A comparative study of the work-family conflicts prevalence, its sociodemographic, family, and work attributes, and its relation to the self-reported health status in Japanese and Egyptian civil workers

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Abstract

Background

Cross-cultural studies studying work-family conflicts (W_F-Cs) are scarce. We compared the prevalence of W_F-Cs, factors predicting it, and its association with self-rated health between Japan and Egypt.

Methods

Among 4862 Japanese and 3111 Egyptian civil workers who were recruited by a convenience sample in 2018/2019 and reported self-rated health status, we assessed the W_F-Cs by the Midlife Development in the US (MIDUS) and attributed it, by linear regression analyses, to sociodemographic, family, and work variables, and assessed its gender- and country-specific associations with self-rated health by logistic regression analyses.

Results

W_F-Cs were more prevalent in Egyptian than Japanese women (23.7% vs. 18.2%) and men (19.1% vs. 10.5%), while poor self-rated health was more prevalent in Japanese than Egyptians (19.3% and 17.3% vs. 16.9% and 5.5%). In both genders of countries, longer working hours, shift work, and overtime work predicted higher scores of the work-to-family conflict (WFC). In contrast, single status predicted lower scores of the family-to-work conflict (FWC). Living with children, fathers, or alone in Japan, while education in Egypt was associated with the conflicts. The OR (95% CI) for poor self-reported health among those with the strong, in reference to weak W_F-Cs, was 4.28 (2.91-6.30) and 6.01 (4.50-8.01) in Japanese women and men and was 2.46 (1.75-3.47) and 3.11 (1.67-5.80) in Egyptian women and men.

Conclusions

Japanese and Egyptian civil workers have different prevalence and correlated factors of W_F-Cs and self-rated health. W_F-Cs were associated in a dose-response pattern with poor-self-rated health civil workers of both countries.

Introduction

Work and family are key realms of human life. However, sometimes the individuals' time, strain, and behavior related to one realm clash with those of the other [1]. Unfair distribution of the subject's energy and time could lead to some sort of conflict [2]. This conflict could be directed from work to family and described as work-to-family conflict (WFC) or from family to work and described as family-to-work conflict (FWC) [3]. Both WFC and FWC compose the total work-family conflicts (W_F-Cs) [4, 5]. *Khan et al. (1964)* have defined W_F-Cs as "inter-role conflicts in which the role pressures from the work and family domains are mutually incompatible in some respect" [6].

W_F-Cs have become a rich area for organizational, social, and health research because they influence organizational achievement [7] and workers' personal lives [8, 9]. W_F-Cs have been related to absenteeism, tardiness, leaving work early, turnover intentions, and other negative work behaviors [10]. Meanwhile, W_F-Cs have been associated with adverse physical and mental health outcomes [9, 11, 12].

The World Health Organization (WHO) suggested in the early 1990s the implementation of self-rated health as a valuable tool for assessing individuals' health and quality of life [13]. Since then, self-rated health was widely used in social science research.

So far, there is a considerable bulk of research studied the attributes of W_F-Cs [14–18] and linked W_F-Cs to poor self-rated health of community dwellers [8, 11] and working populations [12, 19–21]. The literature indicated vast variabilities in the W_F-Cs' levels and their correlates, the proportions of subjects with poor self-rated health, and the magnitude of association between these conflicts and self-rated health across different cultures and populations. Yet, cross-cultural studies that compare the attributes and the health sequences of W_F-Cs among working people of different cultures are limited [5]. In Egypt and Japan, the released literature was based on small sample studies and indicated social and occupational variabilities between the two populations, such as the differences in the family structure and the average daily working hours. Yet, the two countries are alike in the lifetime-employment system and the community's view of males as breadwinners and females as caregivers. The Egyptian studies suggested the prevalence of WFC, FWC, and poor self-rated health as 46.7%, 50.8%, and 16.9% [11]. The prevalence reported in the Japanese studies ranged between 15.2–54.0% for WFC, 21.2 to 36.4% for FWC, and 13.9–35.2% for poor self-rated health in men and 22.8–72.5%, 16.3–56.8%, and 17.7–36.0%, respectively in women [8, 12, 17]. Accordingly, in the current research, we aimed to run a cross-cultural study among large samples of Egyptian and Japanese civil workers to compare the prevalence and correlated factors of the W_F-Cs and poor self-rated health in the two working populations and to compare the associations of W_F-Cs with the poor self-rated health among the civil workers in both countries.

