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The role of work–family conflict in the association between long working hours and workers' sleep disturbance and burnout: results from the sixth Korean Working Conditions Survey

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Background

The effect of long working hours on mental health has drawn great social attention in recent years.

Aims

We investigated how work–family conflict mediates the associations between long working hours and sleep disturbance and burnout.

Method

We included 19 159 individuals from a nationally representative sample of workers in South Korea. We decomposed the total effect into a direct effect (long working hours → sleep disturbance or burnout) and an indirect effect (long working hours → work–family conflict → sleep disturbance or burnout). Logistic mediation models were used.

Results

Long working hours were associated with increased risks of work–family conflict, sleep disturbance and burnout. The longer the working hours, the stronger the direct and indirect effects. The odds ratios of the direct effects of long working hours on sleep disturbance were 1.64 (95% CI 1.39–1.95) for 49–54 h/week and 1.66 (95% CI 1.37–2.01) for ≥55 h/week; those of the indirect effects were 1.16 (95% CI 1.12–1.21) for 49–54 h/week and 1.27 (95% CI 1.21–1.33) for ≥ 55 h/week. Similarly, odds ratios of the direct effects of long working hours on burnout were 1.18 (95% CI 1.05–1.33) for 49–54 h/week and 1.20 (95% CI 1.04–1.37) for ≥55 h/week; those of the indirect effects were 1.11 (95% CI 1.09–1.15) for 49–54 h/week and 1.20 (95% CI 1.16–1.24) for ≥55 h/week.

Conclusions

Our results suggest that work–family conflict mediates the associations between long working hours and sleep disturbance and burnout. Longitudinal studies should be followed to confirm the causal relationship.

Keywords

Insomnia; work time; mental health; workplace; sleep–wake disorders.

The effects of long working hours on health have drawn great social and academic attention in recent years. There is a growing evidence that establishes a positive association between long working hours and the risk of various physical and mental health outcomes.[1–4] Recent studies demonstrated that a reduction in working hours improves work–life balance, sleep quality and quality of life for workers.[5,6] These epidemiological studies provide valuable information for informing policy decisions related to working hours at both the national and organisational levels. By expanding our understanding of the health consequences of long working hours, policies can be designed to mitigate the negative effects on workers' mental health, ultimately promoting a healthier and more sustainable work environment.

Long working hours, work-family conflict and mental health

Long working hours, sleep disturbance and burnout are key factors that deteriorate workers' quality of life. Previous studies have suggested that exposure to long working hours is an independent risk factor for sleep disturbance[7–10] and burnout[11–13] among workers. However, although some studies have revealed associations between long working hours and sleep disturbance and burnout, the mechanism underlying these relationships is yet to be fully elucidated.

Work–family conflict refers to the negative interactions between work and family life, and has a considerable impact on workers' mental health conditions, including psychological stress and depression.[14,15] Previous studies have shown that chronic stress caused by work–family conflict leads to emotional exhaustion (burnout) and insomnia.[16,17] In addition, the association between long working hours and work–family conflict has been well documented in the current literature.[18,19] Long working hours can lead to work–family conflict by preventing workers from spending time on housework or caring for their families (time-related work–family conflict), or by causing excess fatigue (strain-related work–family conflict).[20]

Study objectives

In summary, exposure to long working hours is a key trigger for work–family conflict, which can induce sleep disturbance and burnout in workers. However, the mediating role of work–family conflict in the association between long working hours and mental health has not been explored in the literature. Therefore, we aimed to examine the following hypotheses: (a) long working hours are associated with increased risks of sleep disturbance and burnout; and (b) work–family conflict mediates the associations between long working hours and sleep disturbance and burnout.

Method

Study sample

We obtained our study population from the sixth Korean Working Conditions Survey (KWCS), a nationally representative worker sample from South Korea. The KWCS has been conducted by the Occupational Safety and Health Research Institute (OSHRI) to gain information about the sociodemographic features, working conditions and health of Korean workers. The target population of the KWCS is all workers aged ≥15 years and living in South Korea. The KWCS employs a multi-staged systemic sampling, in which the enumeration district is used as a stratifying variable. The sixth KWCS sampled approximately 50 000 survey participants, and surveys were conducted from October 2020 to April 2021. The surveys were conducted through one-on-one, face-to-face interviews with professional interviewers employed by the OSHRI.

