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Original Article



Use of work-related communication technology outside regular working hours and work-family conflict (work interference with family and family interference with work): results from the 6th Korean working conditions survey

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CI, confidence interval; EWCS, European Working Conditions Survey; FIW, Family interference with work; IRB, Institutional Review Board; KWCS, Korean Working Conditions Surveys; OECD, Organization for Economic Co-operation and Development; OR, odds ratio; TAJD, technology assisted job demand; WFC, work-family conflict; WIF, Work interference with family.

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ABSTRACT

Background: Recently, use of work-related communication technology—smartphones, tablets, and laptops—is increasing rapidly by development of technology with the coronavirus disease 2019 pandemic. Some studies have suggested that work-related communication technology has a significant link with work-family conflict (WFC) but these studies included only limited number of participants and lacked essential covariates. Therefore, this study analyzes this association using large representative data sample and selected waged workers who were married-couples with children.

Methods: This study was conducted based on data from the 6th Korean Working Conditions Surveys (KWCS). A total of 17,426 waged workers having a marriage partner and one or more children were selected. Logistic regression analysis was performed to determine whether WFC was associated with communication technology use. The odds ratios (ORs) for WFC were stratified by sex and working hours.

Results: In fully adjusted model, WFC was higher those who used communication technology outside regular working hours compared with those who did not use it (OR: 1.66; 95% confidence interval [CI]: 1.39–1.97). When stratified by sex and working hours, the effect was greater in women than in men (OR: 1.79; 95% CI: 1.42–2.26 vs. OR: 1.52; 95% CI: 1.17–1.97) and women who worked over 52 hours per week had the highest OR (3.40; 95% CI: 1.25–9.26).

Conclusions: This study revealed that the work-related communication technology use outside regular working hours was associated with WFC. The association were greater among those having longer working hours and female workers. These results suggest that appropriate policy should be implemented to reduce working hours and right to disconnect after work, particularly in female workers.

Keywords: Information technology; Work-life balance; Gender difference; Work-life conflict; Work-family balance

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Competing interests

The authors declare that they have no competing interests.

Author Contributions

Investigation: Choi BY; Methodology: Min JY, Ryoo SW, Min KB; Supervision: Min KB; Validation: Ryoo SW; Writing - original draft: Choi BY; Writing - review & editing: Min JY, Min KB.

BACKGROUND

The use of communication technology—smartphones, tablets, and laptops—is a worldwide trend,¹ that has affected not only personal lives, but also the work environment. Its many benefits in the workplace can assist employees in collaborating and sharing information without the limitation of working space, as well as in completing work-related tasks through cost savings and flexibility.² The restricted face-to-face communication necessitated by the coronavirus disease 2019 pandemic resulted in an inevitable surge in the use of communication technology.³ However, work-related communication technology usage, after working hours, is known to negatively affect workers' mental health.^{4,7} A study by Arlinghaus and Nachreiner reported a significant association between work-related contacts outside of regular working hours and poor self-reported health, in a representative sample of 23,760 European employees.⁶ Hu et al.⁷ analyzed the effects of work-related smartphone usage after regular working hours on bedtime procrastination among 210 and 205 employees in the United States and China, respectively. Their analysis revealed that off-time work-related smartphone usage influenced bedtime procrastination.

Advances in work-related communication technology pose challenges to employees and organizations,⁸ as these have pervaded both, personal life and the work environment, by enabling work intrusions, which impede necessary recovery.⁹ Work-family conflict (WFC)—a critical issue in the incompatibility of family and work—has been defined as an inter-role conflict that arises when the demands and responsibilities of work and family interfere with each other.¹⁰ The use of communication technology beyond normal work hours facilitates employees' abilities to integrate their work and home domains, allowing them employees to access their work in multiple ways—emails, texts, and phone calls—from anywhere, and establish contact at any time. The resultant collision between work and family roles causes WFC.^{9,11,15} Increased connectivity with work via communication technology (e.g., when supervisors contact their subordinates outside regular working hours or during their free time) could also be attributed to WFC.

The negative impact of WFC on employees' physical and mental health and job-related outcomes has received considerable attention.^{12,16} Previous studies have shown that those with high WFC also had a significantly higher prevalence of mental disorders,^{17,19} and that WFC acted as a mediator between occupational stress and psychological health.^{18,19} Some studies have suggested that work-related communication technology (or smartphone usage) has a significant association with WFC.^{9,11,14} As these studies included only limited number of participants and lacked essential covariates (i.e., working hours, whether to have a child, or get married), further studies are needed to clarify the association between using work-related communication technology after working hours and WFC.

