baseline, respectively. The worksites belong to three organizations: 1) a major pharmaceutical company (production factories, packaging units, laboratories, canteens, and cleaning departments; 13 workplaces, 731 respondents), 2) municipal workplaces in the care sector (15 nursing homes for the elderly and seven institutions for mentally handicapped; 994 respondents), and 3) the technical services of the municipality (cemeteries, parks, workshops, sewage pumping stations, road construction and repair, administrative offices; 17 workplaces, 343 respondents). The workplaces are all located in the greater Copenhagen area.

The baseline questionnaire was sent to the participants between May 1996 and April 1997. Of the 2730 employees, 2053 completed the questionnaire, yielding a participation rate of 75.2%. We have information from absence registers for 1980 of the respondents. Only 53 respondents were 60 years or older, reflecting the common use of early retirement in Denmark. We consequently excluded these highly selected subjects. We further excluded eight trainees and apprentices, yielding a final sample of 1919 subjects. The mean age was 40 years and 68% of the participants were women. The level of education and social status was generally low; 63% of the respondents were skilled, semiskilled, or unskilled workers.

Measurement of Predictors and Covariates

The questions for the scales on psychologic demands, decision authority, and skill discretion were derived from the Whitehall II study[11] and translated into Danish in a previous study that also developed the questions on support from colleagues and supervisor.[12] These five scales consist of two to eight items, each with four response categories ranging from "often" to "never." In addition, scales on meaning of work and predictability were developed and validated by our research group.[8] *Meaning of work* is present when the respondent finds the tasks meaningful and feels that the work is important and useful for others. *Predictability* refers to relevant and useful information on major upcoming events at the workplace, eg, changes in organization, new technology, and so on. The two scales have four items on meaning and two on predictability, each item with five response categories ranging from "fits precisely" to "does not fit." All seven scales were coded according to their names, ie, high scores are unfavorable for psychologic demands and favorable for the other variables. Cronbach's alphas for the scales were generally satisfactory (0.69–0.84), except for the two-item scale on psychologic demands, which had an alpha of 0.56.[8]

Exposures in the physical work environment were measured by single questions on how much of the

daily working time one is exposed to the following: twisting the back, stooping work position, lifting more than 30 kg, pushing/pulling heavy burdens, repeating the same job task many times per hour, loud noise, temperature fluctuations, cold, and dust. For each exposure, we asked the respondents how often they occurred with six response categories ranging from "almost all the time" to "never." We further asked respondents to rate the intensity of physical activity at work on a five-point scale ranging from "very light" to "very heavy."

Socioeconomic status (SES) was defined based on questions about employment grade, education, and job title. For 1796 of the 1919 people, we had sufficient data to code SES. The respondents were classified into six groups (managers/academics, middle managers, other white collar, skilled blue collar workers, semiskilled, and unskilled workers).

Health behaviors were measured by questions on smoking, alcohol consumption, and by calculating body mass index (BMI) from self-reported height and weight.

We asked the participants if they lived with a partner or alone, for the total number of children living at home, and how many of these were below the age of 7 years. Based on this, we created the variable *"family status"* with the following categories: 1 = single without children, 2 = couple without children, 3 = couple with children who are all seven years or older, 4 = couple with children below 7 years (including those with older siblings), and 5 = single parent.

Measurement of Absence

Absence data were drawn from the computer-based registers of the workplaces. We used data recorded during the 24 months after the completion of the questionnaire.

For every absence period, we received data on first and last day and a code of the type of absence. We collapsed consecutive or overlapping periods. We calculated absence resulting from the employees' own sickness, including work injuries and occupational diseases and excluded absence resulting from other reasons such as a child's first sick day or pregnancy-related absence, vacation, or maternity leave.

Unfortunately, there is no general consensus on the limits between short and long absence spells in the literature. We defined short absences as those lasting 1 to 10 days and long absences as more than 10 days. This is meaningful in a Danish context because sick-leave benefits during spells of up to 2 weeks or 10 working days are paid entirely by employers. For longer spells, a considerable part of the employers' costs are reimbursed by tax-financed public health insurance with a fixed maximum amount. Most employers are obliged by collective agreements to pay the difference up to normal wages, especially in higher occupational groups.