A flow chart of the selection of the study sample is shown in Supplementary Fig. 1 available at https://doi.org/10.1192/bjo.2023.555. Of the total 50 538 survey participants included in the sixth KWCS, we excluded those aged under 19 years, leaving 50 493 workers. Next, we limited our study sample to employees working at least 35 h per week, leaving 26 193 workers. The reason for excluding those working <35 h/week is that previous studies have indicated that those working less than standard working hours (35–40 h/week) may do so because of existing poor health,[21,22] and 35–40 h/week has been regarded as a theoretical minimum risk exposure and defined as the reference in most previous studies that explored the health effects of long working hours.[1,2,23] Furthermore, based on our data, individuals working <35 h/week exhibited lower levels of work–family conflict, but had a higher risk of the health outcome, particularly sleep disturbance. This suggests that there may be unique relationships between their working hours, work–family conflict and health for individuals working <35 h/week. Next, we excluded those who lived alone ($n = 5454$), because the impact of long working hours on their work–family conflict may differ from those living with other family members. After excluding those with missing values ($n = 1580$), our final study sample consisted of 19 159 workers.

Data availability and ethics statement

Data from the sixth KWCS is available at https://www.kosha.or.kr. This study was approved by the Institutional Review Board of the Yonsei Health System (approval number: 4-2022-1507). The requirement for informed consent was waived by the Institutional Review Board.

Measurements

Working hours

Weekly working hours were assessed using the following question: 'On average, how many hours per week do you work at your job? Please answer the actual working hours, excluding lunch breaks and commuting time'. The working hours were categorised into 35–40 h, 41–48 h, 49–54 h and ≥55 h. This working hour categorisation is in line with that of previous studies that explored the health effects of long working hours.[1,2,23]

Work–family conflict

Work–family conflict was assessed using four questions, which were the same as the work–family conflict measure used in the European Working Conditions Survey (Supplementary Table 1).[24] The response for each item was based on a five-point Likert scale, in which a higher score indicated a higher level of work–family conflict. Items 1 and 2 represented 'work-to-family conflict,' whereas items 3 and 4 represented 'family-to-work conflict'. However, a previous study that used the same measurement did not separate work–family conflict into two factors because the authors of the study found that only a single factor underlies the four items.[24] We also did not separate work–family conflict items because the results of the factor analysis (Supplementary Material) suggested the unidimensionality of work–family conflict measurement, as in the previous study. Cronbach's alpha was 0.85 in this study, and the total score of work–family conflict, which ranged from 4 to 20, was treated as a continuous variable.

Sleep disturbance

Sleep disturbance was measured with the Minimal Insomnia Symptom Scale (MISS),[25] which consists of questionnaires measuring the following three aspects of sleep quality: difficulties in falling asleep, night awakenings and not feeling rested after sleep. Survey participants responded with an integer between 0 ('never') and 4 ('daily') for each item, and the total score ranged from 0 to 12. A MISS score >5 was defined as sleep disturbance, based on the results of a previous study.[25] Cronbach's alpha was 0.86 in this study.

Burnout

The symptoms of burnout were measured with the following two questions assessing workers' exhaustion from their job, which originated from the Korean version of the Maslach Burnout Inventory – General Survey:[26] 'How often do you feel the following emotions while working? (i) I feel exhausted at the end of the working day (ii) I feel emotionally drained by my work'. The response for each item was based on a five-point Likert scale, in which a higher score indicated a higher level of burnout. Cronbach's alpha was 0.91. We defined a total score >6 as burnout, which approximately corresponded to the highest quartile of the responses (22.6%).

Covariates

We considered gender, age, education, monthly income, marital status, number of household members and occupation as confounding variables. Age was classified as <40, 40–49, 50–59 or ≥60 years. Education was classified as having completed high school or below or college or above. Monthly income (in South Korean won) was classified as <₩200, ₩200–₩299, ₩300–₩399 or ≥₩400. Marital status was classified as married or unmarried or others (separated, divorced, widowed). The number of household members was classified as two, three to four or five or more. The occupation was classified as white collar, service and sales workers, or blue collar, according to the Korean Standard Classification of Occupation.

Statistical analysis

We compared the characteristics of the study participants according to their weekly working hours (standard working hours versus long working hours). We then calculated the prevalence of sleep disturbance and burnout according to the study variables. The chi-squared test was used for descriptive analyses.