This study aimed to investigate whether work-related communication technology used after working hours was associated with WFC, using large representative data based on Korea's waged workers. Given Greenhaus and Beutell's (1985) WFC perspectives—work roles comprising tight work schedules or long working hours, and family roles of raising children or caregiving—induce lack of time, and produce pressure to participate in each role,²⁰ this study analyzed whether this association was affected by an increase in working hours and sex differences, through stratification of working hours (≤ 40 , 41–52, or > 52) and sex differences (male or female).

METHODS

Study participants

The Korean Working Conditions Survey (KWCS), conducted by the Korea Occupational Safety and Health Agency, is similar to the European Working Conditions Survey (EWCS)²¹ in terms of structure and licensed survey items. It provides an overview of working conditions in Korea. The 6th KWCS conducted in 2020–2021 collected responses from employees aged over 15 years, and its respondents consisted of: waged workers, unpaid family workers, self-employed workers, and employers running their own businesses. However, we excluded self-employed and unpaid-family workers and selected only 38,240 waged employees over 20 years of age. Thereafter, 19,040 employees having a marriage partner and one or more children were selected. Finally, 16,334 employees were included in the analysis excluding 2,706 who did not respond to the questionnaires, used in this study (Fig. 1).²²

Main variables

In this study, the use of communication technology for work purposes outside regular working hours was defined by responses to the following question: “In the last month, in your free time, how often have you used communication tools for work?” Communication tools refer to email, phone and video conferencing, text messaging, social media, and other applications.” Respondents who answered “daily,” “several times a week,” or “several times a month” were categorized as “yes,” whereas those who answered “less often,” or “never” were categorized into “no.”

WFC was measured, using the following questions: “How often in the last 12 months (or since you started your job) have you ...? (A) felt too tired after work to do some of the household jobs that needed to be done, (B) found that your job prevented you from giving

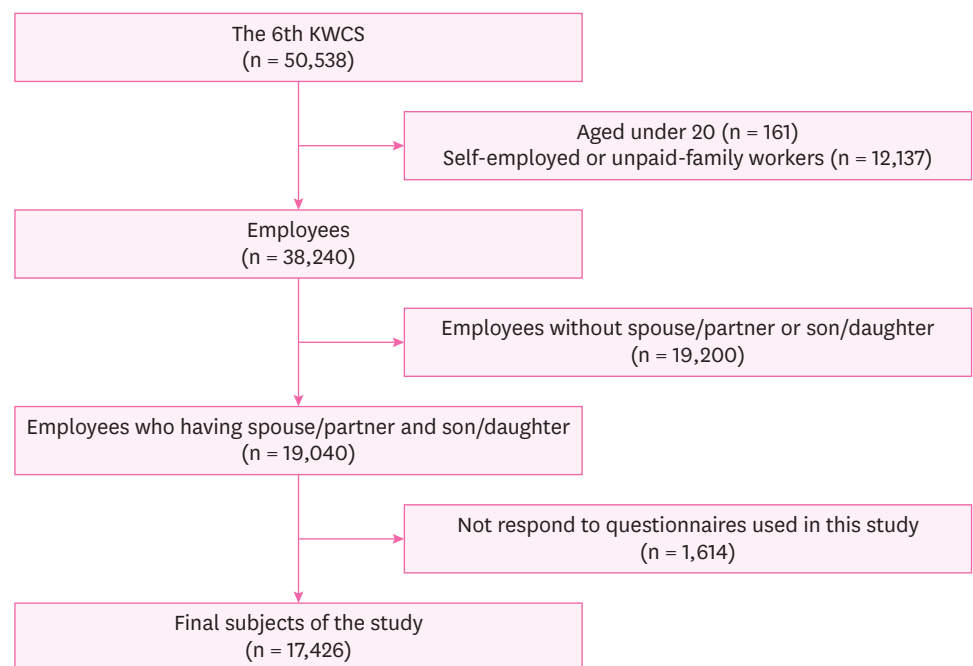


Fig. 1. Flow chart of the selection of study subjects.
KWCS: Korean Working Conditions Survey.

the time you wanted to give to your family, (C) found it difficult to concentrate on your job because of your family responsibilities, and (D) found that your family responsibilities prevented you from giving the time you to give to your job?" The response options were on a scale of—always, most of the time, sometimes, rarely, and never, which were accordingly scored with the values of 4 to 0. This definition of WFC implies bidirectional aspect between work and family. Recent studies defined to two directions of WFC: work interference with family (WIF) and family interference with work (FIW).^{23,24} It is suggested that items (A) and (B) refer to "WIF" while (C) and (D) refer to "FIW." The items were benchmarked against those of the EWCS. Additionally, the index is similar to the items of the Work-Family Conflict Scale (WFCS) of the International Social Survey Programme, 2012. The reliability of the WFC used in the ISSP was estimated, and Cronbach's alpha was .79 in South Korea.²⁵ Finally, correlations with relevant variables were estimated, and the results confirmed the validity of the scale. Borgmann et al.²⁶ formed a sum index from items (A) to (D), which can assume a minimum of 0 and a maximum of 16 points, and a dichotomized index for the analyses, where 8 and more points were interpreted as "high WFC" and 0–7 points as "low WFC." These cut-offs were also used to define high and low WFC.

