ORIGINAL ARTICLE

Psychosocial factors at work and self reported health: comparative results of cross sectional and prospective analyses of the French GAZEL cohort

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Background: Psychosocial factors at work have been found to be significant contributors to health, especially cardiovascular health.
Aims: To explore the relation between psychosocial factors at work and self reported health, using cross sectional and prospective analyses for a large occupational cohort of men and women.
Methods: Psychosocial factors at work were evaluated using the Karasek questionnaire, designed to measure psychological demands, decision latitude, social support, and physical demands. Self reported health was used as health outcome. Covariates included chronic diseases, and sociodemographic, occupational, and behavioural factors. The cross sectional and prospective analyses concerned respectively 11 447 and 7664 workers. Men and women were analysed separately.
Results: Cross sectional analysis revealed significant associations between psychological demands, decision latitude, social support, and physical demands, and self reported health for both men and women. Prospective analysis showed that high psychological demands for both genders, low decision authority for men, and low social support and high physical demands for women were predictive of poor self reported health. These results were independent of potential confounding variables.
Conclusions: Results highlight the predictive effects of psychosocial factors at work on self reported health in a one year follow up study. They also underline the need for longitudinal study design and separate analyses for men and women in the field of psychosocial factors at work.

Since the publication in 1979 by Karasek,[1] psychosocial factors at work have been recognised as occupational risk factors. In most subsequent epidemiological studies, Karasek's model and the Job Content Questionnaire (JCQ)[2 3] were used to evaluate: (1) psychological demands, which measure job demands, time pressure, and conflicting demands; and (2) decision latitude, in which both control over work (decision authority) and the possibility of learning new skills (skill discretion) are measured. A third scale was added to this model: social support from colleagues and the supervisor. Karasek postulated that health may be affected by job strain, defined as a combination of high levels of psychological demands and low levels of decision latitude. Health risks might be increased by low levels of social support, a combination known as iso-strain—that is, social isolation and job strain.[4]

The above psychosocial factors at work have been found to be important contributors to health, especially cardiovascular health.[5 6] Various studies also showed that these aspects of work were associated with other health outcomes, such as musculoskeletal disorders,[7 8] mental disorders,[9 10] and behavioural risk factors such as smoking and drinking.[11 12] Some recent studies dealt with the relations of psychosocial factors at work to health status or health related quality of life, and either self reported health or the Short-Form 36 questionnaire (a generic health status measurement instrument) was used as health outcome.[13–19] Some of them had a prospective design.[14 15 18] As reported by Zapf and colleagues,[20] most of the literature on stressors and health is cross sectional, and the weaknesses of this design are widely acknowledged, because it usually makes the demonstration of causal relations impossible.

Among the cross sectional studies, the study by Amick and colleagues[13] showed that job strain and iso-strain were associated with health status. Lerner and colleagues[16] reported an association between job strain and health related quality of life. Schrijvers and colleagues[17] found that the odds of poor perceived health was larger among people reporting hazardous physical working conditions, low job control, low social support at work, and high psychological demands. Pikhart and colleagues[19] showed a significant association between effort-reward imbalance and poor self rated health.

Borg and colleagues[14] found that repetitive work, high psychological demands, low social support, job insecurity, and high ergonomic exposures were predictive of a decline in self rated health in a prospective study over five years. Cheng and colleagues[15] found that low control, high demands, and low social support were associated with poor health status at

Main messages

- Psychosocial factors at work were found to be predictive factors of poor self reported health in a one year follow up study.
- Gender specific associations were observed, as psychological demands for both genders, decision authority for men only, and social support and physical demands for women only predicted poor health.
- Strong differences were found between cross sectional and prospective results, underlying the need for prospective study design in the field of psychosocial factors at work.

Policy implications

- Psychosocial aspects of work should be the target of preventive actions on the workplace.
- Attention should be paid to specific psychosocial factors at work for women.