Data Analyses

Analyses were made on individual data with psychosocial factors in the working environment as predictors of short and long absence spells adjusted for potential confounders. Analyses were performed separately by gender. Multiple Poisson regression was used in the SAS package using the GENMOD procedure. Like in previous studies,[4,13] a Poisson regression model with a scale parameter was used to specify an overdispersed model. This means that standard errors (SE) are adjusted according to the overdispersion. For 300 participants with less than 2 years of follow up, the logarithm of the actual observation time was included as an offset variable that is a regression variable with a constant coefficient of one for each observation.[14]

Covariates were standardized to a mean of zero and a variance of one. The regression parameters can then be interpreted as the relative change in number of absence spells (ie, the rate ratio [RR]) when moving one standard deviation on the dimension of the independent variable. Note that confidence intervals for rate ratios are not symmetric as a result of logarithmic transformation.

The associations between psychosocial work environment and absence spells were estimated in the following steps. In the first model, we calculated associations for each psychosocial scale adjusted for age, family type, health behaviors (alcohol, smoking, and BMI), organization, and intervention assignment. In the second model, we additionally adjusted for the 10 single items on physical work environment.

We did not include SES in the models, because we assumed that SES is not a confounder but a variable involved in the causal pathway. Because SES is mainly based on occupational status, and occupational status influences the likelihood of being exposed to psychosocial workplace factors, associations between SES and sickness absence spells might be mediated by different exposure to psychosocial working conditions. If this assumption is correct, adjusting analyses on associations between psychosocial factors and absence spells for SES would be overadjustment. However, because this assumption can be debated, we have recalculated the final model with adjustment for SES.

The following variables were treated as categorical variables: intervention assignment (intervention workplace, control workplace with high absence rates, control workplace with low absence), organization (pharmaceutical company, municipal care, and technical services), family status, smoking (never smoked, exsmoker, moderate smoker, heavy smoker: more than 15 cigarettes per day), and SES.

Results

The 1619 participants with complete follow-up data had 8829 short spells of sickness absence (1–10 working days) and 507 long spells (>10 days) during the 2-year obser-

TABLE 1
Mean Number of Short, Long, and Total Spells During 2 Year of Follow Up by Gender, Age, Family Type and Socioeconomic Status

		Mean Number of Spells (95% confidence intervals)		
	N	Short (1–10 d)	Long (>10 d)	Total
Gender				
Women	1083	5.66 (5.36–5.97)	0.34 (0.29–0.39)	6.00 (5.68–6.32)
Men	536	5.03 (4.68–5.38)	0.26 (0.21–0.31)	5.29 (4.93–5.65)
Age				
18–29	250	6.08 (5.45–6.71)	0.15 (0.09–0.20)	6.23 (5.59–6.87)
30–39	509	6.21 (5.79–6.63)	0.26 (0.20–0.32)	6.47 (6.03–6.91)
40–49	491	5.12 (4.72–5.53)	0.34 (0.27–0.41)	5.46 (5.03–5.89)
50–59	369	4.42 (3.94–4.90)	0.47 (0.36–0.57)	4.89 (4.37–5.41)
Family type*				
Single, no children	269	5.23 (4.59–5.86)	0.30 (0.21–0.40)	5.53 (4.87–6.20)
Couple, no children	555	5.30 (4.88–5.72)	0.34 (0.27–0.40)	5.63 (5.20–6.07)
Couple, only children >7 y	359	4.77 (4.35–5.18)	0.25 (0.17–0.32)	5.01 (4.57–5.46)
Couple, (also) children <7 y	304	6.38 (5.86–6.90)	0.30 (0.22–0.39)	6.68 (6.13–7.23)
Single parent	119	6.24 (5.39–7.10)	0.42 (0.27–0.57)	6.66 (5.77–7.56)
Socioeconomic status†				
Managers, academics	48	2.04 (1.34–2.74)	0.17 (0.04–0.29)	2.21 (1.47–2.94)
Middle managers	286	5.88 (5.26–6.50)	0.19 (0.13–0.25)	6.07 (5.43–6.70)
Other white collar	236	4.84 (4.24–5.45)	0.17 (0.11–0.23)	5.01 (4.38–5.64)
Skilled workers	107	5.45 (4.61–6.29)	0.37 (0.25–0.50)	5.82 (4.95–6.69)
Un-/semiskilled salaried staff	564	5.19 (4.85–5.54)	0.39 (0.32–0.45)	5.58 (5.21–5.94)
Un-/semiskilled workers	276	6.72 (6.06–7.38)	0.40 (0.28–0.53)	7.12 (6.42–7.82)

*Thirteen missing.
†One hundred two missing (as a result of insufficient answers to the questions defining the variables).

vation period. Short spells had a mean length of 2.85 days and long spells a mean of 29.7 days. Only 8.8% had no absence spells at all. The individual with most absences had 233 absence days during the 2 years of follow up.