Other variables

Potential confounding factors included sex, age, income, education level, working hours, and shift work. Age was divided into five categories: 20–29, 30–39, 40–49, 50–59, and 60 and above because older workers experience higher WFC than younger workers when communication technology is used after working hours.²⁷ Education level was divided into three groups: middle school graduate or below, high school graduate and college graduate or above. Monthly income was assessed using four categories: less than 2,000,000, 2,000,000–2,999,999, 3,000,000–3,999,999, and 4,000,000 or more Korean won. Working hours were divided into 3 groups: less than 40 working hours per week or equal, 41–52 working hours per week, and more than 52 working hours per week. Shift work was divided into two groups, depending on whether or not it comprised working in shifts. Occupational classification was divided into three groups: white-collar (managers, professionals and related workers, clerks), service and sales (service and sales workers), and blue-collar (skilled agricultural, forestry, and fishery workers; craft and related trades workers; plant, machine operators and assemblers; and elementary workers). Workplace size was defined by the number of employees and divided into 4 groups: 1–4, 5–49, 5–299, and 300 or more. Housework was defined using the following question: "In general, how often are you have involved in any of the following activities outside work?" Respondents who answered that they did cooking and housework, "daily," "several times a week," or "several times a month" were categorized as "yes," whereas those who answered "less often," and "never" were categorized as "no."

Statistical analysis

Weighted analysis was conducted to show the weighted prevalence rate using the weighted number of people and the proportion of communication technology use for work purposes outside regular working hours, as well as *p*-values. First, a χ^2 test was conducted to identify the participants' characteristics according to their communication technology usage. Then, multiple logistic regression analysis was performed to determine whether WFC was associated with communication technology usage. Moreover, to analyze the effects of sex and working hours, the odds ratios (OR) for WFC were stratified by sex and working hours and those who did not use any communication technology were defined as reference group. All the statistical analyses were performed using SAS 9.4 (SAS Institute, Cary, NC, USA) and the statistical significance level was set at *p* < 0.05.

Ethics statement

The Institutional Review Board (IRB) of Seoul National University Hospital waived the need for written informed consent to exempt the review of this study (IRB No. E-2208-111-1351).

RESULTS

Table 1 shows the general and occupational characteristics of 16,334 waged workers who had a spouse and one or more children. In all, 5,212 (31.9%) participants used communication technology for work purposes outside of regular working hours and 11,121 (68.1%) participants did not. Those who used communication technology were younger (in their 30s–40s). Furthermore, the participants included more men (63.1% vs. 58.7%), more workers from the high-income group than from the low-income group (32.2% vs. 24.8%), more workers who were college graduates or above (72.7% vs. 62.7%), those working longer than 52 hours per week (6.7% vs. 5.1%), more white-collar occupations (62.4% vs. 51.0%) and less blue-collar occupations (23.8% vs. 35.2%), more shift workers (27.4% vs. 24.2%) and more large company employees (22.9% vs. 19.9%). Those who used communication technology experienced more WFC than those who did not (11.5% vs. 7.1%), and they had higher mean of WFC (3.74 vs. 3.16).

Table 2 depicts sharing of household chores among workers stratified by sex and working hours. Women performed a larger share of chores than men, regardless of working hours. However, the percentage of not doing housework, gradually increased when men's working hours increased from 42.7% to 57.7%.

Table 3 presents the crude and adjusted OR. The crude model showed a statistically significant association between use of communication and WFC (OR: 1.69; 95% confidence interval [CI]: 1.42–2.02). After adjusting for age and sex, the association was statistically significant (OR: 1.68; 95% CI: 1.41–2.00). When fully adjusted for socioeconomic factors and working environmental factors, although the OR decreased slightly, it was still statistically significant (OR: 1.64; 95% CI: 1.38–1.96). Therefore, the use of communication technology was significantly associated with WFC in all the models.

Fig. 2 shows the percentage of WFC by use of communication technology, based on sex. There were statistically significant differences in WFC, among those who used communication technology outside of regular working hours compared with those who did not use it (11.48% vs. 7.12%). In addition, sex-related differences in WFC were not statistically significant when there was no use of communication technology ($p = 0.079$), but statistically significant when it was used outside regular working hours ($p = 0.002$).