Table 1 Prevalence and incidence of poor self reported health by sociodemographic and health related characteristics

	Men				Women			
	Cross sectional study (n=8277)		Prospective study (n=5575)		Cross sectional study (n=3170)		Prospective study (n=2089)	
	n	Prevalence of poor self reported health (%)	n	Incidence of poor self reported health (%)	n	Prevalence of poor self reported health (%)	n	Incidence of poor self reported health (%)
Self reported health								
Good	6684		4892		2416		1752	
Poor	1532	18.6	643	11.6	730	23.2	316	15.3
Number of chronic conditions								
0	4756	12.8	3465	9.2	1954	18.0	1410	12.6
1	2495	22.0	1593	14.4	902	28.0	538	19.2
2 or more	1026	37.7	517	19.2	314	42.3	141	27.1
		***		***		***		***
Age (y)								
⩽44	–	–	–	–	286	23.0	194	13.1
45–49	1375	18.9	1010	11.4	1416	22.2	978	16.0
50–54	5547	19.3	3934	11.8	1136	24.2	750	15.6
⩾55	1355	15.9	631	11.2	332	24.2	167	12.1
		*		ns		ns		ns
Marital status								
Single	173	32.0	101	18.0	223	21.4	158	15.3
Married	7293	18.1	4966	11.4	2121	21.7	1408	15.3
Cohabiting	305	17.1	204	12.3	211	22.9	148	14.3
Separated	114	24.3	68	19.4	61	32.2	37	13.5
Divorced	309	24.8	187	11.2	424	28.3	263	14.9
Widowed	70	14.7	43	9.3	125	30.4	73	19.4
		***		ns		**		ns
Number of stressful personal events								
0	3366	17.0	2325	11.0	1366	19.1	933	14.0
1	3000	18.8	2016	12.5	1083	23.6	716	15.1
2	1361	21.1	869	10.6	527	28.7	328	18.2
⩾3	550	21.8	365	13.0	194	34.7	112	19.1
		**		ns		***		ns
Smoking								
Non-smokers	6609	18.1	4521	10.9	2627	22.4	1765	15.3
Smokers	1553	20.4	1013	14.6	480	27.0	293	15.2
		*		***		*		ns
Alcohol								
Abstainers	656	24.7	398	14.6	738	27.8	459	15.7
Light drinkers	4441	17.6	3064	11.3	1680	22.1	1124	15.0
Moderate drinkers	2037	18.3	1379	11.1	646	20.1	442	15.2
Heavy drinkers	1143	19.7	734	12.3	106	28.3	64	17.2
		***		ns		**		ns
Overweight								
No	5732	16.4	4012	10.2	2610	21.4	1782	14.6
Yes	2483	23.8	1550	15.4	524	31.8	294	19.1
		***		***		***		*

*p<0.05, **p<0.01, ***p<0.001.

baseline, as well as greater functional declines over a four year follow up period. In the five year prospective study by Stansfeld and colleagues,[18] high psychological demands, low decision latitude, low social support, and effort-reward imbalance were predictors of a decline in several dimensions of health functioning. The last three studies had a prospective design.[14 15 18]

Self reported health (or alternatively self rated, self assessed, or self perceived health) has been much studied over the past decade. This parameter has several advantages for epidemiological research. It constitutes a general single item question to which the answers can easily be collected via a self administered questionnaire. It reflects a person's integrated perception of health and is known to take into account the various aspects of health, as suggested by the World Health Organisation's definition of health, which includes its physical, mental, and social aspects. Several authors have reported strong associations between self reported health and more objective measures of morbidity.[21–23] Further, in prospective studies, poor self reported health was found to be a significant predictor of mortality.[22–26]

The objective of this study was to explore the associations between psychosocial factors at work, measured with the full recommended version of the JCQ, and self reported health. The data collected underwent cross sectional and prospective analyses, whose results were then compared. In addition, as the study population includes a large number of men and women, the analyses were done separately for men and women.

METHODS

Study population

The GAZEL cohort was established in 1989 and originally included 20 624 subjects working at Electricité De France–Gaz De France (EDF-GDF), comprising men aged 40–50 and women aged 35–50 at baseline.[27] Since 1989, this cohort has been followed up by means of yearly self administered questionnaires and by data collection from the company's personnel and medical departments. Research on psychosocial factors at work and health has been conducted in this cohort since 1995.[28–33]

Psychosocial factors at work

The full recommended JCQ scales of decision latitude, psychological demands, social support, and physical demands were included in the self administered questionnaire of the GAZEL cohort for the year 1997. The French version used here has already been used and/or validated elsewhere.[34–36] In addition, the internal consistency, factorial validity, and convergent validity of this version were studied in the GAZEL cohort in a previous investigation.[33] Decision latitude and psychological demands each comprised nine items; social support, eight