Table 1 shows the distribution of absence spells by gender, age groups, family types, and SES during the 2 years of follow up.

Women had more absence spells than men, particularly longer spells. With increasing age, the number of short spells declined but the number of long spells increased. Couples with children under the age of 7 years had the highest number of short spells, whereas single parents had more long absence spells than the other family types. Cohabitating parents with children who are all 7 years of age or above had the lowest number of absence spells, both shorter and longer. Generally, people of higher SES had less spells than those of lower SES. Regarding short spells, top managers and academics had lower numbers than the other five groups. Regarding long spells, the three white collar groups had less spells than the skilled, semiskilled, and unskilled groups.

Table 2 shows the association between psychosocial work environment factors and the number of short absence spells of up to 10 days. In women, high decision authority and high predictability at work were prospectively associated with a low number of short absence spells when adjusted for sociodemographic factors, health-related behaviors, organization, and intervention assignment (model 1). Further adjustment for physical work environment factors (model 2) attenuated effect sizes somewhat, and decision authority and predictability were no longer statistically significant, although the effect for predictability remained suggestive ($P = 0.07$). In addition, skill discretion, which was not significant in model 1, became a significant predictor in model 2. The effect was opposite of the expected direction, ie, higher skill discretion was associated with more short spells of absence.

In men, high scores of decision authority, supervisor support, predictability, and meaning of work were significantly associated with lower numbers of short absence spells when adjusted for covariates in model 1. Further adjustment for physical work environment factors in model 2 resulted into slightly attenuated but still statistically significant effect estimates for supervisor support, predictability, and meaning of work. The effect of decision authority, however, became statistically insignificant.

Table 3 shows the association between psychosocial work environment factors and the number of absence spells longer than 10 days. In women, low psychologic demands and high decision authority predicted significantly lower numbers of long-term absence spells in both model 1 and model 2.

TABLE 2
Associations Between Psychosocial Work Environment Factors and Number of Short Absence Spells*

	Model 1			Model 2		
Short Spells (1–10 d)	**RR**	**CI**	***P***	**RR**	**CI**	***P***
Women						
Psychologic demands	1.01	0.97–1.07	0.58	0.99	0.94–1.05	0.77
Skill discretion	1.01	0.96–1.06	0.73	**1.07**	**1.01–1.13**	**0.02**
Decision authority	**0.92**	**0.88–0.97**	**0.00**	0.97	0.92–1.03	0.33
Support from supervisor	0.98	0.93–1.03	0.37	0.98	0.93–1.04	0.52
Support from colleagues	0.96	0.91–1.01	0.14	0.96	0.91–1.02	0.15
Predictability at work	**0.93**	**0.89–0.98**	**0.01**	0.95	0.90–1.00	0.07
Meaning at work	0.98	0.93–1.03	0.37	1.01	0.96–1.07	0.68
Men						
Psychologic demands	0.99	0.92–1.07	0.84	1.01	0.94–1.09	0.82
Skill discretion	0.94	0.88–1.00	0.06	0.97	0.90–1.05	0.45
Decision authority	**0.89**	**0.83–0.96**	**0.00**	0.94	0.87–1.02	0.15
Support from supervisor	**0.91**	**0.85–0.97**	**0.01**	**0.93**	**0.86–0.99**	**0.03**
Support from colleagues	1.02	0.95–1.09	0.55	1.03	0.96–1.10	0.43
Predictability at work	**0.91**	**0.84–0.97**	**0.01**	**0.91**	**0.84–0.98**	**0.02**
Meaning at work	**0.91**	**0.85–0.97**	**0.01**	**0.91**	**0.86–0.98**	**0.01**

Rate ratios were calculated for a one standard deviation increase in the exposure variable. Model 1 is adjusted for age, family type, alcohol consumption, smoking, body mass index, organization, and intervention assignment. Model 2 is further adjusted for 10 measures of physical work environment: twisting the back, stooping work position, lifting more than 30 kg, pushing/pulling heavy burdens, repeating the same job task many times per hour, loud noise, temperature fluctuations, cold, dust, and physical activity. Significant results printed in bold.

*Rate ratios (RRs), 95% confidence intervals (CIs), and *P* values.