Table 4 shows the logistic regression analyses results of WFC stratified by working hours and sex for all waged workers. In all the groups, workers of using communication technology had a higher risk of WFC than workers not to use it. As working hours increased, the OR increased, showing 1.44 (95% CI: 1.15–1.81) at less than or equal to 40 hours per week, 1.69 (95% CI: 1.20–2.39) at 41–52 hours per week, 2.84 (95% CI: 1.71–4.73) at greater than 52 hours per week. When stratified by sex, the effect on the increase of OR was greater in women than in men (OR: 1.79; 95% CI: 1.42–2.26 vs. OR: 1.52; 95% CI: 1.17–1.97). In particular, women who worked over 52 hours per week had the highest OR (OR: 3.40; 95% CI: 1.25–9.26) when stratified by sex and working hours. Among men who worked less than or equal to 40 hours per week, the OR was not statistically significant with WFC (OR: 1.17; 95% CI: 0.81–1.68).

Communication technology and work-family conflict

Table 1. Characteristics of the participants according to use of communication technology for work purposes outside regular working hours

Characteristics	Total	Communication technology outside regular working hours		p-value
		Yes	No	
Sex				< 0.001
Men	9,816 (60.1)	3,291 (63.1)	6,525 (58.7)	
Women	6,518 (39.9)	1,921 (36.9)	4,597 (41.3)	
Age				< 0.001
20–29	189 (1.2)	59 (1.1)	130 (1.2)	
30–39	3,790 (23.2)	1,330 (25.5)	2,460 (22.1)	
40–49	6,467 (39.6)	2,205 (42.3)	4,262 (38.3)	
50–59	4,681 (28.7)	1,372 (26.3)	3,308 (29.7)	
≥ 60	1,207 (7.4)	246 (4.7)	961 (8.6)	
Income (×10,000 KRW/month)				< 0.001
< 200	3,181 (19.5)	800 (15.3)	2,382 (21.4)	
200–299	4,295 (26.3)	1,223 (23.5)	3,073 (27.6)	
300–399	4,422 (27.1)	1,512 (29.0)	2,910 (26.2)	
≥ 400	4,435 (27.2)	1,678 (32.2)	2,757 (24.8)	
Education				< 0.001
Below middle school	603 (3.7)	109 (2.1)	494 (4.4)	
High school	4,963 (30.4)	1,314 (25.2)	3,649 (32.8)	
Above college	10,767 (65.9)	3,789 (72.7)	6,978 (62.7)	
Weekly working hours				< 0.001
≤ 40	11,841 (72.5)	3,605 (69.2)	8,236 (74.1)	
41–52	3,568 (21.8)	1,256 (24.1)	2,313 (20.8)	
> 52	924 (5.7)	352 (6.7)	572 (5.1)	
Shift work				0.010
No	12,217 (74.8)	3,783 (72.6)	8,434 (75.8)	
Yes	4,116 (25.2)	1,429 (27.4)	2,687 (24.2)	
Occupation				< 0.001
White-collar	8,923 (54.6)	3,255 (62.4)	5,667 (51.0)	
Sales and service	2,253 (13.8)	716 (13.7)	1,538 (13.8)	
Blue-collar	5,158 (31.6)	1,242 (23.8)	3,916 (35.2)	
Number of employees				0.013
1–4	2,448 (15.0)	700 (13.4)	1,749 (15.7)	
5–49	6,970 (42.7)	2,175 (41.7)	4,795 (43.1)	
50–200	3,507 (21.5)	1,145 (22.0)	2,361 (21.2)	
≥ 300	3,409 (20.9)	1,192 (22.9)	2,216 (19.9)	
Work-family conflict				< 0.001
Low (0–7)	14,944 (91.5)	4,614 (88.5)	10,330 (92.9)	
High (≥ 8)	1,390 (8.5)	599 (11.5)	792 (7.1)	
Mean ± SE	3.34 ± 3.49	3.74 ± 3.61	3.16 ± 3.40	
Median (IQR)	3 (1–5)	4 (1–6)	3 (0–5)	
Total	16,334 (100.0)	5,212 (31.9)	11,121 (68.1)	

Values are presented as number (%).

KRW: Korean won; SE: standard error; IQR: interquartile range.

