



## Organisational justice and change in justice as predictors of employee health: the Whitehall II study

Mika Kivimäki, Jane E Ferrie, Jenny Head, Martin J Shipley, Jussi Vahtera and Michael G Marmot

*J. Epidemiol. Community Health* 2004;58:931-937  
doi:10.1136/jech.2003.019026

---

Updated information and services can be found at:  
<http://jech.bmj.com/cgi/content/full/58/11/931>

---

*These include:*

### References

This article cites 27 articles, 12 of which can be accessed free at:  
<http://jech.bmj.com/cgi/content/full/58/11/931#BIBL>

10 online articles that cite this article can be accessed at:  
<http://jech.bmj.com/cgi/content/full/58/11/931#otherarticles>

### Rapid responses

You can respond to this article at:  
<http://jech.bmj.com/cgi/eletter-submit/58/11/931>

### Email alerting service

Receive free email alerts when new articles cite this article - sign up in the box at the top right corner of the article

---

### Topic collections

Articles on similar topics can be found in the following collections

[Occupational Health](#) (1298 articles)  
[Socioeconomic Determinants of Health](#) (875 articles)

---

### Notes

---

To order reprints of this article go to:  
<http://journals.bmj.com/cgi/reprintform>

To subscribe to *Journal of Epidemiology and Community Health* go to:  
<http://journals.bmj.com/subscriptions/>

## RESEARCH REPORT

## Organisational justice and change in justice as predictors of employee health: the Whitehall II study

Mika Kivimäki, Jane E Ferrie, Jenny Head, Martin J Shipley, Jussi Vahtera, Michael G Marmot

*J Epidemiol Community Health* 2004;**58**:931–937. doi: 10.1136/jech.2003.019026

**Objective:** Organisational justice has been proposed as a new way to examine the impact of psychosocial work environment on employee health. This article studied the justice of interpersonal treatment by supervisors (the relational component of organisational justice) as a predictor of health.

**Design:** Prospective cohort study. Phase 1 (1985–88) measured relational justice, job demands, job control, social support at work, effort-reward imbalance, and self rated health. Relational justice was assessed again at phase 2 (1989–90) and self rated health at phase 2 and phase 3 (1991–93).

**Setting:** 20 civil service departments originally located in London.

**Participants:** 10 308 civil servants (6895 men, 3413 women) aged 35–55.

**Outcome measure:** Self rated health.

**Main results:** Men exposed to low justice at phase 1 or adverse change in justice between phase 1 and phase 2 were at higher risk of poor health at phase 2 and phase 3. A favourable change in justice was associated with reduced risk. Adjustment for other stress indicators had little effect on results. In women, low justice at phase 1 predicted poor health at phase 2 and phase 3 before but not after adjustment for other stress indicators. Adverse change in justice was associated with worse health prospects irrespective of adjustments.

**Conclusions:** The extent to which people are treated with justice in workplaces seems to predict their health independently of established stressors at work. Evidence on reduced health risk after favourable change in organisational justice implies a promising area for health interventions at workplace.

See end of article for authors' affiliations

Correspondence to:  
Professor M Kivimäki,  
Finnish Institute of  
Occupational Health,  
Topeliuksenkatu 41 aA,  
FIN-00250 Helsinki,  
Finland; mika.kivimaki@hl.fi

Accepted for publication  
28 March 2004

According to established occupational stress models, high demands, low job control, poor social support, and an effort-reward imbalance present significant psychosocial health risks at work.<sup>1–3</sup> The study of organisational justice is a recent attempt to identify new psychosocial determinants of employee health.<sup>4–10</sup> The relational component of organisational justice, which is the main focus of this study, refers to the extent supervisors consider their employees' viewpoint, are able to suppress personal biases, and take steps to deal with subordinates in a fair and truthful manner. The procedural component of organisational justice involves the fairness of formal decision-making procedures.

Although organisational justice partly overlaps established occupational stressors, it may also tap additional elements that contribute to employee health.<sup>4–6</sup> Job demands, job control, and social support deal with the person's job characteristics or situations in which the employee needs help. Fairness of interpersonal treatment and organisational procedures capture more basic elements of the social structure in which these characteristics are operating.<sup>11 12</sup> Organisational justice captures the whole range of unfair treatment at work, not only an imbalance between efforts and rewards.<sup>11 12</sup>

Previous studies report lower levels of justice to be associated with lower wellbeing, higher self reported morbidity, higher medically certified absence, increased mental health problems, and greater likelihood of maladaptive coping.<sup>4–6 13–17</sup> Research on change in organisational justice and health is now required to determine the effect of change in justice. Reduced health risk after an improvement in justice would be consistent with a causal interpretation and identify a potential target for workplace interventions. Failure to observe such an association would suggest that the link between justice and health may be attributable to residual confounding by stable health risk factors, for

example, early material and social disadvantage, adulthood socioeconomic position, and personality.<sup>18</sup> Previous studies have failed to address the question of change in justice. They have also had short follow up periods ( $\leq 3$  years), such that the long term health effects of organisational justice, as well as the effects of change, have yet to be determined.