TABLE 3
Associations Between Psychosocial Work Environment Factors and Number of Long Absence Spells*

	Model 1			Model 2		
Long Spells (>10 d)	**RR**	**CI**	***P***	**RR**	**CI**	***P***
Women						
Psychologic demands	**1.19**	**1.08–1.32**	**0.00**	**1.13**	**1.01–1.26**	**0.03**
Skill discretion	0.99	0.89–1.09	0.78	1.06	0.95–1.19	0.28
Decision authority	**0.77**	**0.70–0.84**	**0.00**	**0.83**	**0.74–0.93**	**0.00**
Support from supervisor	0.93	0.84–1.03	0.18	0.98	0.88–1.10	0.77
Support from colleagues	0.93	0.84–1.03	0.15	0.96	0.86–1.06	0.40
Predictability at work	0.94	0.85–1.04	0.21	1.00	0.90–1.12	0.98
Meaning at work	0.99	0.89–1.10	0.84	1.03	0.91–1.16	0.64
Men						
Psychologic demands	0.93	0.80–1.10	0.41	0.95	0.80–1.13	0.60
Skill discretion	0.91	0.78–1.05	0.18	1.01	0.86–1.19	0.91
Decision authority	**0.75**	**0.64–0.87**	**0.00**	**0.81**	**0.68–0.96**	**0.02**
Support from supervisor	**0.77**	**0.67–0.89**	**0.00**	**0.81**	**0.70–0.94**	**0.01**
Support from colleagues	0.97	0.85–1.12	0.70	0.99	0.85–1.14	0.85
Predictability at work	**0.75**	**0.64–0.87**	**0.00**	**0.81**	**0.68–0.95**	**0.01**
Meaning at work	0.93	0.81–1.08	0.35	1.00	0.87–1.17	0.95

Rate ratios were calculated for a one standard deviation increase in the exposure variable. Model 1 is adjusted for age, family type, alcohol consumption, smoking, body mass index, organization, and intervention assignment. Model 2 is further adjusted for 10 measures of physical work environment: twisting the back, stooping work position, lifting more than 30 kg, pushing/pulling heavy burdens, repeating the same job task many times per hour, loud noise, temperature fluctuations, cold, dust, and physical activity. Significant results printed in bold.

*Rate ratios (RRs), 95% confidence intervals (CIs), and *P* values.

In men, decision authority, supervisor support, and predictability significantly predicted fewer long absences in both models.

When we further adjusted the analyses for SES, we found that rate ratios for significant predictors from Table 2 and Table 3 changed by less than 4% with the exception of the association between decision authority and long absence spells in women, in which the effect estimate was attenuated by 11%, from RR = 0.83 (confidence interval [CI] = 0.74–0.93) to RR = 0.92 (CI = 0.82–1.04).

When we repeated the analyses without adjusting for intervention as-

signment and organization, changes were generally very small. The estimates for decision authority were strengthened in women both for short spells (RR = 0.76, CI = 0.68–0.85) and long spells (RR = 0.92, CI = 0.87–0.97) and for short spells in men (RR = 0.81, CI = 0.72–1.00). Although all other changes were marginal with differences in RR of 0.03 or less, skill discretion for short spells in women was not statistical significant in this model (RR = 1.05, CI = 0.99–1.11).

Discussion

This study has shown that specific psychosocial work environment factors have effects on short and long absence spells. Two of seven factors (support from supervisors and predictability in men) showed significant effects for both short and long spells. In addition, skill discretion in women predicted long spells and showed a similar (although not statistically significant) association of the same direction with short spells. In men, decision authority predicted short spells and showed a lower and statistically insignificant association of the same direction with long spells. It is possible that with more statistical power, both effect sizes could have been statistically significant. On the other hand, psychologic demands and decision authority in women were significantly associated with short spells and showed no considerable effect size for long spells, whereas in men, meaning of work was significantly associated with long spells without showing any associations with short spells. These findings underline that it is important not only to analyze number of absence days as an outcome, but also to study the association of the work environment with different durations of absence in both genders.

Results are especially interesting with regard to decision authority, the only psychosocial work environment factor that had been consistently found to be associated with sickness absence in the literature.[1] In our previous analyses with the IPAW cohort, we found a strong effect of low decision authority on number of sickness absence days in both men and women.[9] Moreover, when we analyzed psychosocial work environment factors not on the individual, but on the workplace level,[10] low decision authority again predicted sickness absence. In the present study, however, decision authority was only associated with long absence spells, but not with short spells, when analyses were adjusted for physical exposures.

Psychologic demands, the other central component of the demand–control–support model, were predictive only for long absence spells in women. The Whitehall II study[15] found that high demands were associated with high absence (as a result of back pain) in lower SES groups, but with low absence in higher SES groups. This may explain some of the inconsistent findings in relation to demands and absence. Because of the low proportion of men of high SES in this study, it was not very feasible to calculate analyses stratified by SES to replicate these findings here.