Table 2. Sharing of housework stratified by sex and working hours

Working hours	Housework	All	Sex		p-value
			Men	Women	
	No	4,498 (27.5)	4,362 (44.4)	135 (2.1)	< 0.001
	Yes	11,836 (72.5)	5,453 (55.6)	6,383 (97.9)	
≤ 40		11,841			
	No	2,912 (24.6)	2,826 (42.7)	86 (1.6)	< 0.001
	Yes	8,929 (75.4)	3,796 (57.3)	5,133 (98.4)	
41–52		3,568			
	No	1,195 (33.5)	1,150 (45.7)	45 (4.3)	< 0.001
	Yes	2,374 (66.5)	1,365 (54.3)	1,008 (95.7)	
> 52		924			
	No	391 (42.3)	386 (56.9)	5 (2.1)	< 0.001
	Yes	533 (57.7)	292 (43.1)	241 (97.9)	
Total		16,334			< 0.001

Communication technology and work-family conflict

Table 3. Odds ratios with 95% confidence intervals for WFC by use of communication technology for work purposes outside typical working hours

Model	No. of subject with WFC	Communication technology outside regular working hours	
		Yes	No
Crude		1.69 (1.42–2.02) ^a	Reference
Model 1 ^b	1,390 (8.5)	1.68 (1.41–2.00)	Reference
Model 2 ^c		1.70 (1.43–2.03)	Reference
Model 3 ^d		1.64 (1.38–1.96)	Reference

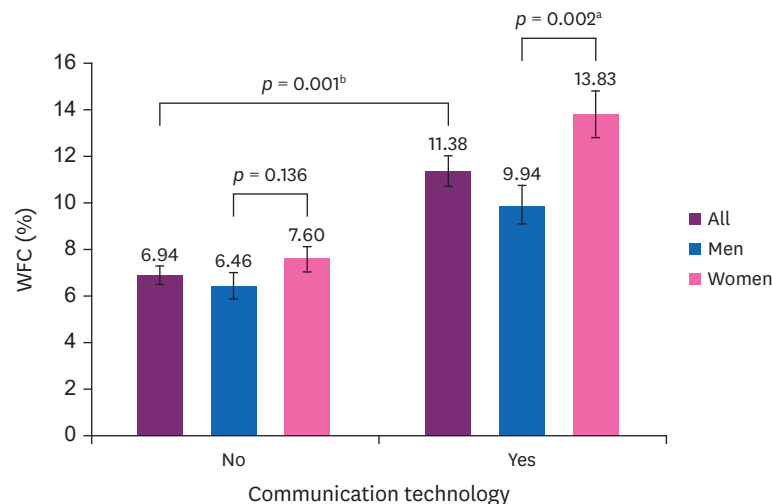
^aData are presented as odds ratios (95% confidence interval); ^bModel 1: adjusted for sex, age; ^cModel 2: model 1 plus adjusted for education, income; ^dModel 3: model 2 plus adjusted for working hour, shift work, occupation.

WFC: working-family conflict.

Table 4. Adjusted odds ratios with 95% confidence intervals for WFC in stratification analysis for working hours, sex

Working hours	Communication technology outside regular working hours								
	Total			Men			Women		
	No. of subject with WFC	Yes	No	No. of subject with WFC	4	No	No. of subject with WFC	Yes	No
≤ 40	857 (7.2)	1.44 (1.15–1.81)	Ref	401 (6.0)	1.17 (0.81–1.68)	Ref	456 (8.7)	1.71 (1.29–2.28)	Ref
41–52	378 (10.6)	1.69 (1.20–2.39)	Ref	243 (9.7)	1.75 (1.08–2.82)	Ref	135 (12.8)	1.66 (1.08–2.53)	Ref
> 52	156 (16.8)	2.84 (1.71–4.73)	Ref	110 (16.2)	2.82 (1.48–5.37)	Ref	46 (18.6)	3.40 (1.25–9.26)	Ref
Total	1,390 (8.5)	1.66 (1.39–1.97)	Ref	754 (7.7)	1.52 (1.17–1.97)	Ref	637 (9.8)	1.79 (1.42–2.26)	Ref

WFC: work family conflict; Ref: reference.

**Fig. 2.** WFC (%) by using of communication technology according to sex. Error bars represent standard errors, the 95% confidence interval.

WFC: work family conflict.

Asterisks indicate significant differences, ^a $p < 0.01$, ^b $p < 0.001$.

DISCUSSION

Using data from a nationally representative sample of South Korean workers, revealed that the use of communication technology outside of regular working hours was associated with increased odds of WFC among wage employees, who were married-couples with children. Similarly, the odds of WFC were greater when working hours were longer. This association was pronounced in female employees, with a 1.2 times significantly higher odds of WFC than their male counterparts. It is difficult to draw causal inferences on the observed association in this cross-sectional study, as the use of communication technology beyond regular working hours may have blurred the boundaries between work and family lives in workers with spouses and children, those who worked for longer hours, and female employees, who were more susceptible.

