BMJ Open

Examining the mediating effect of work-to-family conflict on the associations between job stressors and employee psychological distress: a prospective cohort study

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ABSTRACT

Objectives The mediating effect of work-to-family conflict (WFC) on the associations between eight types of job stressors (measured based on the job demands-control, effort–reward imbalance and organisational justice models) and psychological distress in employees was examined.

Design This study employed a prospective design.

Setting An occupational cohort study in Japan (Japanese Study of Health, Occupation, and Psychosocial Factors Related Equity; J-HOPE).

Participants 5859 men and 1560 women who were working for 11 firms and participated at three consecutive waves of J-HOPE, at 1-year intervals, from 2010 to 2013.

Main outcome measures Psychological distress, as measured by Kessler 6 scores.

Results Mediation analysis using data on job stressors at baseline, WFC at 1-year follow-up and psychological distress at 2-year follow-up showed that WFC mediated 39.1% (95% CI 29.1% to 49.1%) and 44.5% (95% CI 31.4% to 51.7%) of the associations of psychological distress with job demands and effort, respectively, for men. The mediating effect of WFC was smaller for job stressors indicating reduced job resources, compared with job demands and effort. The mediating effect of WFC was somewhat larger for women than it was for men, with WFC mediating 47.5% (95% CI 22.5% to 72.6%) and 64.0% (95% CI 24.3% to 100.0%) of the associations of psychological distress with job demands and effort, respectively.

Conclusions WFC was a key mediator in the associations between most job stressors and employee psychological distress. Results suggest that policy measures and support from supervisors, to prevent job stressors from adding to WFC, are needed to reduce employee psychological distress.

INTRODUCTION

The association between adverse work characteristics and the health outcomes of employees has been a key issue in occupational health research. Some well-established models provide theoretical grounding for this

Strengths and limitations of this study

► A large-scale data set (consisting of 5859 men and 1560 women) from a three-wave cohort study was used.
► Job stressors, work-to-family conflict (WFC) and psychological distress were observed, in this order, in the three waves, allowing us to examine how WFC mediated the associations between job stressors and psychological distress.
► The proportions of the association with psychological distress mediated by WFC were compared across eight types of job stressors.
► The study sample was dominated by men and was not population-representative, and unobserved individual attributes were not controlled for.
► High attrition rates, missing values in certain variables and no precise identification of the causality also limited the reliability of results.

association, focusing on specific job characteristics. For instance, the job demands-control (JD-C) model claims that workers with high job demands, low job control and/or their combination (high job strain) have a higher risk of psychological distress,[1 2] while psychological distress itself has been shown to be a key factor for mortality from several major causes[3] as well as various health outcomes in preceding studies. The effort–reward imbalance (ERI) model claims that high effort, low reward and/or their combination (high ERI) lead to health risks.[4 5] In recent years, more attention has been placed on the possibility that low levels of organisational justice, which refers to perceptions of fairness in treatment of the individuals within the workplace, may have an adverse impact on employee health outcomes.[6 7]

In addition to these job stressors faced by employees in the workplace, work–family conflict has been shown to have an adverse

association with employee mental health, specifically in terms of psychological distress, mental disorders and depression.[8–24] Employees often face conflict in responsibilities and obligations between the workplace and family life, which are likely to spill over into other domains, resulting in adverse impacts on mental health.[13 23] Work–family conflict can be divided into two forms: work-to-family conflict (WFC; workplace demands interfering with family responsibilities) and family-to-work conflict (FWC; family obligations interfering with work responsibilities).[16] In any case, work–family conflict, regardless of whether WFC or FWC, is not an exogenous variable because it is likely affected by stressors in either the workplace or family life.[8 19]

Work–family conflict has attracted more attention in Japan as well as in other advanced countries. The official labour statistics[25] show that the employment/population ratio among women aged 15–64 years old has been increasing substantially in recent years (from 51.5% in 1980 to 66.1% in 2016), although the ratio is somewhat lower than that in many European countries. The ratio of full-time employees is much lower among women than among men (women: 56.1% vs men: 88.9% in 2016) and managerial positions are still dominated by men (87.1% in 2016). However, delayed adjustment of social policy and corporate management to an increase in women's labour force participation, along with traditional gender norms, has made it more difficult to balance work and family life.[26] Correspondingly, an increasing number of studies have been addressing work–family conflict and its relevance to health using Japanese data (eg, refs 9 21–23).