Next, we investigated whether there were significant relationships between the variables in the following two indirect paths: (a) long working hours → work–family conflict and (b) work–family conflict → sleep disturbance or burnout. We used either linear regression (long working hours → work–family conflict) or logistic regression (work–family conflict → sleep disturbance or burnout).

In the main analysis, we performed logistic mediation analyses with the methodology suggested by Buis.[27] A diagram of the

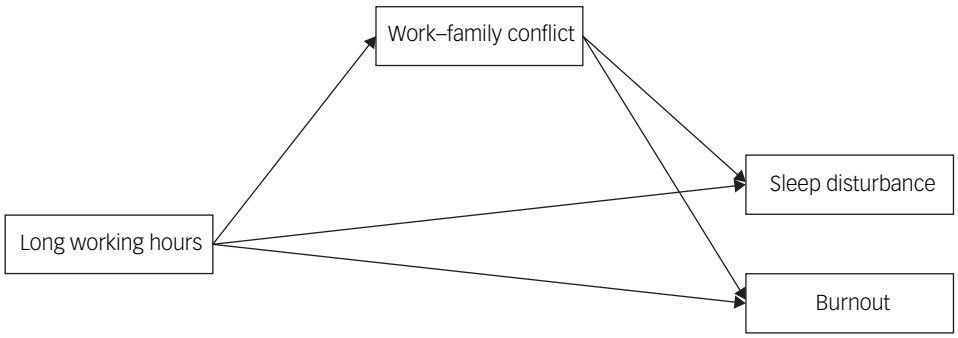

Fig. 1 Diagram of a mediation model.

mediation model is shown in Fig. 1. We performed mediation analysis separately for each dependent variable. In the logistic mediation analysis, the total effect of long working hours on outcomes was decomposed into a direct effect (long working hours → sleep disturbance or burnout) and an indirect effect (long working hours → work–family conflict → sleep disturbance or burnout). The dependent variables were treated as binary variables, and the effects were presented as odds ratios. The indirect effect via work–family conflict was estimated via bootstrapping procedures with 5000 resamples, and 95% confidence intervals were calculated. The Stata function '*ldecomp*' was employed to perform logistic mediation analyses.[27] R software for Windows (version 4.2.2; R Foundation for Statistical Computing, Vienna, Austria; https://www.r-project.org) was used to perform descriptive and linear or logistic regression analyses. Stata for Windows (version 14.2; StataCorp, College Station, Texas, USA) was used to perform the logistic mediation analyses.

Additional analysis

The following two additional analyses were performed. First, we conducted a gender-stratified mediation analysis to investigate whether the associations between working hours, work–family conflict and mental health outcomes vary depending on gender. Second, we employed a different method to estimate the mediating effect of work–family conflict, in which the models treated working hours, sleep disturbance symptoms (MISS score), and burnout symptoms as continuous variables. These mediation analyses were performed with the R package '*mediation*'.

Results

Descriptive analysis

Table 1 shows the baseline characteristics according to working hours. The proportion of men, those with lower educational