Table 2 Prevalence and incidence of poor self reported health by occupational characteristics

	Men				Women			
	Cross sectional study (n=8277)		Prospective study (n=5575)		Cross sectional study (n=3170)		Prospective study (n=2089)	
	n	Prevalence of poor self reported health (%)	n	Incidence of poor self reported health (%)	n	Prevalence of poor self reported health (%)	n	Incidence of poor self reported health (%)
Educational level								
University	1579	15.7	1146	10.8	280	17.9	204	15.3
Upper vocational	604	17.7	425	11.1	178	25.0	123	13.8
Upper secondary	537	19.0	370	12.3	380	22.7	258	12.1
Lower vocational	4181	19.1	2794	12.1	1531	22.7	1008	15.5
Lower secondary	1027	20.2	659	10.8	600	25.5	372	16.0
Primary	347	23.2	179	12.4	201	26.6	124	19.7
Occupation		**		ns		ns		ns
Managers	1660	16.8	1164	11.3	257	17.0	182	12.8
Engineers	1920	15.3	1353	9.2	219	19.4	156	14.2
Administrative associate professionals	969	21.6	630	11.2	1739	22.4	1161	14.9
Technicians	464	19.4	319	12.0	–	–	–	–
Foremen	2414	19.2	1584	13.1	367	20.3	251	12.0
Clerks	223	22.6	138	13.9	579	31.6	332	21.2
Skilled industrial workers	300	22.4	192	16.9	–	–	–	–
Craftsmen	302	29.6	175	12.1	–	–	–	–
Number of stressful occupational events		***		*		***		*
0	5490	16.9	3749	11.3	2206	21.0	1481	14.8
1	2011	22.0	1311	12.4	675	26.4	442	16.1
⩾2	776	22.0	515	12.1	289	32.5	166	17.6
Psychological demands		***		ns		***		ns
Low	3936	14.8	2735	9.7	1414	17.9	984	12.8
High	4055	22.2	2663	13.6	1558	28.2	978	18.2
Decision latitude		***		***		***		***
High	4734	15.9	3332	11.0	1160	18.3	822	14.1
Low	3265	22.7	2067	12.6	1812	26.2	1142	15.8
Social support		***		ns		***		ns
High	3917	13.9	2790	10.4	1348	17.2	966	12.5
Low	3859	23.1	2466	13.0	1550	27.8	963	18.4
Physical demands		***		**		***		***
Low	4319	15.3	3073	10.4	1617	18.4	1156	13.0
High	3816	22.3	2426	12.9	1452	28.2	879	18.2
		***		**		***		***

*p<0.05, **p<0.01, ***p<0.001.

items; and physical demands, five items. Answers were graded according to the following Likert-type scale: "totally disagree", "disagree", "agree", and "totally agree". The scores for each scale were constructed according to Karasek's recommendations and were dichotomised at the median of the total sample of men and women, for use in the analyses.[3] Decision latitude included the two subscales of decision authority and skill discretion, and social support, support from colleagues, and from the supervisor.

Self reported health

Self reported health was based on an eight level scale ranging from "very good" (coded 1) to "very poor" (coded 8). The question was formulated as follows: "How do you rate your general health status?". Poor self reported health was defined by levels ranging from 5 to 8—that is, with a cut off in the middle. Self reported health was included in the questionnaires for 1997 and 1998. It has been shown previously that this indicator was strongly associated with the presence of diseases in the GAZEL cohort.[37]