In the present study, we hypothesised that WFC would mediate the associations between job stressors and employee psychological distress, and examined this hypothesis using data from a three-wave panel collected at 1-year intervals. These data were obtained from an occupational cohort study in Japan (Japanese Study of Health, Occupation, and Psychosocial Factors Related Equity; J-HOPE). We focused on WFC, rather than on FWC, because the former seems to have implications that are more practical for health promotion in the workplace than the latter does. In examining the mediating effect of WFC on the associations between job stressors and psychological distress, we compared the results across eight types of job stressors, which were divided into the following three groups: (1) job demands, job control and job strain (based on the JD-C model); (2) effort, reward and ERI (based on the ERI model); and (3) procedural justice and interactional justice (two major types of organisational justice). High job demands and effort may reduce disposable resources for family life, resulting in a spillover of the negative load effects. This effect is likely to raise WFC, which in turn results in increased psychological distress. Low job control and reward, which mean limited job resources, are expected to have psychological impacts that are different from those caused by high job demands and effort because they are not necessarily accompanied by a trade-off between workplace and family

life. Meanwhile, organisational justice, which can be considered another domain of job resources, may affect employees' management of the integration of their work and family lives,[18] possibly in a way that is different from that of job stressors. Some studies have addressed the mediating effect of WFC, but have focused on specific job stressors such as job demands,[22] ERI[11] or organisational justice,[15] leaving the relative importance of the mediating effect for each job stressor unclear.

We also considered gender differences in the mediating effects of WFC between job stressors and employee psychological distress. Preceding studies that have observed gender differences in the association between WFC and health have likely reflected differences in the balance between work and family life between men and women.[9 14 17] However, the evidence for the gender difference in the levels of WFC or the strength of the association between WFC and health has been mixed.[8] Men participate more in the labour force and are more likely to be engaged in full-time work compared with women, while women tend to have greater difficulties with combining work and private life compared with men, probably leading to mixed observation of gender differences.[14] In addition, cross-country studies[9 18] suggest that these gender differences are affected by the sociocultural background as well, especially in terms of labour participation and gender egalitarianism in workplace, as well as roles played in and obligations pertaining to family life.

To conduct the mediation analysis, we used data from a three-wave panel, with a 1-year interval, obtained from J-HOPE. Job stressors, WFC and psychological distress were observed at baseline, 1-year follow-up and 2-year follow-up, respectively, allowing us to alleviate simultaneity biases. We computed the proportion of the total association between each job stressor and psychological distress, as mediated by WFC, within the framework of the mediation analysis.[27 28] In these statistical analyses, we controlled for key covariates, including job types and hours worked, which were expected to confound the associations examined.

METHODS
Design
This study was a confirmatory data analysis to examine the validity of the hypothesis that WFC would mediate the associations between the job stressor and employee psychological distress, considering eight types of job stressors. To this end, we used panel data from four waves (waves 1–4) of J-HOPE, which collected data of employees working in 13 surveyed firms, 3 of which participated only in the first three waves. The surveyed firms covered 12 types of industries, including manufacturing, transportation and information technology. Wave 1 was conducted between October 2010 and December 2011 (depending on the availability of firms), and the following waves (waves 2–4) were conducted approximately 1 year following the first, in each firm. The questions about job stressors and