To our knowledge, this is the first time that the effects of decision authority and psychologic demands on sickness absence were both controlled for physical workload and stratified for absence of different duration in a prospective study. Blank and Diderichsen[16] conducted similar analyses, but their study was cross-sectional. Like in our study, Blank and Diderichsen found that high psychologic demands were associated with absence only in women (and more strongly with long than short spells) and that low job control was associated with long spells in both genders. In contrast to our study, low job control was also associated with short spells in men. Frost et al also studied work environment and absence spells while controlling for physical exposures in another cross-sectional study[17] but used only one aggregated measure of psychosocial work environment, which makes comparison difficult.

This study also indicates that it is important to differentiate social support at work in support from supervisors and support from colleagues. Although support from colleagues was unrelated to both short and long sickness absence spells in both genders, support from supervisors predicted both fewer short and long absence spells in men.

Like social support from supervisors, high predictability at work was significantly associated with fewer short and long spells in men. In women, there was a clear and significant association with short spells before we adjusted for physical workload. After adjustment, the association was no longer statistical significant but remained suggestive. The other newly conceptualized variable, meaning of work, was only predictive for fewer short spells and this effect was restricted to men.

It is possible that a small part of the absence has been classified incorrectly, eg, leave because of a child's sickness registered as the employee's own sickness or vice versa. We analyzed only absences registered as employees' own sickness. Nondifferential misclassification would probably cause a dilution of associations and an underestimation of the significance of true effects. The distinction used in other studies between self-certified short absences and longer medically certified absences is not meaningful in a Danish context. Medical certification is not compulsory at fixed terms and is only made if required by the employer (who actually has to pay for the certificate if they require it earlier than 3 sickness absence days) or by the health insurance (most often at 4 weeks). Policies are very different between employers, and it is not registered in the absence data we used whether a physician certified a specific absence.

Potentially improvements of psychosocial work environment in intervention workplaces may have

ameliorated the effect of psychosocial factors on absence during follow up. Although we adjusted the analyses for intervention assignment, such changes may have diluted the true associations and thus introduced a minor underestimation of the true effect. Adjusting for organization may also cause a minor underestimation, because some of the factors analyzed may be associated with the organizations. As reported, not adjusting for these two variables resulted in very small changes, mainly strengthening of the estimates for decision authority.

Repeating analyses while adjusting the results for SES caused very minor changes, and because this adjustment implies a risk of overadjustment, we consider the rate ratios from model 2 as the most appropriate adjusted results. The small changes when adjusting for SES suggest that the confounders we have included may actually explain major parts of the social gradient in absence.

An unexpected finding in this study was that women with high levels of skill discretion had more short absence spells compared with women with low skill discretion. We found the same unexpected result when we analyzed the effect of skill discretion on number of absence days.[9] In discussions with study participants, we noted that some of the unskilled female participants in the study perceived what we called "skill discretion" more like "demands for change" that they felt straining. Researchers studying implementation of empowerment strategies such as introducing "self-governing groups" have reported similar experiences, especially in low-skilled employees.[18]

In general, effect sizes of the psychosocial factors in this study were stronger for long sickness absence than for short absence. This is in agreement with the recent review by Allebeck and Mastekaasa[1] that found a similar tendency in four of 10 studies that had analyzed different lengths of spells. It has been argued that longer spells are more related to health[19] and shorter spells more to coping.[20] If this assumption were correct, then our findings would indicate that adverse psychosocial working conditions influence sickness absence primarily through an increased risk of ill health. This would further indicate that strategies to reduce longer sickness absences should focus more on changes of potential health-hazardous psychosocial work environment exposures and less on changes in coping styles and individual behavior.

With regard to preventive intervention activities, the results of this study suggest several options. Increasing decision authority, for example, could be the strategy of choice for reducing long-term sickness absence, because it was associated with this outcome in both men and women. However, based on our findings, a significant change in short spells should not be expected. Increasing supervisor support and predictability, on the other side, would reduce both long- and short-term spells; however, the effect would be limited to men. In general, an intervention strategy that focuses on factors that have been identified in research and also carefully maps the prevailing problems in the local physical and psychosocial work environment is recommended.[21]

Finally, we want to point out that the cutoff point we used for short- and long-term spells is based on a national context. As delineated in the "Methods" section, we used a cutoff point of 10 days because in Denmark, the employer pays the first 10 lost working days, whereas the following period beyond 10 days is partly reimbursed by tax-financed health insurance. Other studies have used different cutoff points based on administrative regulations in the specific countries or on other considerations. It would be very interesting if international standards for defining short- and long-term absence periods could be developed in the near future so that different studies could be more reliably compared with each other.

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