Covariates

Several covariates were used as potential confounding variables of the relation between psychosocial factors at work and self reported health: the number of chronic conditions within the 12 previous months (including chronic bronchitis, asthma, hypertension, angina pectoris, myocardial infarction, claudication, osteoarthritis, diabetes, hyperlipidaemia, and cancer); age (in five-year groups); marital status (six categories); the number of stressful personal events occurring during the previous 12 months (the 12 events included death of a spouse, death of a close relative, divorce, and marital separation); the number of stressful occupational events within the previous 12 months (job change, transfer, reconversion, and department restructuring); smoking (non-smokers versus smokers); overweight (defined by body mass index, calculated as weight/height^2 exceeding 27.2 kg/m^2 for men and 26.9 for women)[38]; and alcohol consumption, graded according to the frequency (number of days/week), the quantity (glasses/day), and the type consumed (wine, beer, or spirits). Drinkers were classified as: abstainers, light drinkers (1–13 drinks/week for men and 1–6 drinks/week for women), intermediate drinkers (14–27 drinks/week for men and 7–20 drinks/week for women), and heavy drinkers (28 drinks/week or more for men and 21 drinks/week or more for women). Data for these variables were obtained from the 1997 questionnaire. The validity of self reported weight and height has been explored previously.[39] The two other covariates studied were educational level (six categories) and occupational group (eight categories for men, and five for women). Data for these two variables were supplied by the EDF-GDF personnel department.

Statistical methods

The cross sectional analysis of the data was designed to explore the associations between psychosocial factors at work

Table 3 Psychosocial factors at work in 1997 as risk factors of poor self reported health in 1997: cross sectional results of logistic regression analyses

	Men						Women					
	Model 1, n=7349		Model 2, n=7314		Model 3, n=7237		Model 1, n=2642		Model 2, n=2630		Model 3, n=2580	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Psychological demands												
Low	1		1		1		1		1		1	
High	1.66	1.47 to 1.88	1.65	1.45 to 1.88	1.63	1.43 to 1.86	1.85	1.52 to 2.25	1.71	1.39 to 2.10	1.71	1.39 to 2.11
Decision latitude												
High	1		1		1		1		1		1	
Low	1.40	1.24 to 1.59	1.28	1.12 to 1.47	1.29	1.12 to 1.47	1.55	1.26 to 1.90	1.39	1.12 to 1.73	1.47	1.17 to 1.83
Social support												
High	1		1		1		1		1		1	
Low	1.58	1.39 to 1.79	1.51	1.33 to 1.72	1.50	1.32 to 1.71	1.58	1.30 to 1.93	1.64	1.34 to 2.01	1.65	1.34 to 2.03
Physical demands												
Low	1		1		1		1		1		1	
High	1.44	1.28 to 1.63	1.32	1.16 to 1.51	1.31	1.14 to 1.49	1.50	1.24 to 1.81	1.32	1.08 to 1.61	1.32	1.08 to 1.62

Model 1: included Karasek's dimensions only.
Model 2: additionally adjusted for chronic conditions, age, marital status, stressful personal events, education, occupation, and stressful occupational events.
Model 3: additionally adjusted for smoking, alcohol, and overweight.

as evaluated in 1997 and the prevalence of poor self reported health, also as evaluated at that time, and the prospective analysis, to establish whether the psychosocial factors at work considered in 1997 were predictive of poor self reported health one year later among the subgroup of the study population who rated their health as good at baseline—that is, in 1997. In both analyses, adjustments were made for covariates measured at baseline. The crude relations between each of the four JCQ scales of decision latitude, psychological demands, social support, and physical demands, and self reported health were submitted to Pearson's χ^2 test, as were those between the covariates and self reported health. Logistic regression analysis was used to adjust for confounding variables. Poor self reported health was used as the dependent variable and the four JCQ scales as independent variables. Three models were constructed. First, a model was constructed including the four JCQ scales simultaneously. Second, adjustment was made for chronic conditions, sociodemographic variables (age, marital status, and stressful personal events), and occupational variables (education, occupation, and stressful occupational events). Third, additional adjustment was made for behavioural risk factors (smoking, alcohol consumption, and overweight). The four JCQ scales were introduced into these models simultaneously to assess their own effect. The interaction between psychological demands and decision latitude was also explored by including the two way interaction term: high demands and low latitude. In addition, we explored the subscales of decision latitude (decision authority and skill discretion) and the subscales of social support (from colleagues and supervisor). Men and women were studied separately to explore potential gender specific associations. Statistical analysis was performed with the SAS statistical software package.[40 41]