Table 1 Baseline characteristics according to working hours

		Weekly working hours				
Characteristics	Overall *N* = 19 159	<40 h *n* = 12 657	41–48 h *n* = 3726	49–54 h *n* = 1661	≥55 h *n* = 1115	*P*-value[a]
Gender						
Men	9579 (50.0)	6036 (47.7)	1765 (47.4)	1029 (62.0)	749 (67.2)	<0.001
Women	9580 (50.0)	6621 (52.3)	1961 (52.6)	632 (38.0)	366 (32.8)	
Age, years						
<40	6509 (34.0)	4369 (34.5)	1234 (33.1)	567 (34.1)	339 (30.4)	<0.001
40–49	5520 (28.8)	3773 (29.8)	1012 (27.2)	494 (29.7)	241 (21.6)	
50–59	4954 (25.9)	3271 (25.8)	1013 (27.2)	396 (23.8)	274 (24.6)	
≥60	2176 (11.4)	1244 (9.8)	467 (12.5)	204 (12.3)	261 (23.4)	
Education						
High school or below	7386 (38.6)	4185 (33.1)	1652 (44.3)	808 (48.6)	741 (66.5)	<0.001
College or above	11 773 (61.4)	8472 (66.9)	2074 (55.7)	853 (51.4)	374 (33.5)	
Monthly income, ₩						
<200	3599 (18.8)	2391 (18.9)	766 (20.6)	210 (12.6)	232 (20.8)	<0.001
200–299	7323 (38.2)	4563 (36.1)	1542 (41.4)	709 (42.7)	509 (45.7)	
300–399	4630 (24.2)	3083 (24.4)	861 (23.1)	434 (26.1)	252 (22.6)	
≥400	3607 (18.8)	2620 (20.7)	557 (14.9)	308 (18.5)	122 (10.9)	
Marital status						
Married	14 615 (76.3)	9730 (76.9)	2786 (74.8)	1261 (75.9)	838 (75.2)	0.045
Unmarried or others	4544 (23.7)	2927 (23.1)	940 (25.2)	400 (24.1)	277 (24.8)	
Number of household members						
2	6096 (31.8)	3792 (30.0)	1345 (36.1)	507 (30.5)	452 (40.5)	<0.001
3–4	11 941 (62.3)	8090 (63.9)	2200 (59.0)	1048 (63.1)	603 (54.1)	
≥5	1122 (5.9)	775 (6.1)	181 (4.9)	106 (6.4)	60 (5.4)	
Occupation						
White collar	9848 (51.4)	7517 (59.4)	1590 (42.7)	563 (33.9)	178 (16.0)	<0.001
Service and sales worker	3875 (20.2)	2069 (16.3)	928 (24.9)	482 (29.0)	396 (35.5)	
Blue collar	5436 (28.4)	3071 (24.3)	1208 (32.4)	616 (37.1)	541 (48.5)	

Values are presented as *n* (%).
a. Chi-squared test.

Table 2 Prevalence of sleep disturbance and burnout according to study variables

Characteristics	Sleep disturbance			Burnout		
	Yes *n* = 1480	No *n* = 17 679	*P*-value[a]	Yes *n* = 4325	No *n* = 14 834	*P*-value[a]
Gender						
Men	663 (6.9)	8916 (93.1)	<0.001	1924 (20.1)	7655 (79.9)	<0.001
Women	817 (8.5)	8763 (91.5)		2401 (25.1)	7179 (74.9)	
Age, years						
<40	434 (6.7)	6075 (93.3)	<0.001	1573 (24.2)	4936 (75.8)	<0.001
40–49	428 (7.8)	5092 (92.2)		1236 (22.4)	4284 (77.6)	
50–59	415 (8.4)	4539 (91.6)		1093 (22.1)	3861 (77.9)	
≥60	203 (9.3)	1973 (90.7)		423 (19.4)	1753 (80.6)	
Education						
High school or below	635 (8.6)	6751 (91.4)	<0.001	1606 (21.7)	5780 (78.3)	0.031
College or above	845 (7.2)	10 928 (92.8)		2719 (23.1)	9054 (76.9)	
Monthly income, ₩						
<200	344 (9.6)	3255 (90.4)	<0.001	716 (19.9)	2883 (80.1)	<0.001
200–299	550 (7.5)	6773 (92.5)		1764 (24.1)	5559 (75.9)	
300–399	310 (6.7)	4320 (93.3)		1074 (23.2)	3556 (76.8)	
≥400	276 (7.7)	3331 (92.3)		771 (21.4)	2836 (78.6)	
Marital status						
Married	1180 (8.1)	13 435 (91.9)	<0.001	3301 (22.6)	11 314 (77.4)	0.959
Unmarried or others	300 (6.6)	4244 (93.4)		1024 (22.5)	3520 (77.5)	
Number of household members						
2	469 (7.7)	5627 (92.3)	0.490	1357 (22.3)	4739 (77.7)	0.009
3–4	914 (7.7)	11 027 (92.3)		2753 (23.1)	9188 (76.9)	
≥5	97 (8.6)	1025 (91.4)		215 (19.2)	907 (80.8)	
Occupation						
White collar	768 (7.8)	9080 (92.2)	0.622	2268 (23.0)	7580 (77.0)	<0.001
Service and sales worker	285 (7.4)	3590 (92.6)		954 (24.6)	2921 (75.4)	
Blue collar	427 (7.9)	5009 (92.1)		1103 (20.3)	4333 (79.7)	
Working hours						
35–40 h	855 (6.8)	11 802 (93.2)	<0.001	2704 (21.4)	9953 (78.6)	<0.001
41–48 h	299 (8.0)	3427 (92.0)		891 (23.9)	2835 (76.1)	
49–54 h	187 (11.3)	1474 (88.7)		432 (26.0)	1229 (74.0)	
≥55 h	139 (12.5)	976 (87.5)		298 (26.7)	817 (73.3)	