The prospective Whitehall II study of British civil servants provided an opportunity for the first large scale examination of relational justice and health. To overcome some of the limitations of previous research, we studied whether the level of relational justice and change in justice were predictive of subsequent health status independently of other occupational stress indicators such as job demands, job control, social support at work, and effort-reward imbalance. We explored both short term and long term health effects of justice.

## METHODS

### Participants

The target population for Whitehall II was all London based office staff, aged 35–55, working in 20 civil service departments between 1985 and 1988 at entry into the study. With a response rate of 73% to the survey at phase 1, the final cohort consisted of 10 308: 6895 men and 3413 women.<sup>19</sup> The true response rate was higher, however, because around 4% of those invited were not eligible for inclusion. Although mostly white collar, respondents covered a wide range of grades (and salaries) from office support to permanent secretary.

### Study design

Baseline screening (phase 1) of the Whitehall II cohort took place between 1985 and 1988. This involved a clinical examination and a self administered questionnaire containing sections on demographic characteristics, health, lifestyle factors, work characteristics, social support, life events, and

**Table 1** Characteristics of participants\*

	Men (n = 6236)			Women (n = 2906)		
	Number	%	Mean (SD)	Number	%	Mean (SD)
<b>Phase 1</b>						
Age group (y)						
35–39	1813	29		674	23	
40–44	1685	27		690	24	
45–49	1216	20		649	22	
50–55	1522	24		893	31	
Grade						
Administrative	2447	39		345	12	
Professional/executive	3278	52		1182	41	
Clerical/support	511	8		1379	47	
Relational justice	6236		78.8 (12.5)	2906		79.3 (13.6)
Job demands	6226		60.4 (19.9)	2879		53.0 (20.7)
Job control	6210		68.6 (14.8)	2856		58.1 (20.5)
Social support at work	6221		76.2 (17.7)	2878		74.2 (20.5)
Effort-reward imbalance	6235		1.04 (0.21)	2901		0.99 (0.25)
Poor self rated health						
No	4881	78		1635	65	
Yes	1355	22		848	35	
<b>Phase 2</b>						
Relational justice	5412		77.7 (12.5)	2482		77.7 (14.3)
Poor self rated health						
No	4276	78		1618	63	
Yes	1355	22		959	37	
<b>Phase 3</b>						
Poor self rated health						
No	4475	78		1700	66	
Yes	1237	22		859	34	

\*Those who responded to relational justice questionnaire at phase 1 and rated their health at phase 1 or at phase 2.

chronic difficulties. In 1989/90 (phase 2), the same questionnaire data were collected by post. The third data collection phase was between 1992 and 1993.

In this study, relational justice, occupational stress indicators, demographic characteristics, and self rated health were assessed at phase 1. Relational justice and self rated health were additionally assessed at phase 2 and the latter also at phase 3.

## Measurements

### Relational justice

Standard scales of organisational justice were not available at phase 1 and phase 2,<sup>9</sup> but it was possible to construct an indicator of relational justice with face validity from the available questionnaire items in the survey instruments. The five items that deal with relational justice loaded to the same

factor (items loadings >0.40) in a varimax-rotated factor analysis of the 19 items covering management and organisation of work, and formed an internally consistent scale of relational justice (Cronbach  $\alpha$  0.71 at phase 1, 0.73 at phase 2) (see box). We summed the response scores and expressed this as a percentage of the theoretical maximum (100 refers to respondents with the highest score for every item of the scale; 25 refers to respondents with the lowest score for every item of the scale). We divided the distribution into quartiles, separately for men and women. The bottom quartile indicated a low level of relational justice, the top quartile a high level of relational justice, and the two middle quartiles an intermediate level. Change in relational justice was calculated by deducting the phase 2 score from the phase 1 score. Scores in the bottom quartile resulting from this subtraction indicated adverse change, scores in the top quartile favourable change, and the middle quartiles no change.

### Relational justice scale (Cronbach's $\alpha$ 0.71 at phase 1 and 0.73 at phase 2)

#### Questions

- 1 Do you get consistent information from line management (your superior)?
- 2 Do you get sufficient information from line management (your superior)?
- 3 When you are having difficulties at work, how often is your superior willing to listen to your problems?
- 4 Do you ever get criticised unfairly?
- 5 Do you ever get praised for your work?

#### Response format

1 = never, 2 = seldom, 3 = sometimes, 4 = often. Question 4 is reverse scored.

### Occupational stress indicators

The occupational stress indicators used were job demand scale (Cronbach's  $\alpha$  = 0.67), job control scale ( $\alpha$  = 0.84), and social support at work scale ( $\alpha$  = 0.79) from the job content questionnaire,<sup>1, 20</sup> and an indicator of effort-reward imbalance from the ratio of the effort scale (numerator, five items,  $\alpha$  = 0.72) and the reward scale (denominator, 10 items,  $\alpha$  = 0.78) (see appendix).<sup>20, 21</sup> In all measures, the bottom quartile indicated a low level, the top quartile a high level, and the middle two quartiles an intermediate level for each of these indicators.