Table 1 The structure of the three-wave cohort data set used in the analysis*

Firm code (industry)	Wave 1	Wave 2	Wave 3	Wave 4	Men	Women
1 (Information technology)		JS	WFC	PD	470	115
2 (Manufacturing)		JS	WFC	PD	1687	200
4 (Information)		JS	WFC	PD	398	192
5 (Pharmaceutical)		JS	WFC	PD	135	141
6 (Service)		JS	WFC	PD	9	16
7 (Veterinary)		JS	WFC	PD	1	3
8 (Medical facilities)		JS	WFC	PD	10	14
9 (Service)		JS	WFC	PD	281	117
10 (Manufacturing)	JS	WFC	PD		1931	697
11 (Transportation)		JS	WFC	PD	887	38
13 (Real estate)	JS	WFC	PD		50	27
Number of participants	2705	7419	7419	4714	5859	1560

*Data of participants in firm 3 (manufacturing) and 12 (real estate) were not used due to lack of availability of a full set of three-wave data.
JS, job stressors; PD, psychological distress; WFC, work-to-family conflict.

psychological distress were asked in all waves, while those about WFC were asked only in waves 1 and 2. We used the data of participants from 11 firms, who provided a full set of responses to the questions about job stressors at baseline, WFC at 1-year follow-up and psychological distress at 2-year follow-up. The baseline corresponded to wave 1 for two firms and to wave 2 for nine firms. The participants in the remaining two firms were excluded because a full set of three-wave data was not available. The data structure is summarised in table 1.

Participants
The original sample consisted of 10 753, 11 405, 10 977 and 6553 participants in waves 1, 2, 3 and 4, respectively. In wave 1, all employees (13 965 individuals in total) who were working in each of the 13 surveyed firms were invited to participate in the study through their firms' personnel sections, and 10 773 individuals responded (response rare: 77.0%). The attrition rates were 18.3%, 13.2% and 16.5% in waves 2, 3 and 4, respectively. The response rates for the questions on WFC, job stressors and psychological distress were relatively high, ranging between 94.8% (for ERI) and 96.9% (for WFC). After excluding participants with missing values in key covariates, we eventually used the data on 7419 individuals (5859 men and 1560 women), representing 85.4% of the entire 8684 participants (6105 men and 2589 women) at baseline.

Measures
Work-to-family conflict
Following Chandola et al,[9] eight questions concerning work–family conflicts were constructed: four for FWC and four for WFC. We used the Japanese version of the WFC questionnaire that has been used in preceding studies.[9 21] The participants were asked 'To what extent do your job responsibilities interfere with your family life?' and the following four items pertained to WFC: (1) 'your job reduces the amount of time you can spend with the family',

(2) 'problems at work make you irritable at home', (3) 'your work involves a lot of travel away from home' and (4) 'your job takes so much energy that you don't feel up to doing things that need attention at home'. These items were rated on a 3-point scale (1=not at all, 2=to some extent and 3=a great deal). The Cronbach's alpha coefficient for the WFC questionnaire was 0.60 in the present sample. We summed these item scores (range: 4–12), with higher scores indicating a higher level of conflict. Next, we constructed a binary variable for high WFC, in which scores equal to or higher than the median of the entire sample (seven) were assigned the value of 1, and those below the median were assigned the value of 0.

Psychological distress
We used the Kessler 6 (K6) scores[29 30] as an indicator of psychological distress. The validity of the Japanese version of the K6 questionnaire has been confirmed.[31] From J-HOPE, we first obtained participant assessments of psychological distress using the following six-item psychological distress question: 'During the past 30 days, about how often did you feel a) nervous, b) hopeless, c) restless or fidgety, d) so depressed that nothing could cheer you up, e) that everything was an effort and f) worthless', where each item was rated on a 5-point scale (0=none of the time to 4=all of the time). Subsequently, we calculated the sum of the reported scores (range: 0–24) and defined it as the K6 score. Higher K6 scores reflected higher levels of psychological distress. The Cronbach's alpha coefficient for the K6 was 0.90 in the present sample. We then constructed a binary variable for psychological distress, defined as a K6≥5, which has been found to indicate mood/anxiety disorder in a Japanese sample.[32]