Methods

Subjects

This comparative, cross-cultural study data were collected separately for Japanese and Egyptian civil workers who work in a central prefecture/governorate (Aichi in Japan and Minia in Egypt). A total of 5310 civil workers aged 20-60 years responded to the 2018 data collection cycle of the Aichi Workers' Cohort

study, and 3133 Egyptian civil workers of the same age range responded to the Minia University Public Health Department's survey in 2019. The Aichi Workers' Cohort study [22] and the Egyptian survey were published previously [23]. As we aim to study the work and family interface, we excluded civil workers who reported the number of family members =0; thus, the final sample consisted of 4862 Japanese and 3111 Egyptian civil workers. The ethical review boards in Nagoya University, Japan, and Minia University, Egypt, have approved each survey. The ethical review board in [Masked for Review] (which hosted the Japanese and Egyptian collected data) has also approved the comparative study (approval no 19501). All Egyptian participants consented to provide their data for the comparative research, and Japanese participants who did not respond to an opt-out consent were considered agreeing to be involved in the comparative study.

Data

The self-administered questionnaire used in both countries contained the same set of targeted variables, including information on the civil workers' sociodemographic, family, job, and health aspects.

Work-family conflicts

The following four statements were used to investigate the level of FWC, 1- "Thinking about home troubles can confuse you at work," 2- "The work time is reduced due to home-related issues," 3- "Your own time to relax is reduced due to responsibilities at home," and 4- "Due to housework, you cannot have enough sleeping time you need to accomplish your work." The following four statements were used to investigate the level of work-to-family conflict (WFC), 1- "Work problems make you annoyed at home," 2- "I dedicate less time to my family because I have to work," 3- "My work depletes my energy that I feel not able to pay attention to anything at home," and 4- "I am often out of home for a long time due to work needs." For each statement, participants can choose one frequency response on a three-point Likert scale (0=never, 1=to some extent, 2=often/ very often) as initially indicated by the Midlife Development in the United States National Study [24] and used in previous Japanese [8] and Egyptian [25] settings.

Health status (Self-reported).

The participants were asked to choose either "1=very good, 2=fairly good, 3=good, 4=not very good, 5=not good" in response to the question "How do you rate your current physical health status?". Participants who chose "not very good" and "not good" were considered to have a poor self-reported health status.

Other variables

We collected information on the sociodemographic, family, and work attributes of the participants, which we believe it could relate to the W_F_Cs, such as age, gender, marital status, education, occupation, living arrangement, number of family members, and how many of them were under the age of 14 years, the number of average working hours per day, working overtime or additional job, time for one-way commuting to work, and whether the work is a regular day time work or requires night shifts. We also assisted the participants' lifestyle variables by inquiring about their smoking and drinking habits and measured the physical activity in the metabolic equivalent of task (METs) unit according to the self-reported hours spent in different activities.

Statistical analysis

We showed the descriptive analyses of the collected data, gender-specific to each country, as mean (SD) or proportion, and included the frequency responses to each statement of the FWC and WFC. The FWC and WFC ranged between 0 and 8 points and joined into a 0 to 16 points score to represent the total W_F_Cs as indicated by previous studies [4, 5, 25]. We used the continuous scores of FWC, WFC, and W_F_Cs as our dependent variable in the multiple linear regression analyses to assess the following:-

1- Which sociodemographic, family, and work factors are associated with these conflicts in both populations.

2- Whether the associated variables differ by gender and country, and what the contribution of each factor is in predicting the conflicts in each gender and population.

Moreover, we used the logistic regression analyses to assess the gender- and country-specific associations of the different levels of FWC and WFC [weak conflict level (<2 points), fair conflict level (2-4 points), and strong conflict level (≥ 5 points)] with the self-reported physical health status. Participants should have been ranked strong in at least one form of conflict (FWC and/or WFC) while ranked fair in the other form of conflict to be in the strong total W_F_Cs category. On the other hand, participants should have been ranked weak in at least one form of conflict while ranked fair in the other form of conflict to be in the weak total W_F_Cs category. Other than these, participants were ranked fair in the total W_F_Cs. The logistic regression models were adjusted for those mentioned above sociodemographic, family, and work factors. We computed the odds ratios (ORs) and 95% confidence intervals (CIs) of having poor self-reported health across the increasing categories of the conflicts, using the weak category as the reference group.

We used the SAS software version 9.4 (SAS Institute Inc, Cary, NC, USA) for the analyses considering a two-tailed p-value <0.05 for statistical significance.

Results

Descriptive analyses in Tables 1 and 2

Table 1
Descriptive analyses of the study variables among Japanese and Egyptian civil workers