### Self rated health

The respondents made an assessment of their health over the past year using a 5 point scale (1 = very good, 2 = good, 3 = average, 4 = poor, 5 = very poor). This measure was dichotomised and used as an indicator of poor health (average or worse compared with good or very good).

**Table 2** Associations of relational justice and other psychosocial work characteristics at phase 1 with poor self rated health at phase 2 and phase 3 in men. Figures are odds ratios (95% confidence intervals) unless otherwise stated

Exposure at phase 1	Poor self rated health at phase 2 (1208/5456 men)			Poor self rated health at phase 3 (1228/5668 men)		
	Number	Model 1*	Model 2†	Number	Model 1*	Model 2†
	Relational justice					
High	1499	1.00	1.00	1552	1.00	1.00
Intermediate	2493	1.06 (0.88 to 1.27)	0.99 (0.83 to 1.20)	2586	1.27 (1.07 to 1.51)	1.27 (1.03 to 1.56)
Low	1464	1.48 (1.22 to 1.80)	1.33 (1.08 to 1.65)	1530	1.43 (1.18 to 1.73)	1.53 (1.18 to 1.98)
Test for trend		p<0.001	p=0.008		p<0.001	p=0.001
Job demands						
Low	1303	1.00	1.00	1342	1.00	1.00
Intermediate	2429	1.12 (0.93 to 1.34)	1.05 (0.86 to 1.29)	2523	1.20 (1.00 to 1.43)	1.13 (0.93 to 1.38)
High	1724	1.34 (1.09 to 1.64)	1.23 (0.97 to 1.56)	1803	1.32 (1.08 to 1.61)	1.20 (0.95 to 1.51)
Test for trend		p<0.001	p=0.057		p=0.007	p=0.120
Job control						
High	1397	1.00	1.00	1444	1.00	–
Intermediate	2675	1.19 (0.98 to 1.47)	1.19 (0.98 to 1.44)	2772	0.99 (0.83 to 1.19)	–
Low	1384	1.38 (1.10 to 1.73)	1.35 (1.07 to 1.71)	1452	1.10 (0.89 to 1.37)	–
Test for trend		p=0.005	p=0.017		p=0.361	–
Social support at work						
High	1143	1.00	–	1191	1.00	1.00
Intermediate	3116	1.06 (0.88 to 1.28)	–	3232	1.20 (1.00 to 1.44)	0.98 (0.78 to 1.22)
Low	1197	1.15 (0.92 to 1.43)	–	1245	1.18 (0.96 to 1.46)	0.80 (0.60 to 1.08)
Test for trend		p=0.213	–		p=0.145	p=0.120
Effort-reward imbalance						
Low	1392	1.00	1.00	1413	1.00	1.00
Intermediate	2740	1.23 (1.02 to 1.47)	1.22 (0.99 to 1.50)	2851	1.15 (0.97 to 1.38)	1.07 (0.87 to 1.30)
High	1324	1.46 (1.19 to 1.81)	1.14 (0.88 to 1.48)	1404	1.34 (1.10 to 1.64)	1.14 (0.89 to 1.47)
Test for trend		p<0.001	p=0.338		p=0.004	p=0.336

Only participants with no missing data in any of the predictors were included in these models. \*Adjusted for age, grade, and self rated health at baseline. †Additionally adjusted for statistically significant predictors in model 1.

**Statistical analysis**

We used analysis of variance to assess differences in levels of relational justice at phase 1 between grades, age groups, and sexes. We tested associations of relational justice and occupational stress indicators at phase 1 with self rated

health at phase 2 and phase 3 using logistic regression analysis, separately for men and women. The first models, containing relational justice or one stress indicator, gave odds ratios and 95% confidence intervals adjusted for age in five year categories, employment grade, and self rated health at

**Table 3** Associations of relational justice and other psychosocial work characteristics at phase 1 with poor self rated health at phase 2 and phase 3 in women. Figures are odds ratios (95% confidence intervals) unless otherwise stated