Consistent with this study, previous studies also reported that the association between communication technology usage and WFC was statistically significant.^{11,14} Wang et al.¹¹ analyzed the association of using communication technology for work at home during off-the-job periods, on WFC. The study included 423 participants in China, and its results indicated that communication technology usage was significantly related to employee time-based WFC ($r = .24, p < 0.01$) and strain-based WFC ($r = .12, p < 0.05$). Wright et al.¹² also investigated the influence of communication technology usage outside of regular work hours on work life conflict on 168 employees from more than 30 companies in Midwestern United States, and their results showed that communication technology use contributed to perception of work life conflict ($\beta = .48, p < 0.001$). Fenner et al.¹⁵ conducted a survey with about 227 employees in the United States, and found that technology-assisted supplemental work using laptops and cell phones after regular work hours was significantly associated with WFC ($\beta = .25, p < 0.01$). This study's results also showed that the odds of WFC gradually increased as working hours increased. The odds of WFC were 1.44 (95% CI: 1.15–1.81) at less than or equal to 40 hours of work per week, 1.69 (95% CI: 1.20–2.39) at 41–52 hours of work per week, and 2.84 (95% CI: 1.71–4.73) at greater than 52 hours of work per week. Why does the use of communication technology after regular work hours cause conflict with family life? This may be because the use of communication technology could cause the work role to spill over into the family role and then induce WFC. This hypothesis is based on Ashforth et al.²⁸ and Clark's boundary and border theories,²⁹ respectively, according to which, less flexible and more permeable boundaries were associated with more work-family or family-work interference.³⁰ Use of smartphones or other smart devices make boundaries between the work and family domains more permeable.

Indeed, most workers would like to have separate work and personal life after work hours, as they have to carry out their family roles as fathers or mothers. If they encounter unexpected tasks outside working hours at home, it leaves them with scarce time to fulfil their family member roles. The use of communication technology makes it difficult to avoid unexpected tasks after working hours, and there is a high possibility that permeability will increase, but flexibility will decrease at the boundary between work and family domains. Eventually, the collapsed work-family boundaries cause role conflicts and lead to WFC.

It is noteworthy that female employees were at increased odds than male employees of WFC associated with the use of communication technology outside working hours. With regards to the unequal association between the use of communication technology and WFC by men and women, there is a study by Ghislieri et al.,⁹ that investigated the association between off-work hours technology assisted job demand (TAJD) and WFC among 319 male and 352 female Italian workers, and found gender differences in the association. Specifically, although off-work hours TAJD was positively associated with WFC in both sexes, it was also significantly associated with work-family enrichment only in the male group. The authors interpreted this difference in results based on the centrality of the working role for men, especially in some cultural contexts. It is difficult to compare this study's findings on women having higher odds of WFC owing to different methodologies and gender roles in Western societies. However, in light of WFC blurring work-family boundaries, this may differ by sex because family roles and sharing the burden of housework also differ by sex and are sensitive to the cultural context. For example, inequality exists in the distribution of household chores between men and women. A study by Kaufman and Taniguchi on 24,547 participants from 37 countries found that women were more likely than men to experience work interferences with family, and FIW.³¹ Cerrato et al. found that although the inequality in sharing housework did not directly

increase the risk of WFC in women, when women's involvement in housework was high, their family conflicts increased, and because of this inequality in the distribution of housework, conflicts with partners was likely to cause high WFC.³²

Given these perspectives, as the use of communication technology after regular working hours will be at the workers' home area, the impact of WFC will be different depending on the distribution of housework. In general, women shoulder more household responsibilities than men. This trend may be conspicuous in Asian countries, including Korea. Moreover, the female share of housework increases when they come from a gender-traditional cultural background.³² According to 2014 statistics of the Organization for Economic Co-operation and Development (OECD), South Korean men spent an average of 49 minutes a day on household chores, that was about a third of the OECD average of 131.7 minutes.³³ Therefore, in light of this, women would be more susceptible than men to the risk of high WFC from communication technology usage outside regular working hours. This study's results showed that 97.9 of female workers, but only 55.6% of male workers participated in housework (Table 2). Employees who has long working hours were found to be more likely to encounter WFC (Table 4). As working hours increase, the amount of time that can be devoted to family decreases. It is predicted that there will be difficulties in fulfilling their family role at home if they use communication technology after regular working hours. It seems that long working hours make workers more vulnerable to WFC. Therefore, for mental health of workers, not only make policy for guaranteeing right to disconnect, but also efforts to reduce working hours will be considered. It takes into account gender differences with high WFC, owing to communication technology usage, as shown in Table 4. A spouse who has to perform a larger portion of household chores is likely to experience conflict when working at home after regular working hours. In families, wives generally share more housework than their husbands, regardless of the increase in working hours. In contrast, men are more likely to sever housework when working hours increase. It could mean that it is more likely for men to have psychological detachment as their working hours increase. Therefore, men and women's unequal involvement in household chores may result in a greater gender gap in the association between communication technology and WFC. Further studies are needed to clarify why the association between communication technology usage and WFC is gender dependent.