Values are presented as *n* (%).
a. Chi-squared test.

attainment and blue collar workers increased with weekly working hours. Table 2 shows the prevalence of sleep disturbance and burnout according to the study variables. The prevalence of sleep disturbance was higher among women (men: 6.9%; women: 5.8%), older workers (<40 years: 6.7%; 40–49 years: 7.8%; 50–59 years: 8.4%; ≥60 years: 9.3%), married workers (married: 8.1%; unmarried or others: 6.6%), workers with low educational levels (high school or below: 8.6%; college or above: 7.2%) and workers with low income levels (<₩200: 9.6%; ₩200–₩299: 7.5%; ₩300–₩399: 6.7%; ≥₩400: 7.7%). The prevalence of burnout was higher among women (men: 20.1%; women: 25.1%), younger workers (<40 years: 24.2%; 40–49 years: 22.4%; 50–59 years: 22.1%; ≥60 years: 19.4%), workers with high educational levels (high school or below: 21.7%; college or above: 23.1%) and workers with white collar jobs or service/sales workers (white collar: 23.0%; service and sales: 24.6%; blue collar: 20.3%). The prevalence of both sleep disturbance and burnout increased with weekly working hours. For instance, the prevalence of sleep disturbance was 6.8% for those working 35–40 h/week, 8.0% for those working 41–48 h/week, 11.3% for those working 49–54 h/week and 12.5% for those working ≥55 h/week. The prevalence of burnout was 21.8% for those working 35–40 h/week, 23.9% for those working 41–48 h/week, 26.0% for those working 49–54 h/week and 26.7% for those working ≥55 h/week.

Table 3 Association of working hours with work–family conflict, and work–family conflict with sleep disturbance and burnout, using logistic/linear regression models

Path	Crude model		Adjusted model	
	β	95% CI	*β*	95% CI
Working hours → work–family conflict				
Working hours per week				
35–40 h	0.00	Reference	0.00	Reference
41–48 h	0.40	0.29–0.50	0.43	0.33–0.54
49–54 h	0.63	0.48–0.77	0.72	0.57–0.86
≥55 h	1.04	0.86–1.21	1.23	1.05–1.41
	Odds ratio	95% CI	Odds ratio	95% CI
Work–family conflict → sleep disturbance				
Work–family conflict (range 4–20)	1.26	1.24–1.28	1.26	1.24–1.29
Work–family conflict → burnout				
Work–family conflict (range 4–20)	1.20	1.18–1.22	1.19	1.18–1.22

Gender, age, education, income, marital status, number of household members and occupation were adjusted.

Main analysis

Table 3 shows the association between working hours and work–family conflict, and between work–family conflict and sleep disturbance and burnout. Long working hours were associated with increased work–family conflict scores in a dose-dependent manner. For instance, working 49–54 h/week was associated with a 0.72-point (95% CI 0.57–0.86) increase in work–family conflict

Table 4 Total, direct and indirect effect of long working hours on sleep disturbance and burnout

	Total effect		Direct effect		Indirect effect		Proportion mediated,
	Odds ratio	95% CI	Odds ratio	95% CI	Odds ratio	95% CI	%
Sleep disturbance							
Working hours per week							
<40 h	1.00	Reference	1.00	Reference	1.00	Reference	
41–48 h	1.23	1.07–1.41	1.12	0.98–1.29	1.09	1.06–1.13	43.9%
49–54 h	1.91	1.60–2.28	1.64	1.39–1.95	1.16	1.12–1.21	23.4%
≥55 h	2.10	1.72–2.57	1.66	1.37–2.01	1.27	1.21–1.33	31.9%
Burnout							
Working hours per week							
<40 h	1.00	Reference	1.00	Reference	1.00	Reference	
41–48 h	1.16	1.06–1.27	1.08	1.00–1.18	1.07	1.05–1.09	45.6%
49–54 h	1.32	1.17–1.49	1.18	1.05–1.33	1.11	1.09–1.15	39.7%
≥55 h	1.43	1.24–1.65	1.20	1.04–1.37	1.20	1.16–1.24	49.9%

Gender, age, education, income, marital status, number of household members and occupation were adjusted.

scores, and working ≥55 h/week was associated with a 1.23-point (95% CI 1.05–1.41) increase in work–family conflict scores. In addition, we found that an increase in work–family conflict was associated with both sleep disturbance and burnout. For instance, a one-point increase in the work–family conflict scores was associated with higher odds of sleep disturbance (odds ratio: 1.26, 95% CI 1.24–1.29) and burnout (odds ratio: 1.19, 95% CI 1.18–1.22).