Job demands and control
We constructed three binary variables indicating high job demands, low job control and high job strain based on the JD-C model.[33] To this end, we used the items

investigating job demands and control from the Japanese version of the Job Content Questionnaire (JCQ), the validity of which has been confirmed.[34] The JCQ is based on the JD-C model and includes scales related to job demands (five items) and job control (nine items), rated on a 4-point scale (1=*strongly disagree* to 4=*strongly agree*). In the present sample, the Cronbach's alpha coefficients were 0.70 and 0.77 for the job demands and control scales, respectively. We summed the responses to these items into single indices of job demands (range: 12–48) and control (range: 24–96). We also calculated the job demands/control ratio to measure the extent of job strain. Finally, we conducted the median-split method on the score of each category, classifying each worker as either high or low.

Effort and reward

To assess effort and reward based on the ERI model,[35] we used the data that were collected using a simplified Japanese version of the Effort-Reward Imbalance Questionnaire (ERIQ), the validity of which has been confirmed.[36] The ERIQ was developed based on the ERI model, and the simplified ERIQ was used in the present study. The questionnaire included subscales on effort (three items) and reward (seven items), rated on a 4-point scale (1=*strongly disagree* to 4=*strongly agree*). Cronbach's alpha coefficients were 0.78 and 0.77 for the effort and reward scales, respectively. We summed the responses into single indices for effort (range: 3–12) and reward (range: 7–28). To measure the extent of ERI, we also calculated the effort/reward ratio and adjusted for differences between the two items. Subsequently, we used the median-split method to construct binary variables.

Procedural and interactional justice

We measured the procedural and interactional aspects of organisational justice using the Japanese version of the Organisational Justice Questionnaire (OJQ),[37 38] the validity of which has been confirmed.[39] The OJQ comprises a seven-item scale measuring procedural justice and a six-item scale measuring interactional justice, both rated on a 5-point Likert scale (1=*strongly disagree* to 5=*strongly agree*). In this sample, the Cronbach's alpha coefficients were 0.90 and 0.95 for procedural and interactional justice scales, respectively. For each justice type, we summed all item scores and divided that number by the number of items in that category, yielding a variable with a score ranging from 1 to 5. Then, we used the median-split method to construct binary variables indicating low procedural and interactional justice.

Covariates

We used age, educational attainment (high school or below, junior college, college and graduate school), nine job types (eg, manager, clerk and factory worker), hours worked per week, household income (adjusted for household size by dividing the root of the number of household members), having one or more family member to share living expenses, 12 firm codes and the indicator variables of firms.
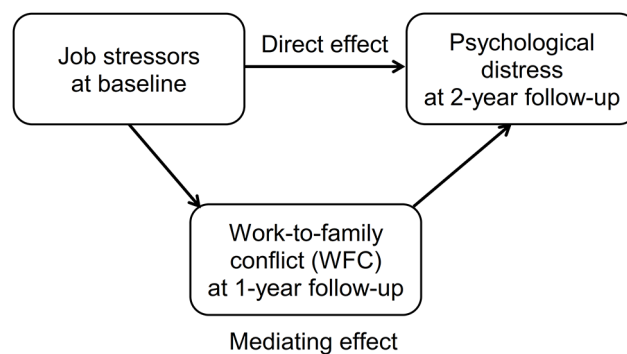

Figure 1 Conceptual framework of the mediation analysis.