RESULTS

Study population

In 1997, 14 987 subjects in the GAZEL cohort answered the self administered questionnaire—that is, 74.1% of the 20 222 subjects asked to complete it (402 of the 20 624 subjects in the initial cohort were not sent a questionnaire in 1997, because 307 had died and 95 had been lost to follow up). Of the 14 987 respondents, 11 447 (76.4%) were working in 1997, 3344 (22.3%) had retired, 157 (1.0%) were not working because of long illness or disability, and 39 (0.3%) were not working for other reasons (unpaid holidays, compassionate leave, nomination for a future appointment, etc). The present cross sectional study is therefore based on the 11 447 subjects, comprising 8277 men and 3170 women, who were working in 1997 and answered the questionnaire that year. Of these 11 447 workers, 9100 rated their health as good in 1997. Among them, 8366 (91.9%) responded to the questionnaire of 1998; 7664 were still working in that year. The other 702 were not, because of retirement (682 subjects), long illness or disability (11 subjects), or other reasons (nine subjects).

Therefore, our prospective analysis is based on the 7664 subjects, 5575 men and 2089 women, who rated their health as good in 1997, were working, and responded to both the 1997 and 1998 questionnaires. Tables 1 and 2 give further details regarding the sociodemographic, occupational, and health related characteristics of the population studied. The comparison between the respondents to the 1998 questionnaire and the non-respondents with respect to the study variables in 1997 showed that non-respondents were more likely to be women. For men, non-respondents were younger, less educated, more likely to be separated, divorced, or widowed, and smokers. For women, non-respondents were more likely to be smokers, overweight, and to have chronic diseases. For both genders, non-respondents also reported poorer health. For occupational factors, no difference was observed between respondents and non-respondents, except for physical demands for men; non-respondents were exposed to higher levels of physical demands.

Cross sectional analysis

In 1997, the prevalence of poor self reported health was 18.6% for men and 23.2% for women (table 1). The four JCQ scales displayed strong associations with self reported health; thus high psychological demands, low decision latitude, low social support, and high physical demands increased the prevalence of poor health for both men and women (table 2). After introducing the four JCQ scales simultaneously into a first model, the associations between these variables and self reported health remained significant (table 3). After adjustment for chronic conditions, and sociodemographic and occupational factors, the four JCQ scales remained significant, but their odds ratios were slightly lower, except for social support for women. Additional adjustment for behavioural risk factors did not change the results; the four JCQ scales were still found to be significant risk factors for self reported health for both sexes. Furthermore, no interaction was observed between psychological demands and decision latitude. Study of the subscales of decision latitude and social support showed that the two variables of support from colleagues and supervisor

Table 4 Psychosocial factors at work in 1997 as predictive factors of poor self reported health in 1998: prospective results of logistic regression analyses

	Men						Women					
	Model 1, n=4973		Model 2, n=4948		Model 3, n=4907		Model 1, n=1752		Model 2, n=1745		Model 3, n=1712	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
Psychological demands												
Low	1		1		1		1		1		1	
High	1.50	1.26 to 1.80	1.60	1.33 to 1.93	1.59	1.31 to 1.92	1.44	1.10 to 1.89	1.48	1.11 to 1.95	1.49	1.12 to 1.99
Decision latitude												
High	1		1		1		1		1		1	
Low	1.18	0.98 to 1.42	1.12	0.92 to 1.36	1.12	0.92 to 1.36	1.14	0.86 to 1.50	1.06	0.79 to 1.43	1.05	0.78 to 1.42
Social support												
High	1		1		1		1		1		1	
Low	1.18	0.98 to 1.41	1.13	0.94 to 1.36	1.12	0.93 to 1.35	1.50	1.14 to 1.96	1.50	1.13 to 1.97	1.54	1.16 to 2.04
Physical demands												
Low	1		1		1		1		1		1	
High	1.29	1.08 to 1.54	1.16	0.96 to 1.40	1.15	0.95 to 1.39	1.48	1.14 to 1.93	1.40	1.07 to 1.84	1.44	1.09 to 1.90

Model 1: included Karasek's dimensions only.
Model 2: additionally adjusted for chronic conditions, age, marital status, stressful personal events, education, occupation, and stressful occupational events.
Model 3: additionally adjusted for smoking, alcohol, and overweight.

were risk factors for self reported health for men and women. Decision authority was significant for men only, and skill discretion was significant for neither men nor women (not shown).