Exposure at phase 1	Poor self rated health at phase 2 (920/2501 women)			Poor self rated health at phase 3 (829/2483 women)		
	Number	Model 1*	Model 2†	Number	Model 1*	Model 2†
	Relational justice					
High	751	1.00	1.00	753	1.00	1.00
Intermediate	1060	1.07 (0.85 to 1.33)	1.05 (0.84 to 1.31)	1029	1.02 (0.82 to 1.28)	0.93 (0.72 to 1.21)
Low	690	1.31 (1.03 to 1.69)	1.26 (0.98 to 1.60)	701	1.32 (1.04 to 1.68)	1.12 (0.82 to 1.55)
Test for trend		p=0.031	p=0.070		p=0.022	p=0.445
Job demands						
Low	597	1.00	1.00	587	1.00	1.00
Intermediate	1395	1.30 (1.03 to 1.64)	1.28 (1.02 to 1.61)	1380	1.19 (0.94 to 1.50)	1.17 (0.92 to 1.47)
High	509	1.49 (1.10 to 2.00)	1.42 (1.05 to 1.93)	516	1.45 (1.07 to 1.95)	1.38 (1.02 to 1.87)
Test for trend		p=0.008	p=0.018		p=0.015	p=0.034
Job control						
High	601	1.00	–	618	1.00	–
Intermediate	1247	1.05 (0.82 to 1.35)	–	1244	1.05 (0.82 to 1.35)	–
Low	653	1.26 (0.93 to 1.70)	–	621	1.19 (0.88 to 1.62)	–
Test for trend		p=0.121	–		p=0.250	–
Social support at work						
High	546	1.00	–	531	1.00	1.00
Intermediate	1279	1.04 (0.83 to 1.32)	–	1291	1.17 (0.92 to 1.49)	1.15 (0.86 to 1.53)
Low	676	1.09 (0.83 to 1.41)	–	661	1.37 (1.05 to 1.80)	1.24 (0.87 to 1.77)
Test for trend		p=0.543	–		p=0.021	p=0.230
Effort-reward imbalance						
Low	604	1.00	–	596	1.00	–
Intermediate	1288	1.14 (0.90 to 1.43)	–	1258	1.02 (0.81 to 1.29)	–
High	609	1.13 (0.86 to 1.49)	–	629	1.24 (0.95 to 1.63)	–
Test for trend		p=0.386	–		p=0.094	–

Only participants with no missing data in any of the predictors were included in these models. \*Odds ratios adjusted for age, grade, and self rated health at baseline. †Additionally adjusted for statistically significant predictors in model 1.

**Table 4** Change in relational justice between phase 1 and phase 2 as a predictor of poor self rated health at phase 2 and phase 3. Figures are odds ratios (95% confidence intervals) unless otherwise stated

Change between phase 1 and phase 2	Poor self rated health at phase 2			Poor self rated health at phase 3		
	Number	Model 1*	Model 2†	Number	Model 1*	Model 2†
<b>Men</b>						
Relational justice						
Favourable change	1159	0.62 (0.51 to 0.75)	0.61 (0.50 to 0.74)	918	0.75 (0.61 to 0.92)	0.75 (0.61 to 0.93)
No change	3264	1.00	1.00	2566	1.00	1.00
Adverse change	972	1.24 (1.02 to 1.50)	1.23 (1.01 to 1.49)	1354	1.25 (1.02 to 1.54)	1.26 (1.03 to 1.54)
Test for trend		p<0.001	p<0.001		p<0.001	p<0.001
<b>Women</b>						
Relational justice						
Favourable change	556	0.84 (0.66 to 1.08)	0.84 (0.65 to 1.08)	487	0.79 (0.61 to 1.03)	0.79 (0.60 to 1.03)
No change	1385	1.00	1.00	1075	1.00	1.00
Adverse change	523	1.31 (1.03 to 1.66)	1.30 (1.02 to 1.65)	601	1.19 (0.93 to 1.54)	1.26 (0.97 to 1.63)
Test for trend		p=0.003	p=0.001		p=0.013	p<0.001

Only participants with no missing data in any of the predictors were included in these models. \*Odds ratios adjusted for age, grade, relational justice at phase 1, and self rated health at phase 1. †Additionally adjusted for all significant phase 1 predictors of self rated health shown in tables 2 and 3.

phase 1 (model 1). We tested for the significance of each exposure by fitting a linear trend across the three levels. Further models (model 2) additionally adjusted for each significant predictor found in model 1. Only participants with no missing data for any of the predictors were included in these models. The statistical significance of interactions between justice and sex was tested in the combined cohort of men and women by including interaction terms. The analyses were replicated among those with good or very good self rated health at phase 1 (the initially healthy sub-cohort). To test reverse causality, we used repeated measures analysis of variance to assess whether health at phase 1 predicted change in justice between phase 1 and phase 2.

The next step tested whether favourable or adverse change in relational justice between phase 1 and phase 2, compared with no change, predicted self rated health at phase 2 and phase 3 after adjustment for age group, grade, self rated health, relational justice at phase 1, and those occupational stressors at phase 1 that significantly predicted self rated health at phase 2 and phase 3. We used SAS statistical program (SAS Institute, Cary, NC, USA) for all the analyses.

## RESULTS

### Baseline characteristics and sample attrition

Of the 10 308 participants, data on relational justice at phase 1 were available for 10 281 employees. Differences in relational justice between age groups were small (range 78.5–79.1,  $p = 0.25$ ), but relational justice was higher among administrative grades (age adjusted mean score 80.0) than professional/executive grades (78.1) and clerical/support grades (78.7) ( $p$  for difference  $< 0.001$ ). Women had slightly higher relational justice (age and grade adjusted mean 79.4) than men (78.7) ( $p = 0.02$ ).