Statistical analysis

We conducted mediation analysis[27 28] to examine the mediating effect of WFC, as illustrated in figure 1, using data on job stressors, WFC and psychological distress observed at baseline, 1-year follow-up and 2-year follow-up, respectively. Specifically, following Baron and Kenny,[40] we estimated three logistic regression models: model 1 to explain psychological distress by each job stressor, model 2 to explain WFC by each job stressor and model 3 to explain psychological distress by each job stressor and by WFC, along with a set of the same covariates observed at baseline. If models 1, 2 and 3 show significant and positive associations between the job stressor and psychological distress, between job stressors and WFC, and between WFC and psychological distress, respectively, then we can suspect that WFC mediates the association between job stressors and psychological distress. We evaluated statistical significance at the 5% level, and expressed the associations in terms of the odds ratio (OR) and 95% confidence interval (CI). Furthermore, we implemented bootstrapping to assess the significance of the mediating effect[27 28 41 42]: we computed the proportion of the total association between each job stressor and its 95% CI obtained by bootstrap estimation with 2000 replications. If the computed 95% CI includes 0, we can argue that the mediating effect of WFC is significant at the 5% level. To deal with the potential problem related to multiple comparisons, we additionally examined the significance of the mediating effect of WFC based on the 99.375% CI, which corresponded to the Bonferroni-corrected alpha level, 0.625% (=5%/8), as we conducted the tests for eight types of job stressors. We performed this mediation analysis separately for men and women. We calculated the achieved power (with $\alpha=0.05$, two-tailed) for each job stressor and WFC in each model using the actual sample sizes.[43]

RESULTS

Key sample features at baseline are presented in table 2. Men had a higher educational attainment, worked longer and earned higher income. There were gender differences in the types of job as well; notably, the proportions of managerial workers, engineers and technicians were

Table 2 Basic sample features at baseline wave

	Men		Women		Difference (men – women)
	M	(SD)	M	(SD)	
Age (years)	40.9	(10.3)	39.7	(9.8)	1.3*
Household size-adjusted income (million yen)	3.8	(2.4)	3.2	(2.7)	0.6*
Hours worked per week	44.6	(10.2)	34.4	(13.2)	10.2*
Proportion (%)					
Educational attainment					
Junior high school	42.0		49.3		−7.3*
Junior college	12.3		26.6		−14.3*
College	32.7		20.5		12.2*
Graduate school	13.1		3.7		9.4*
Job classification					
Managerial workers	22.3		2.6		19.7*
Researchers and professionals	12.3		13.1		−0.7
Engineers and technicians	13.2		2.4		10.8*
Clerical workers	8.3		33.4		−25.1*
Service workers	3.8		2.4		1.3**
Manufacturing workers (technical)	9.0		2.4		6.6*
Manufacturing workers (operational)	13.5		5.4		8.1*
Manufacturing workers (manual)	6.3		17.0		−10.7*
Other	11.3		21.3		−10.0*
Having one or more family member	20.3		20.6		−0.3
N	5859		1560		

*p<0.001,**p<0.05 (two-tailed).

higher among men, whereas those of clerical workers and manual manufacturing workers were higher among women. The proportions of educational attainment of college or graduate school (men; 45.7%, women: 24.2%) were somewhat above the nationwide averages (men: 35.9%, women: 22.7% in 2012),[44] while the distribution based on job classification was largely similar to the nationwide distribution observed in the government statistics.[26]

The results from the regression models (models 1–3) and the mediation analysis are presented in tables 3 and 4, for men and women, respectively. For men, model 1 results showed that all types of job stressors were highly and positively associated with psychological distress. Model 2 results showed that most types of job stressors, except for job control, were highly and positively associated with WFC. Model 3 results showed that both job stressors and WFC were highly related to psychological distress. We also found that the OR of each job stressor (except for job control) was somewhat lower than that found in model 1. These observations point to the partial mediating effect of WFC on the association between each job stressor and psychological distress, except for job control, which was negatively related to WFC, as shown in model 2. The rightmost column of table 3 presents the

estimated proportion of the association between each job stressor (except for job control) and psychological distress mediated by WFC. The proportion of the mediating effect of WFC ranged from 9.1% (95% CI 3.8% to 14.4%) for procedural justice to 41.5% (95% CI 31.4% to 51.7%) for effort. The mediating effect of WFC was larger for job demands (39.1% (95% CI 29.1% to 49.1%)) and effort (41.5% (95% CI 31.4% to 51.7%)) than for other types of job stressors. The statistical significance of the mediating effect of WFC was confirmed for all job stressors even with wider 99.375% CIs, which took account of the multiple comparisons problem.