Prospective analysis

In 1998, the incidence of poor self reported health was 11.6% for men and 15.3% for women (table 1). Study of the crude associations between JCQ scales in 1997 and self reported health one year later showed that high psychological demands, low social support, and high physical demands were predictive of poor self reported health, but low decision latitude was not (table 2). Introducing the four JCQ scales simultaneously into a logistic regression analysis did not greatly change the results (table 4). Psychological and physical demands were still significant predictors of poor health for both men and women. Social support was also a significant predictor for women, but the association was no longer significant for men. Adjustment for chronic conditions, and sociodemographic and occupational covariates did not change the results for women, but made physical demands non-significant for men. Note that the fact that physical demands were no longer significant for men was mainly due to the adjustment for occupational grade. After additional adjustment for behavioural risk factors, the associations remained significant for psychological demands for both sexes, and for social support and physical demands for women only. No significant interaction was found between psychological demands and decision latitude. Study of the subscales of decision latitude and social support showed that decision authority predicted poor health for men (OR 1.22, 95% CI: 1.00 to 1.49), and support from colleagues was a significant predictor for women (OR 1.41, 95% CI: 1.06 to 1.88).

DISCUSSION

Our findings underline the differences between the respective results of the cross sectional and prospective analyses for the relations between psychosocial factors at work and self reported health. Whereas the cross sectional analysis showed significant associations between the four scales of psychological demands, decision latitude, social support, and physical demands and self reported health for both men and women, the prospective analysis showed that at one year of follow up, psychological demands for both sexes, decision authority for men only, and social support and physical demands for women only, were significant predictors of poor self reported health.

Several limitations of this study are worth noting. First, the rate of response to the self administered questionnaire in 1997 for the cross sectional analysis (74%), and the response rate for the prospective study (91%) can be considered satisfactory. However, a selection bias cannot be totally excluded. A comparison between respondents and non-respondents suggested a healthy worker effect. If subjects in poor health shifted to jobs with lower levels of job stress factors, such bias could lead to an underestimation of the associations observed between psychosocial factors at work and self reported health. Note also that to some extent the exclusion of the retired and disabled subjects from the analyses could have underestimated these associations.

Second, our results were based on a single evaluation of psychosocial factors at work, and not on the history or duration of exposure to these factors. As the results of our prospective analysis provided evidence of the predictive effects of these factors on health, it would be potentially fruitful to evaluate the duration of exposure to psychosocial factors at work and explore its association with self reported health.

Third, although our study design was prospective, we cannot conclude that there are causal relations between psychosocial factors at work and health. As stated by Zapf and colleagues,[20] only a full two-wave panel design could overcome the problem of reserved causation. Because in our study, psychosocial factors at work were evaluated only once, and self reported health twice, we were unable to test the reverse causation of self reported health on psychosocial factors at work. Therefore we could not rule out this alternative explanation and conclude that psychosocial factors at work are a plausible cause of poor self reported health.

Furthermore, both psychosocial factors at work and health were measured by self report; consequently a potential bias could have arisen from the negative reporting of both. This weakness, connected with "common method variance", for example through social desirability or negative affectivity, can lead to inflated correlations between stressors and health.[20]

Both these sources of bias—that is, reverse causation and common method variance, may partly account for the associations observed in our study. Objective evaluations of psychosocial factors at work, and information about personality, would be helpful in clarifying these issues.

The strong points of this study should also be stressed. First, the study was based on a large prospective cohort, and allowed comparison between the cross sectional and prospective approaches. Note that very few previous studies in this area had a prospective design,[14 15 18] although none of them had a

full two wave panel design. In addition, the present study included both men and women, and as each sex was analysed separately, we were also able to explore sex related differences regarding the effects of psychosocial factors at work on self reported health.[42] Significant associations were observed for both genders (psychological demands), for men only (decision authority), and for women only (social support and physical demands). These gender specific associations which are not easily interpretable may be related to cultural and organisational aspects of the company. Note that most of the employees of the French electric and gas company are men (80%), and that there is a clear gender division of work; women are not engaged in the same work activities as men.