This study has some limitations. First, it assessed the use of communication technology and WFC simultaneously because of its cross-sectional design. Therefore, there was no causal relationship between the use of communication technology and WFC. Second, the variables could not be adjusted sufficiently. Although the WFC levels of both fathers and mothers are associated with their children's problems,³⁴ this study did not consider their children's ages and number of children in the family. The burden of housework would be higher among parents with preschool children than those with school-age children. It also did not consider the workers' positions and job characteristic. The occurrence of WFC may vary depending on positions at the worksite. WFC may not occur among bosses in high positions, who can delegate work to their subordinates. Conversely, from the point of view of subordinates, WFC may occur through receiving unexpected orders, when they were originally supposed to do housework. This could lead to WFC in subordinates, unlike employees in high positions. Third, regular working hours do not include rest periods during which the persons employed are not at the disposal of the employer in legally but most of workers are difficult to know exactly that regular working hours don't have lunch time. In this regard, lunch break is not included in the regular working hours, and the exact working hours of employees are difficult to determine.

CONCLUSIONS

A significant association was found between the use of communication technology outside regular working hours and WFC elevation in wage employees, who were married-couples with children. The odds of WFC in the association were greater among those having longer working hours and female workers. Therefore, an effective policy should be implemented to reduce working hours, and women's right to disconnect after work will need to be guaranteed.

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REFERENCES

1. O'Dea S. Global smartphone penetration rate as share of population from 2016 to 2020. <https://www.statista.com/statistics/203734/global-smartphone-penetration-per-capita-since-2005/>. Updated 2021. Accessed August 23, 2022.
2. Majchrzak A, Rice RE, Malhotra A, King N, Ba S. Technology adaptation: the case of a computer-supported inter-organizational virtual team. *Manage Inf Syst Q* 2000;24(4):569-600.
[CROSSREF](#)
3. Brynjolfsson E, Horton JJ, Ozimek A, Rock D, Sharma G, TuYe HY. COVID-19 and remote work: an early look at US data. <https://www.nber.org/papers/w27344>. Updated 2020. Accessed August 23, 2022.
4. Fonseca A, Osma J. Using information and communication technologies (ICT) for mental health prevention and treatment. *Int J Environ Res Public Health* 2021;18(2):461.
[PUBMED](#) | [CROSSREF](#)
5. Berg-Beckhoff G, Nielsen G, Ladekjær Larsen E. Use of information communication technology and stress, burnout, and mental health in older, middle-aged, and younger workers - results from a systematic review. *Int J Occup Environ Health* 2017;23(2):160-71.
[PUBMED](#) | [CROSSREF](#)
6. Arlinghaus A, Nachreiner F. When work calls-associations between being contacted outside of regular working hours for work-related matters and health. *Chronobiol Int* 2013;30(9):1197-202.
[PUBMED](#) | [CROSSREF](#)
7. Hu W, Ye Z, Zhang Z. Off-time work-related smartphone use and bedtime procrastination of public employees: a cross-cultural study. *Front Psychol* 2022;13:850802.
[PUBMED](#) | [CROSSREF](#)
8. Kompier MA. New systems of work organization and workers' health. *Scand J Work Environ Health* 2006;32(6):421-30.
[PUBMED](#) | [CROSSREF](#)
9. Ghislieri C, Emanuel F, Molino M, Cortese CG, Colombo L. New technologies smart, or harm work-family boundaries management? gender differences in conflict and enrichment using the JD-R theory. *Front Psychol* 2017;8:1070.
[PUBMED](#) | [CROSSREF](#)
10. Byron K. A meta-analytic review of work-family conflict and its antecedents. *J Vocat Behav* 2005;67(2):169-98.
[CROSSREF](#)
11. Wang Z, Chen X, Duan Y. Communication technology use for work at home during off-job time and work-family conflict: the roles of family support and psychological detachment. *An Psicol* 2016;33(1):93-101.
[CROSSREF](#)
12. Wright KB, Abendschein B, Wombacher K, O'Connor M, Hoffman M, Dempsey M, et al. Work-related communication technology use outside of regular work hours and work life conflict: the influence of

communication technologies on perceived work life conflict, burnout, job satisfaction, and turnover intentions. *Manage Commun Q* 2014;28(4):507-30.