The results for women, which are presented in table 4, were largely similar to those for men, in that WFC mediated the association between each job stressor and psychological distress, except for job control, and that the mediating effect of WFC was the highest for job demands and effort. At the same time, we observed some gender differences by comparing the results between tables 3 and 4. First, model 1 showed no association between low job control and psychological distress in women, contrary to the positive association for men. Second, model 2 showed a closer association between each job stressor (except for job control) and WFC for women than that for men. Third, model 3 observed a closer association between

Table 3 The estimated associations across each job stressor, psychological distress (Kessler 6 ≥ 5) and work-to-family conflict (WFC) among men (n=5859)*

Model	Model 1		Model 2		Model 3		Mediating effect of WFC†		
	Psychological distress at 2-year follow-up		WFC (high) at 1-year follow-up		Psychological distress at 2-year follow-up				
Dependent variable	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)	%	(95% CI)‡	(99.375% CI)†§
Explanatory variables									
Job demands (high)	1.62***	(1.45 to 1.81)	2.27***	(2.03 to 2.54)	1.38***	(1.23 to 1.55)	39.1	(29.1 to 19.1)	(25.2 to 53.1)
WFC (high)					2.58***	(2.30 to 2.89)			
Job control (low)	1.35***	(1.25 to 1.52)	0.86**	(0.77 to 0.97)	1.43***	(1.27 to 1.61)			
WFC (high)					2.77***	(2.47 to 3.11)			
Job strain (high)	1.90***	(1.73 to 2.12)	1.99***	(1.78 to 2.23)	1.69***	(1.51 to 1.89)	25.0	(19.2 to 30.7)	(16.9 to 33.0)
WFC (high)					2.54***	(2.27 to 2.85)			
Effort (high)	1.72***	(1.73 to 1.92)	2.70***	(2.41 to 3.03)	1.41***	(1.26 to 1.59)	41.5	(31.4 to 51.7)	(27.4 to 55.6)
WFC (high)					2.54***	(2.26 to 2.85)			
Reward (low)	2.01***	(1.80 to 2.25)	1.35***	(1.21 to 151)	1.95***	(1.73 to 2.18)	10.8	(6.7 to 14.9)	(5.1 to 16.6)
WFC (high)					2.67***	(2.38 to 2.99)			
Effort–reward imbalance (high)	2.05***	(1.84 to 2.29)	2.55***	(2.28 to 2.86)	1.74***	(1.56 to 1.95)	28.8	(22.9 to 34.6)	(20.6 to 37.0)
WFC (high)					2.45***	(2.18 to 2.75)			
Procedural justice (low)	1.68***	(1.51 to 1.87)	1.20***	(1.08 to 134)	1.66***	(1.48 to 1.85)	9.1	(3.8 to 14.4)	(1.7 to 16.5)
WFC (high)					2.70***	(2.41 to 3.03)			
Interactional justice (low)	1.58***	(1.42 to 1.77)	1.25***	(1.11 to 1.39)	1.54***	(1.38 to 1.73)	12.1	(5.7 to 18.6)	(3.0 to 21.3)
WFC (high)					2.69***	(2.40 to 3.02)			

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

*Adjusted for age, educational attainment, job types, hours worked per week, household income, having one or more family members to share living expenses and firm codes.

†Proportion of the association between each job stressor and psychological distress mediated by WFC.

‡Obtained by bootstrap estimation with 2000 replications.

§Corresponding to the Bonferroni-corrected alpha level, 0.625% (=5%/8).