Second, as psychosocial factors at work were evaluated by means of the full recommended JCQ,[43] we were able to study the main scales of the model, as well as the subscales of decision authority, skill discretion, and support from colleagues and supervisor. These original JCQ scales constituted a validated instrument and allowed the comparison of our results with those of others. Nevertheless, most of the previous authors mentioned here did not use the original JCQ, but proxies.[14 16–19] The few who did, used the short version (five items) of the scale of psychological demands.[13 15]

Third, our study included relevant confounders, such as sociodemographic, occupational, and behavioural factors, and chronic diseases, thus reducing the potential effects of confounding. Note that additional adjustment for depressive symptoms (not shown) did not modify the results. Furthermore, adjustment for baseline chronic diseases reduced the effects of previous illness on both psychosocial factors at work and self reported health. However, full adjustment did not greatly change the results, except for physical demands for men, which in the prospective analysis were no longer significant when occupational grade were taken into account. In this connection, it has already been reported that adjusting for occupational grade could constitute an overadjustment in the study of psychosocial factors at work, especially for decision latitude.[18 44] It has already been suggested that the true associations between psychosocial factors at work and health outcomes may be between the unadjusted and adjusted results.[44] The adjustment was made in two steps, in order to distinguish behavioural risk factors from the other covariates. We assumed that the variables of smoking, alcohol consumption, and overweight might be intermediate variables in the relation between psychosocial factors at work and self reported health. Therefore, in theory, if the association between psychosocial factors at work and health had been eliminated after adjustment for behavioural risk factors, the latter might have constituted a step on a pathway from exposure to health. In fact, we observed no great change after adjustment for these variables, suggesting that as previously reported[18] they did not mediate the association between psychosocial factors at work and self reported health. This method of data analysis comprising several steps of adjustment has already been used by others[18 19] to study the effects of potential confounding variables. In our study, we may have disregarded other potential confounding variables such as personality factors, negative affectivity, or social desirability, as mentioned earlier and underlined by Zapf and colleagues.[20] However, it seems unlikely that these variables completely explain the associations observed between psychosocial factors at work and health. Note that other authors[9 18 45] observed no strong confounding effects of personality factors in the relation between psychosocial factors at work and health outcomes.

The authors of certain cross sectional studies reported that job strain[13 16] and iso-strain[13] were associated with health status[13] or health related quality of life.[16] However, these authors did not explore the respective effects of demands, latitude, and support. In the study by Schrijvers and colleagues,[17] significant associations were found between physical working conditions, job control, social support, and to a certain extent, psychological demands, and perceived health. By constrast, Pikhart and colleagues[19] did not report any significant associations between proxies of the Karasek model and self reported health, but showed a significant association between effort-reward imbalance and self reported health.

Among the authors of the three longitudinal studies that we found in this field, Borg and colleagues[14] used a method of data analysis very similar to ours. Among subjects in good self rated health in 1990, these authors studied the deterioration of this health five years later. Note that they did not conduct separate analyses for men and women. Using proxies of the Karasek model, their results suggested that job demands and support were significant predictive factors, but not decision authority or skill discretion. The prospective study by Cheng and colleagues[15] showed that demands, latitude, and support were associated with a decline in health status among a population of women. Stansfeld and colleagues[18] reported sex related differences in the associations between psychosocial factors at work and health functioning; thus, decision latitude for men, psychological demands for women, and social support for both were predictors of one or more components of health functioning.

In the present study, the absence of significant interactions between psychological demands and decision latitude was in agreement with previous findings,[16–18] and suggested that there were no significant buffering effects.

Our study showed that the three psychosocial factors at work explored—that is, psychological demands, decision latitude, and social support, as well as physical demands, were significantly associated with self reported health for both sexes in the cross sectional analysis. The results were very different for the prospective analysis, as psychological demands for both genders, decision authority for men, and social support and physical demands for women were predictors of poor health. Finally, it may be surprising to observe that decision latitude, the main scale of the Karasek model, was not the strongest predictor of self reported health. This finding needs further consideration. Note that some authors underlined the effects of quantitative demands such as overtime on various health outcomes.[46 47]

Although we cannot conclude that there is a causal relation between psychosocial factors at work and self reported health, some considerations support this possibility: previous reports from prospective studies, and strengths of these associations, independently of potential confounding variables. These considerations strengthen the possibility that psychosocial factors at work have a causal effect on self reported health. Our findings also underline the need for longitudinal design, and for separate analyses for men and women when studying psychosocial factors at work.

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