Poor self rated health at phase 1 was a significant predictor of dropping out of the cohort before phase 2 (odds ratio,

### Policy implications

The focus of workplace health interventions should be broadened to cover justice in managerial treatment.

adjusted for age, grade and sex, 1.3, 95% confidence intervals (CI) 1.2 to 1.5). Dropping out was also more likely in participants with low relational justice compared with those with intermediate or high justice at phase 1 (odds ratio, adjusted for age, grade, and health at phase 1, 1.1, 95% CI 1.0 to 1.2). Table 1 presents descriptive statistics of the participants included in the subsequent analyses.

### Level of relational justice and subsequent health

Table 2 shows that in men lower levels of justice and job control and higher levels of job demands and effort-reward imbalance were associated with higher risk of poor health at phase 2 (model 1). With the exception of job control, these factors also predicted poor health at phase 3. In models simultaneously adjusting for all significant predictors, lower justice and higher demands remained as significant predictors of health at both phases (model 2).

In women, lower relational justice and higher job demands were associated with increased risk of poor health at phase 2 and phase 3 (table 3, model 1). Lower social support was an additional predictor of poor health at phase 3. In the fully adjusted model, only high demands remained as a significant predictor of health at both phases (model 2). However, no sex interaction with relational justice was found in models for a cohort combining men and women ( $p$  values for interaction  $\geq 0.43$ ).

We replicated analyses in a sub-cohort of 4492 male and 1679 female employees with good health at phase 1 (not shown in table). In men, age and grade adjusted odds ratios for low justice were 1.6 (95% CI 1.3 to 2.1) and 1.5 (95% CI 1.2 to 1.9) for incident self rated poor health at phase 2 and phase 3, respectively. For women, the corresponding odds ratios were 1.2 (95% CI 0.9 to 1.7) and 1.2 (95% CI 0.8 to 1.6). Despite slightly lower odds ratios among women, there were no significant sex interactions ( $p \geq 0.18$ ).

To examine the possibility of reverse causation, we tested whether health at phase 1 predicted change in relational justice (not shown in table). In men, a small decline in justice between phase 1 and phase 2 was observed for those with good health (change score  $-1.5$ ) but not for those with poor health (change score  $-0.4$ ;  $p$  for health  $\times$  time interaction = 0.01). This reflects regression towards the mean, an

### Key points

- The justice of interpersonal treatment by supervisors predicts employee health independently of established occupational stressors
- Low and declining justice increases risk of poor health
- High and increasing justice is associated with reduced health risk
- These associations seem slightly stronger in men than women



opposing trend against the hypothesis of reverse causation. In women, no interaction between health at phase 1 and time on change in justice was observed ( $p = 0.67$ ). Thus, reverse causation is unlikely to explain the observed association between relational justice and subsequent self rated health.

### Change in justice as a predictor of health

Results in table 4 indicate that favourable change compared with no change in relational justice between phase 1 and phase 2 was associated with lower risk of poor health at phase 2 and phase 3. This association was statistically significant only for men. Adverse change in justice was associated with higher risk of poor health both in men and women. Analysis of a cohort combining men and women revealed no sex interaction with change in justice on health at phase 2 ( $p$  for interaction = 0.14) and health at phase 3 ( $p$  value = 0.40). Additional adjustment for the other occupational stressors at phase 1 that predicted health at phase 2 and phase 3 had little effect on these findings.

## DISCUSSION

This prospective study showed low and declining levels of relational justice to predict decreasing health in a large well characterised cohort of men and women in the British civil service. Favourable change in the extent to which employees were treated with justice was associated with reduced health risk in men. These associations were largely replicable across two different follow up periods (three and six years, on average), and were not attributable to other occupational stressors or reverse causation.

Research of organisational justice is very recent compared with the large number of analyses published on the demand-control model and the effort-reward imbalance model.<sup>1-3 20 21</sup> There are conceptual differences in proposed health relevant features of work between these three models. The primary focus of the demand-control model is on task level characteristics whereas the other two models emphasise work related social contexts and processes.<sup>1-3 7-12</sup> According to the effort-reward imbalance model, health risk derives from the mismatch between high efforts spent at work and low rewards received in turn. Rewards comprise money, social approval, job security, and career opportunities.<sup>3</sup> The justice model is not limited to this specific exchange process between efforts and rewards. Instead, it aims at capturing the whole range of unfair treatment at work as experienced or witnessed by the employees.<sup>7-12</sup> Indeed this study suggests that justice of interpersonal treatment may have a unique effect on employee health that cannot be accounted for by factors such as job control, job demands, social support, and effort-reward imbalance.