Table 4 shows the total, direct and indirect effects of long working hours on sleep disturbance and burnout. Both the direct and indirect effects on sleep disturbance or burnout increased with weekly working hours. The odds ratios of the direct effects of long working hours on sleep disturbance were 1.64 (95% CI 1.39–1.95) for 49–54 h/week and 1.66 (95% CI 1.37–2.01) for ≥55 h/week, whereas those of the indirect effects were 1.16 (95% CI 1.12–1.21) for 49–54 h/week and 1.27 (95% CI 1.21–1.33) for ≥55 h/week. Similarly, odds ratios of the direct effects of long working hours on burnout were 1.18 (95% CI 1.05–1.33) for 49–54 h/week and 1.20 (95% CI 1.04–1.37) for ≥55 h/week, whereas those of the indirect effects were 1.11 (95% CI 1.09–1.15) for 49–54 h/week and 1.20 (95% CI 1.16–1.24) for ≥55 h/week. The findings suggest that work–family conflict partially mediates the associations between long working hours and sleep disturbance and burnout.

Additional analysis

Supplementary Fig. 3 shows the mean score of work–family conflict according to weekly working hours in male and female workers. There was a positive correlation between working hours and the mean work–family conflict score, and women had a higher level of work–family conflict than men. Supplementary Table 2 presents the results of a gender-stratified analysis. There was a significant association between long working hours and both sleep disturbance and burnout. This relationship was stronger among men compared with women. Nevertheless, the indirect effect of long working hours on sleep disturbance and burnout follows a dose-dependent pattern in both men and women. Supplementary Table 3 also supports the findings of the main analysis that work–family conflict partially mediates the associations between long working hours and outcomes.

Discussion

In this study, we found that long working hours (> 40 h/week) were significantly associated with increased risks of sleep disturbance and burnout than standard working hours (35–40 h/week). Additionally, we found that work–family conflict partially mediated the effects of long working hours on sleep disturbance and burnout. There were consistent dose–response relationships between long working hours and work–family conflict and outcomes, wherein longer working hours were associated with greater total, direct and indirect effects. Our study is meaningful in that it suggests the mechanism by which long working hours affect workers' mental health.

Our findings are in line with those of previous studies showing that long working hours are associated with increased risks of sleep disturbance and burnout. Previous studies from different countries have suggested that working beyond a certain number of hours, depending on the respective social context and work-time regulation, is significantly associated with sleep disturbance and burnout. For instance, some European countries have found that working >48 h/week or >54 h/week is associated with an increased risk of sleep disorders.[4,8] Similarly, previous Korean studies have suggested that working >52 h/week is significantly associated with an increased risk of sleep disturbance[9] and decreased sleep time.[28] In the case of burnout, earlier studies from both Western and Eastern countries have found that long working hours are related to a higher risk of burnout.[11,12,29] In addition, we reconfirmed the dose–response relationships between long working hours and sleep disturbance and burnout, as shown in previous studies.[11,28]

In our gender-stratified analysis, our results show that although men tend to work more than women, women had higher levels of work–family conflict. Our findings reflect the cultural influence of Confucianism on gender role expectation in South Korean society, where men have been expected to assume the role of primary economic provider (the 'breadwinner') and women have been expected to take on the caregiver role.[30] Interestingly, the effect of long working hours on sleep disturbance were stronger in men than women. This result is consistent with that of the previous study that has demonstrated a stronger effect of long working hours on sleep disturbance in men compared with women.[31] One potential explanation, as suggested by Kim and Lee,[31] could be that within the cultural context of Korean society, male workers are expected to assume the role of primary economic providers. Consequently, even if long working hours lead to health problems for male workers, there may be limited flexibility for them to easily reduce their working hours because of the societal expectation of fulfilling their economic responsibilities.