Table 4 The estimated associations across each job stressor, psychological distress (Kessler 6 ≥ 5) and work-to-family conflict (WFC) among women (n=1560)*

Model	Model 1		Model 2		Model 3		Mediating effect of WFC†		
	Psychological distress at 2-year follow-up		WFC (high) at 1-year follow-up		Psychological distress at 2-year follow-up				
Dependent variable	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)	%	(95% CI)‡	(99.375% CI)‡§
Explanatory variables									
Job demands (high)	1.71***	(1.38 to 2.13)	2.72***	(2.16 to 3.44)	1.38**	(1.10 to 1.74)	47.5	(22.5 to 72.6)	(13.8 to 81.3)
WFC (high)					3.20***	(2.50 to 40.9)			
Job control (low)	1.21	(0.94 to 1.57)	0.79	(0.61 to 1.02)	1.32††	(1.01 to 1.72)			
WFC (high)					3.48***	(2.73 to 4.43)			
Job strain (high)	1.85***	(1.47 to 2.31)	2.20***	(1.72 to 2.81)	1.59***	(1.26 to 2.00)	33.6	(17.2 to 49.9)	(12.0 to 55.2)
WFC (high)					3.20***	(2.51 to 4.09)			
Effort (high)	1.55***	(1.24 to 1.93)	3.00***	(2.37 to 3.80)	1.20	(0.95 to 1.52)	64.0	(24.3 to 100.0)	(10.1 to 100.0)
WFC (high)					3.27***	(2.56 to 4.20)			
Reward (low)	2.14***	(1.70 to 2.68)	1.82***	(1.43 to 2.32)	1.94***	(1.53 to 2.44)	21.3	(10.7 to 32.0)	(7.0 to 35.7)
WFC (high)					3.21***	(2.52 to 4.10)			
Effort–reward imbalance (high)	1.84***	(1.48 to 2.28)	2.70***	(2.14 to 3.41)	1.50***	(1.20 to 1.88)	41.3	(22.4 to 60.2)	(15.7 to 66.9)
WFC (high)					3.15***	(2.46 to 4.02)			
Procedural justice (low)	1.80***	(1.45 to 2.23)	2.08***	(1.64 to 2.63)	1.57***	(1.25 to 1.96)	32.7	(17.2 to 48.2)	(11.3 to 54.1)
WFC (high)					3.21***	(2.52 to 4.10)			
Interactional justice (low)	1.71***	(1.37 to 2.13)	1.52***	(1.20 to 1.92)	1.59***	(1.27 to 2.00)	21.8	(7.7 to 35.9)	(8.1 to 35.4)
WFC (high)					3.31***	(2.60 to 4.22)			

***p<0.001, **p<0.01, ††p<0.05.
*Adjusted for age, educational attainment, job types, hours worked per week, household income, having one or more family members to share living expenses and firm codes.
†Proportion of the association between each job stressor and psychological distress mediated by WFC.
‡Obtained by bootstrap estimation with 2000 replications.
§Corresponding to the Bonferroni-corrected alpha level, 0.625% (=5%/8).

WFC and psychological distress for women than that for men. Finally, the mediating effect of WFC was somewhat larger for women than it was for men for all job stressors (except for job control), in line with a combination of the second and third observations.

We also found that the value of the achieved power was very close to one in most model specifications for both men and women; however, it was low in three cases for women (for job demands (0.41) in model 1 and for job control (0.65) and effort (0.40) in model 3), all of which corresponded to a non-significant or limited association with psychological distress.

DISCUSSION

We have examined the mediating effect of WFC on the association between job stressors and employee psychological distress using the panel data obtained from J-HOPE. As expected, and in line with what has been suggested by preceding studies,[11 15 22] the present results confirmed that WFC mediated the associations between job stressors and employee psychological distress. These findings are supportive of a view that the negative effect of stressful conditions in the workplace leads to an increased imbalance between work and family life, which in turn increases psychological distress.