A sense of justice is valued by people across a wide variety of settings,<sup>12 22 23</sup> and even highly cooperative non-human species, such as monkeys, have been shown to manifest inequity aversion.<sup>24</sup> Perceptions of unfairness have previously been related to health risk factors such as increased psychological distress,<sup>5 17</sup> heightened levels of unfavourable serum lipids,<sup>25</sup> and raised blood pressure.<sup>26</sup> In this study, we found a 30%–50% excess risk of poor health among men with low relational justice after three and six years of follow up. The corresponding figures for women were lower (10%–30%), but the sex difference was not statistically significant. This issue deserves further attention in future studies of justice, as experiences and reactions to work conditions often differ between men and women. In prior longitudinal studies, with smaller samples and shorter follow ups, the associations between relational justice and health have been weaker than in this study.<sup>5</sup>

To our knowledge, evidence on the health effects of changing justice has not previously been reported. We found

that an adverse change in relational justice was associated with a 20%–30% excess risk of poor health and a favourable change with a 15%–40% lowering of the risk. Confounding by stable third factors (for example, childhood socioeconomic circumstances, and personality) is an unlikely explanation for effects when the exposure captures change in a risk factor.<sup>18</sup> The magnitude of the observed effects are comparable to those found for established occupational stressors. For example, decreasing job control and increasing job demands were associated with a 10%–40% increase in health problems in the Whitehall II cohort and in a study of Finnish municipal employees.<sup>20 27</sup> In the latter study the reference category was an increase in control and a decrease in demands whereas in this study we used “no change” as the reference, an approach leading to more conservative estimates.

### Strengths and weaknesses of the study

In this study, sample attrition was slightly greater among unhealthy participants and those experiencing low relational justice than among the other employees. This is likely to produce a “healthy worker” effect and constrict variation in the exposure, both leading, if anything, to underestimation rather than overestimation of the association between relational justice and subsequent health. Exposure and outcome were measured by self reports, a potential source of inflated associations in cross sectional data. However, because we adjusted our analyses for baseline health, an artificial inflation of associations would have occurred only if common-method variance had affected the second and third surveys but not the first survey.

Standard measures of relational justice were not available at the time of the baseline survey and thus our justice measure had to be derived from existing questions. Some of the items were those also included in the social support scale. Despite this, the effect of justice seems not to be attributable to social support. The associations between social support at work and health were weaker than those for relational justice, corresponding to earlier studies using standard scales for organisational justice.<sup>4-6</sup> Of the five questions that comprise our justice measure, the item that best describes the concept and is not included in the social support scale (“Do you ever get criticised unfairly?”), was the strongest predictor of poor health in men and women and across both follow up periods.

Our justice measure captured aspects such as the extent supervisors are able to suppress personal bias and deal with employees in a fair and truthful manner. In contrast, the measure did not include items that cover whether supervisors consider their subordinates’ viewpoints in decision making. As such supervisory consideration has been strongly correlated with the other aspects of relational justice in previous studies, this may not be a major source of bias.<sup>4-6</sup> However, consideration of subordinates’ viewpoints partly overlaps with the concept of job control (participation in decision making).<sup>1</sup> Thus, it is possible that our study overestimates the independence of the health effects of relational justice and job control. On the other hand, previous investigations with the standard scales indicate this is unlikely as the impact of organisational justice on health has been independent of job control.<sup>4-6</sup>

We measured health using overall subjective health ratings. Self rated health has predicted mortality in the Whitehall II study and among other adult populations in Britain, USA, Scandinavia, Japan, and Australia.<sup>28-32</sup> Comparisons with other health measures suggest that self rated health may be an even more inclusive and accurate measure of overall health status than medical records or self reports of these records.<sup>29</sup> The direction for future research is to examine associations between organisational justice and

other health measures, such as sickness absence, mental health problems, and specific diseases. If stress is behind the health toxic effect of low justice, then stronger associations would be expected with indicators of impaired immune function, mental health problems, and cardiovascular disorders than for other health outcomes.<sup>33</sup> Assessing employee health with objective indicators of diseases, in addition to self reported measures, would also be a step forward.

### Policy implications

Large scale intervention studies to decrease occupational stress have remained comparatively rare and they have often had an individualistic focus.<sup>34-36</sup> The justice theory may provide complementary elements for workplace interventions. According to the theory, fair decision making should be consistently applied, unbiased and open, and reflect respectful and considerate treatment of individuals by their supervisors.<sup>7-10</sup> The evidence in this study suggests that improving the fairness of decision making will have a favourable effect on the health of employees.

### ACKNOWLEDGEMENTS

We thank all participating civil service departments and their welfare, personnel, and establishment officers; the Occupational Health and Safety Agency; the Council of Civil Service Unions; all participating civil servants in the Whitehall II study; all members of the Whitehall II study team.

### CONTRIBUTORS

MK, guarantor for the paper, with JEF, JH, MJS, JV and MGM designed the hypothesis, analysed the data, and wrote the paper. MGM is the director of the Whitehall II study.