[CROSSREF](#)

13. Andrade C, Matias M. Work-related ICT use during off-job time, technology to family conflict and segmentation preference: a study with two generations of employees. *Inf Commun Soc* 2022;25(14):2162-71.
14. Cho S, Kim S, Chin SW, Ahmad U. Daily effects of continuous ICT demands on work-family conflict: negative spillover and role conflict. *Stress Health* 2020;36(4):533-45.
[PUBMED](#) | [CROSSREF](#)
15. Fenner GH, Renn RW. Technology-assisted supplemental work and work-to-family conflict: the role of instrumentality beliefs, organizational expectations and time management. *Hum Relat* 2009;63(1):63-82.
[CROSSREF](#)
16. Liu C, Cao J, Zhang P, Wu G. Investigating the relationship between work-to-family conflict, job burnout, job outcomes, and affective commitment in the construction industry. *Int J Environ Res Public Health* 2020;17(16):5995.
[PUBMED](#) | [CROSSREF](#)
17. Wang J, Afifi TO, Cox B, Sareen J. Work-family conflict and mental disorders in the United States: cross-sectional findings from The National Comorbidity Survey. *Am J Ind Med* 2007;50(2):143-9.
[PUBMED](#) | [CROSSREF](#)
18. Sugawara N, Danjo K, Furukori H, Sato Y, Tomita T, Fujii A, et al. Work-family conflict as a mediator between occupational stress and psychological health among mental health nurses in Japan. *Neuropsychiatr Dis Treat* 2017;13:779-84.
[PUBMED](#) | [CROSSREF](#)
19. Carvalho VS, Chambel MJ, Neto M, Lopes S. Does work-family conflict mediate the associations of job characteristics with employees' mental health among men and women? *Front Psychol* 2018;9:966.
[PUBMED](#) | [CROSSREF](#)
20. Greenhaus JH, Beutell NJ. Sources of conflict between work and family roles. *Acad Manage Rev* 1985;10(1):76-88.
[CROSSREF](#)
21. Eurofound WA, Cabrita J, Parent-Thirion A, Biletta I, Vargas O, et al. 6th European working conditions survey: 2017 update. <https://data.europa.eu/doi/10.2806/422172>. Updated 2017.
22. Akkas M, Hossain M, Rhaman S. Causes and consequences of work-family conflict (WFC) among the female employees in Bangladesh: an empirical study. *Journal of Business and Economics* 2015;6(12):2063-71.
[CROSSREF](#)
23. Netemeyer R, Boles J, McMurrian R. Development and validation of work-family and family-work conflict scales. *J Appl Psychol* 1996;81(4):400-10.
[CROSSREF](#)
24. Boyar SL, Carson CM, Mosley DC Jr, Maertz CP Jr, Pearson AW. Assessment of the validity of Netemeyer et al.'s (1996) WFC and FWC scales. *Int J Confl Manage* 2006;17(1):34-44.
[CROSSREF](#)
25. Breyer B, Bluemke M. *Work-Family Conflict Scale (ISSP)*. Mannheim: GESIS - Leibniz-Institut für Sozialwissenschaften; 2016.
26. Borgmann LS, Kroll LE, Müters S, Rattay P, Lampert T. Work-family conflict, self-reported general health and work-family reconciliation policies in Europe: results from the European Working Conditions Survey 2015. *SSM Popul Health* 2019;9:100465.
[PUBMED](#) | [CROSSREF](#)
27. Loreg A. Work-related communications after hours: the influence of communication technologies and age on work-life conflict and burnout [Electronic Theses, Projects, and Dissertations]. San Bernardino, CA: California State University; 2020, 986.
28. Ashforth BE, Kreiner GE, Fugate M. All in a day's work: boundaries and micro role transitions. *Acad Manage Rev* 2000;25(3):472-91.
[CROSSREF](#)
29. Clark SC. Work/family border theory: a new theory of work/family balance. *Hum Relat* 2000;53(6):747-70.
[CROSSREF](#)
30. Bulger CA, Matthews RA, Hoffman ME. Work and personal life boundary management: boundary strength, work/personal life balance, and the segmentation-integration continuum. *J Occup Health Psychol* 2007;12(4):365-75.
[PUBMED](#) | [CROSSREF](#)
31. Kaufman G, Taniguchi H. Gender equality and work-family conflict from a cross-national perspective. *Int J Comp Sociol* 2019;60(6):385-408.
[CROSSREF](#)

32. Cerrato J, Cifre E. Gender inequality in household chores and work-family conflict. *Front Psychol* 2018;9:1330.
[PUBMED](#) | [CROSSREF](#)
33. OECD.Stat. OECD Stat Extract. <https://stats.oecd.org/Index.aspx>. Updated 2022. Accessed July 19, 2022.
34. Chai L, Schieman S. Work-to-family conflict and children's problems with school, friends, and health: household economic conditions and couple relationship quality as contingencies. *J Fam Issues* 2022;43(6):1555-78.
[PUBMED](#) | [CROSSREF](#)