In addition to this key result, the present study provided two noticeable findings, and both are expected to provide new insight into the understanding of the relevance of WFC. First, the mediating effect of WFC was higher for job demands and effort than it was for the other job stressors, which indicated reduced job resources. High levels of job demands and effort are likely to require employees to devote more resources to work, leaving them with fewer resources to devote to their family life, which may result in more WFC, and thus higher psychological distress. In this sense, higher WFC captures a trade-off between the responsibilities and obligations pertaining to work and family life, which is caused by the high job demands and effort. In comparison, the magnitude of the mediating effect of WFC tended to be smaller for job control, reward and organisational justice, which can be categorised as job resources. To be sure, the lower levels of these variables are likely to lead to fewer resources to devote to family life. However, they may not necessarily mean a serious trade-off between work and family life. Lower job control and reward may be accompanied by lower job demands and effort, and lower organisational justice does not directly cause fewer resources to devote to family life. In all, we can argue that job resources tend to be associated with employee psychological distress in a relatively direct manner, not mediated by WFC, as compared with that observed in the case of job demands and effort.

We also found that the mediating effect of WFC on the association between job stressors and psychological distress was somewhat larger for women than it was for men. Preceding studies have discussed gender differences in the associations between WFC and health

outcomes,[8 13 16] but the gender differences in the mediating effects of WFC have been largely understudied. The present results suggest that stress in the workplace is more likely to be transformed to higher WFC for women than it is for men. It should be noted, however, that the study sample was highly male-dominated, even more than that suggested by the nationwide difference in the employment/population rates between men and women. This indicates the study sample's limited representativeness of all Japanese workers, requiring us to be cautious when making any generalisation. The results were also somewhat surprising given the shorter hours worked and lower proportions of jobs with high responsibility among women than among men in the present sample. However, the findings were generally supportive of the view that WFC is more relevant to the psychological distress of female employees in Japan. In recent decades, female labour force participation has been rising at such a fast pace in Japan that socioinstitutional settings do not seem to have been sufficiently adjusted to it. Put differently, we cannot rule out the possibility of obtaining different results about the gender differences in countries with already high levels of female labour force participation and family-friendly socioinstitutional settings.

We recognise several limitations and drawbacks in the present study, in addition to limited representativeness of the present male-dominant sample, the limited number of female participants, the arbitrary selection of types of firms and industries, and a somewhat low Cronbach's alpha coefficient for the WFC questionnaire (0.60). First, we did not control for the potential biases that may arise due to the high attrition rates as well as exclusion of participants with missing data. In particular, results from auxiliary regressions (not reported) showed that participants who had reported higher levels of job stressors tended to drop out at the following wave, which points to the risk of underestimating the adverse impact of job stressors on psychological distress. Second, we disregarded FWC and stressors in family life. For a holistic understanding of the relevance of work–family conflict for employee health, we must expand the present analysis to cover FWC and stressors in family life as well.[20–22] Third, we did not control for unobserved individual attributes such as personality traits. This may result in overestimated associations between job stressors and psychological distress, both of which were based on self-reported, subjective assessments. Lastly, it should be noted that we used a single point measure of each of independent, dependent and mediating variables obtained from a three-wave panel with a 1-year interval. We may obtain different results if we use their changes and/or choose a longer or shorter interval.

Despite these limitations, we can conclude that WFC acted as a key mediator in the association between most job stressors and employee psychological distress, especially for women. Results suggest that policy measures and the support of supervisors to prevent job stressors from

adding to WFC are needed to reduce employee psychological distress.

Competing interests We have read and understood BMJ policy on declaration of interests and declare that we have no competing interests.

Patient consent Obtained.

Ethics approval The Research Ethics Committee of the Graduate School of Medicine and Faculty of Medicine, The University of Tokyo (No 2772), the Kitasato University Medical Ethics Organization (No B-12-103), and the Ethics Committee of the University of Occupational and Environmental Health, Japan (No 10-004).

Provenance and peer review Not commissioned; externally peer reviewed.

Data sharing statement There are no additional data available in relation to this manuscript. Contact the corresponding author (TO) if detailed information about the access to the data set is needed.

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