### Authors' affiliations

**M Kivimäki, J Vahtera**, Finnish Institute of Occupational Health and University of Helsinki, Finland

**J E Ferrie, J Head, M J Shipley, M G Marmot**, International Centre for Health and Society, Department of Epidemiology and Public Health, University College London Medical School, UK

Funding: the Whitehall II study has been supported by grants from the Medical Research Council; British Heart Foundation; Health and Safety Executive; Department of Health; National Heart Lung and Blood Institute (HL36310), US, NIH: National Institute on Aging (AG13196), US, NIH; Agency for Health Care Policy Research (HS06516); and the John D and Catherine T MacArthur Foundation Research Networks on Successful Midlife Development and Socio-economic Status and Health. MK, also working at the University of Helsinki, Finland, and JV were supported by the Academy of Finland (projects 77560, 104891, and 105195) and the Finnish Environment Fund, JEF is supported by the MRC (Grant number 47413), MJS by a grant from the British Heart Foundation, and MGM by an MRC Research Professorship.

Conflicts of interest: none declared.

### APPENDIX

#### ITEMS OF THE OCCUPATIONAL STRESS SCALES

##### Job demands

"Do you have to work very fast?"; "Do you have to work very intensively?"; "Do you have enough time to do everything?" (reverse scored); "Do different groups at work demand things from you that you think are hard to combine?"

##### Job control

"Do you have the possibility of learning new things through your work?"; "Does your work demand a high level of skill or expertise?"; "Does your job require you to take the initiative?"; "Do you have to do the same thing over and over again?" (reverse scored); "Does your job provide you with a variety of interesting things?"; "Is your job boring?" (reverse scored); "Do you have a choice in deciding HOW you

do your work?"; "Do you have a choice in deciding WHAT you do at work?"; "Others take decisions concerning my work." (reverse scored); "I have a good deal of say in decisions about work"; "I have a say in my on work speed."; "My working time can be flexible."; "I can decide when to take a break."; "I have a say in choosing with whom I work."; "I have a great deal of say in planning my work environment."

##### Social support at work

"Do you get sufficient information from line management (your superior)?"; "Do you get consistent information from line management (your superior)?"; "When you are having difficulties at work, how often do you get help and support from your colleagues?"; "When you are having difficulties at work, how often are your colleagues willing to listen to your work related problems?"; "When you are having difficulties at work, how often do you get help and support from your immediate superior?"; "When you are having difficulties at work, how often is your superior willing to listen to your problems?"

##### Effort scale

"Do you have to work very fast?"; "Do you have to work very intensively?"; "Do you have enough time to do everything?"; "Does your work demand a high level of skill and expertise?"; "Does your job require you to take initiative?"

##### Reward scale

"Do you ever get praised for your work?"; "Does your job provide you with a variety of interesting things?"; "Do you consider your job very important?"; "Do your colleagues consider your job very important?"; "When you are having difficulties at work, how often do you get help and support from your colleagues?"; "When you are having difficulties at work, how often do you get help and support from your immediate superior?"; "How satisfied are you with your usual take home pay?"; "How satisfied are you with your work prospects?"; "How satisfied are you with the way your abilities are used?"; "How satisfied are you with the interest and skill involved in your job?"

### REFERENCES

- 1 Karasek R, Theorell T. *Stress, productivity and reconstruction of working life*. New York: Basic Books, 1990.
- 2 Johnson J, Hall E. Job strain, work place social support, and cardiovascular disease: a cross-sectional study of a random sample of the Swedish working population. *Am J Public Health* 1988;**7**:1336-42.
- 3 Siegrist J. Adverse health effects of high-effort/low-reward conditions. *J Occup Health Psychol* 1996;**1**:27-41.
- 4 Elovainio M, Kivimäki M, Vahtera J. Organizational justice: evidence of a new psychosocial predictor of health. *Am J Public Health* 2002;**92**:105-8.
- 5 Kivimäki M, Elovainio M, Vahtera J, et al. Organisational justice and health of employees: prospective cohort study. *Occup Environ Med* 2003;**60**:27-34.
- 6 Kivimäki M, Elovainio M, Vahtera J, et al. Association between organisational inequity and incidence of psychiatric disorders in female employees. *Psychol Med* 2003;**33**:319-26.
- 7 Bies RJ, Moag JS. Interactional justice: communication criteria of fairness. In: Lewicki RJ, Sheppard BH, Bazerman MZ, eds. *Research on negotiations in organizations*. Greenwich, CT: JAI Press, 1986:43-55.
- 8 Greenberg J. Organizational justice: yesterday, today, and tomorrow. *Journal of Management* 1990;**16**:399-432.
- 9 Moorman RH. Relationship between organizational justice and organizational citizenship behaviors: Do fairness perception influence employee citizenship? *J Appl Psychol* 1991;**76**:845-55.
- 10 Kramer RM, Tyler TR. *Trust in organizations: frontiers of theory and research*. London: Sage, 1996.
- 11 van den Bos K, Lind EA. Uncertainty management by means of fairness judgments. In: M P Zanna, eds. *Advances in experimental social psychology*. San Diego, CA: Academic Press, 2002:1-60.
- 12 Miller DT. Disrespect and the experience of injustice. *Ann Rev Psychol* 2001;**52**:527-53.
- 13 Huo YJ, Smith HJ, Tyler TR, et al. Superordinate identification, subgroup identification, and justice concerns: Is separatism the problem; is assimilation the answer? *Psychol Sci* 1996;**7**:40-5.
- 14 Folger R, Cropanzano R. *Organizational justice and human resource management*. Thousand Oaks, CA: Sage, 1998.