Long working hours may directly affect sleep disturbance and burnout by causing excessive stress or time pressure on workers. Previous studies have found that long working hours increase work-related stress,[32] and chronic exposure to high work-related stress is an independent risk factor for sleep disturbance and

burnout.[33,34] Moreover, perceived time pressure can intensify the impact of long working hours on mental health outcomes.[35] Physiologically, previous studies have suggested that long working hours disturb hormonal secretion in the body, leading to sleep disturbance, depression and burnout. For instance, those with long working hours exhibited a high level of cortisol, which indicates overactivation of the hypothalamic-pituitary-adrenal axis, which is known to greatly affect one's sleep patterns and emotions.[36,37]

Our study is meaningful in that our findings not only confirm the associations between long working hours and sleep disturbance and burnout, but also provide novel information that work–family conflict can be a key mediator in these relationships. Furthermore, our findings indicate a dose–response relationship between long working hours, sleep disturbance and burnout, in terms of both direct and indirect effects. Our results are consistent with previous findings that work–family conflict is closely associated with long working hours, sleep disturbance and burnout.[16,18–20] An increase in working hours may inhibit workers from spending time with their family members and doing housework, leading to conflict with family members. Additionally, workers may choose to cope with time pressure caused by long working hours by reducing sleep time to fulfil their family roles, which eventually leads them to be exposed to elevated risks of sleep disturbance and burnout.[38]

The practical implication of our findings is that active policy interventions are warranted to mitigate the mental health problems of workers exposed to long working hours. Specifically, a previous study found that organisational policies to support work schedule flexibility or workers' control over work time may contribute to mitigating the negative effects of long working hours on work–family conflict.[39] Another study suggested that policies that support childcare can lower the detrimental effects of long commuting hours on work–family conflict.[40] Therefore, it can be inferred that a direct reduction in work hours combined with policies to support work–family balance could be effective in mitigating the mental health effects of long working hours.

The present study had some limitations. First, the analyses were based on a cross-sectional design, and we could not draw a causal or temporal relationship between the variables. Therefore, we expect further longitudinal mediation analysis to elucidate the causal effect of long working hours and the mediating effect of work–family conflict on sleep disturbance and burnout. Second, our measurements relied on self-reported surveys. Further studies using more objective measurements of sleep quality, such as polysomnography, can be considered to validate the results of the present study. Third, given that the effect of long working hours on work–family conflict and mental health varies according to social and cultural contexts, the conclusion of this study may not necessarily be generalisable to workers in other countries. Finally, we excluded those working less than standard hours because this is beyond the scope of this study. However, exploring the relationship between work–family conflict, working hours and health specifically in those with short working hours (e.g. part-time workers) would be an intriguing topic to investigate in future in-depth studies.

Nevertheless, this study had several strengths. First, unlike most studies, which are limited to certain occupations (e.g. healthcare professionals or teachers), our study included a large number of workers from a nationally representative sample. Therefore, our findings have strength in terms of generalisability. In addition, the present study is meaningful in that we revealed the mediating effect of work–family conflict on the associations between long working hours and sleep disturbance and burnout for the first time.

In conclusion, our study confirmed the mediating role of work–family conflict in the relationship between long working hours and sleep disturbance and burnout. Work–family conflict partially mediated the effect of long working hours. Both direct and indirect effects became greater with working hours, which indicates a dose–response relationship between long working hours and work–family conflict and mental health outcomes. Working >40 h/week was positively associated with increased work–family conflict, which in turn leads to increased risks of sleep disturbance and burnout. Longitudinal studies are warranted to fully elucidate the causal relationship between long work hours, work–family conflict and mental health outcomes. Our findings underscore that appropriate policies are needed to mitigate the potential negative effects of long working hours on work–family balance.

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Supplementary material

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Data availability

The data that support the findings of this study are openly available at https://www.kosha.or.kr/eoshri/resources/KWCSDownload.do.

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Author contributions

S.-U.B., J.-H.Y. and J.-U.W. conceptualised the study. S.-U.B. was responsible for the study methodology. S.-U.B. and J.-H.Y. conducted formal analysis. S.-U.B. wrote the original draft, and J.-H.Y. and J.-U.W. reviewed and edited the manuscript. S.-U.B. was responsible for data visualisation. J.-H.Y. and J.-U.W. provided study supervision. All authors have read and agreed to the submission of the manuscript.

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Declaration of interest

None.

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