- 15 **Theorell T**, Afredsson , Westerholm P, et al. Coping with unfair treatment at work—what is the relationship between coping and hypertension in middle-aged men and women *Psychoter Psychosom* 2000;**69**:86–94.
- 16 **Elovainio M**, Kivimäki M, Vahtera J, et al. Sleeping problems and health behaviors as mediators between organizational justice and health. *Health Psychol* 2003;**22**:287–93.
- 17 **Elovainio M**, Kivimäki M, Helkama K. Organisational justice evaluations, job control, and occupational strain. *J Appl Psychol* 2001;**86**:418–24.
- 18 **Macleod J**, Davey Smith G. Psychosocial factors and public health: a suitable case for treatment? *J Epidemiol Community Health* 2003;**57**:565–70.
- 19 **Marmot MG**, Davey Smith G, Stansfeld S, et al. Health inequalities among British civil servants: the Whitehall II study. *Lancet* 1991;**337**:1387–93.
- 20 **Stansfeld SA**, Fuhrer R, Shipley MJ, et al. Work characteristics predict psychiatric disorders: prospective results from the Whitehall II study. *Occup Environ Med* 1999;**56**:302–7.
- 21 **Kuper H**, Singh-Manoux A, Siegrist J, et al. When reciprocity fails: effort-reward imbalance in relation to coronary heart disease and health functioning within the Whitehall II study. *Occup Environ Med* 2002;**59**:777–84.
- 22 **Wenckind C**, Milinski M. Cooperation through image scoring in humans. *Science* 2000;**200**:850–2.
- 23 **Johnson DDP**, Stopka P, Knights S. The puzzle of human cooperation. *Nature* 2003;**421**:911–12.
- 24 **Brosnan SF**, de Waal FBM. Monkeys reject unequal pay. *Nature* 2003;**425**:297–8.
- 25 **Richards JC**, Hof A, Alvarenga M. Serum lipids and their relationships with hostility and angry affect in men. *Health Psychol* 2000;**19**:393–8.
- 26 **Wager NM**, Fieldman G, Hussey T. The effect on ambulatory blood pressure of working under favourably and unfavourably perceived supervisors. *Occup Environ Med*, 2003;**60**, 468–74.
- 27 **Vahtera J**, Kivimäki M, Pentti J, et al. Effect of change in the psychosocial work environment on sickness absence: a seven year follow-up of initially healthy employees. *J Epidemiol Community Health* 2000;**54**:484–93.
- 28 **Kivimäki M**, Head J, Ferrie JE, et al. Sickness absence as a global measure of health: Evidence from all-cause mortality in the Whitehall II study. *BMJ* 2003;**327**:364–8.
- 29 **Idler EL**, Benyamini Y. Self-rated health and mortality: a review of twenty-seven community studies. *J Health Soc Behav* 1997;**38**:21–37.
- 30 **Miilunpalo S**, Vuori I, Oja P, et al. Self-rated health status as a health measure: the predictive value of self-reported health status on the use of physician services and on mortality in the working-age population. *J Clin Epidemiol* 1997;**50**:517–28.
- 31 **Sundquist J**, Johansson SE. Self-reported poor health and low educational level as predictors for mortality: a population based follow up study of 39 156 people in Sweden. *J Epidemiol Community Health* 1997;**51**:35–40.
- 32 **Mackenbach JP**, Simon JG, Looman CWN, et al. Self-assessed health and mortality: could psychosocial factors explain the association? *Int J Epidemiol* 2002;**31**:1162–8.
- 33 **McEwen BS**. Protective and damaging effects of stress mediators. *N Engl J Med* 1998;**338**:171–9.
- 34 **Landsbergis PA**, Cahill J. Labor union programs to reduce or prevent occupational stress in the United States. *Int J Health Serv* 1994;**24**:105–29.
- 35 **Pellerier KR**, Rodenberg A, Vinther A, et al. Managing job strain: a randomized, controlled trial of an intervention conducted by mail and telephone. *J Occup Environ Med* 1999;**41**:216–23.
- 36 **Theorell T**, Embad R, Arnetz B, et al. Employee effect of an educational program for managers at an insurance company. *Psychosom Med* 2001;**63**:724–33.