	Japan		Egypt	
	Women	Men	Women	Men
Age, years ¹	38.8 (11.0)	44.2 (10.8)	38.4 (10.1)	43.3 (10.3)
Education	80 (5.0)	201 (6.1)	218 (13.5)	383 (25.6)
Junior high/High	501 (31.4)	217 (6.7)	305 (18.9)	354 (23.6)
Vocational	1013 (63.6)	2847 (87.2)	1091 (67.6)	760 (50.8)
University or more				
Marital status	925 (58.1)	2454 (75.2)	1258 (77.9)	1353 (90.4)
Married	77 (4.8)	68 (2.1)	42 (2.6)	12 (0.8)
Divorced/Separated	13 (0.8)	17 (0.5)	79 (4.9)	10 (0.7)
Widow	578 (36.3)	725 (22.2)	235 (14.6)	122 (8.2)
Single				
Cohabitants	905 (56.7)	2428 (74.3)	1210 (75.0)	1283 (85.7)
Spouse	707 (44.3)	1895 (58.0)	1123 (69.6)	1212 (81.0)
Children	394 (24.7)	622 (19.0)	232 (14.4)	250 (16.7)
Father	500 (31.3)	851 (26.1)	292 (18.1)	334 (22.3)
Mother	275 (17.2)	295 (9.0)	126 (7.8)	87 (5.8)
Others	176 (11.0)	248 (7.6)	10 (0.6)	13 (0.8)
Alone				
Number of family members ¹	2.2 (1.4)	2.4 (1.4)	3.1 (1.9)	3.9 (1.8)
Number of children < 14 years old ¹	0.7 (0.9)	0.7 (0.9)	1.1 (1.2)	1.4 (1.4)
Occupation	861 (54.0)	1424 (43.6)	1070 (66.3)	715 (47.8)
Professional	735 (46.0)	1842 (56.4)	374 (23.2)	521 (34.8)
Cleric	—	—	170 (10.5)	260 (17.4)
Technical/worker				
Regular daytime work	1201 (75.4)	2977 (91.2)	1352 (83.8)	1165 (77.8)
Yes	392 (24.6)	286 (8.8)	262 (16.2)	332 (22.2)
No				
Job hours per day ¹	8.2 (1.3)	8.4 (1.1)	6.8 (1.5)	7.5 (1.7)
Time to reach work, minutes ¹	45.8 (24.0)	56.4 (26.2)	30.0 (21.7)	31.1 (21.0)
Working overtime/Extra job	1394 (87.3)	2797 (85.6)	1396 (86.5)	827 (55.2)
No	202 (12.7)	469 (14.4)	218 (13.5)	670 (44.8)
Yes				
Family-to-work conflict (FWC)	746 (46.7)	1874 (57.4)	690 (42.8)	773 (51.6)
Weak (score <2)	611 (38.3)	1137 (34.8) 255 (7.5)	717 (44.4)	577 (38.6)
Fair (score 2-4)	239 (15.0)	1.6 (1.9)	207 (12.8)	147 (9.8)
Strong (>=5)	2.2 (2.1)		3.1 (2.1)	2.6 (2.1)
Family-to-work conflict score ¹				

¹ Mean (SD), all such variables. Other variables in the table were presented as number (proportion).

	Japan		Egypt	
	Women	Men	Women	Men
Work-to-family conflict (WFC)	562 (35.2)	1428 (43.7)	557 (34.5)	563 (37.6)
Weak (Score<2)	835 (52.3)	1593 (48.8)	664 (41.1)	592 (39.6)
Fair (score 2-4)	199 (12.5) 2.3 (1.8)	245 (7.5) 2.0 (1.7)	393 (24.4)	342 (22.8)
Strong (>=5)			3.7 (2.4)	3.5 (2.4)
Work-to-family conflict score ¹				
Total work-family conflicts (W_F_Cs)	859 (53.8)	2103 (64.4)	752 (46.6)	787 (52.6)
Weak	447 (28.0)	821 (25.1)	479 (29.7)	424 (28.3)
Fair	290 (18.2)	342 (10.5) 3.6 (3.0)	383 (23.7)	286 (19.1)
Strong	4.5 (3.3)		6.8 (3.7)	6.1 (3.8)
Total work-family conflict score ¹				
Self-reported health	1288 (80.7) 308 (19.3)	2703 (82.8)	1341 (83.1)	1414 (94.5)
Good		563 (17.3)	273 (16.9)	83 (5.5)
Poor				
¹ Mean (SD), all such variables. Other variables in the table were presented as number (proportion).				

Table 2
Comparing the response frequency to the work-family conflict items in Japanese and Egyptian civil workers

	Japan			Egypt		
	Never	Sometimes	Often	Never	Sometimes	Often/always
Women						
Family-to-work conflict (FWC)						
"Thinking about home troubles can confuse you at work"	1006 (63.0)	488 (30.6)	102 (6.4)	1045 (64.7)	443 (27.5)	126 (7.8)
"The work time is reduced due to home-related issues"	944 (59.1)	595 (37.3)	57 (3.6)	711 (44.0)	684 (42.4)	219 (13.6)
"Your own time to relax is reduced due to responsibilities at home"	847 (53.0)	566 (35.5)	183 (11.5)	657 (40.7)	610 (37.8)	347 (21.5)
"Due to housework, you cannot have enough sleeping time you need to accomplish your work"	756 (47.4)	542 (33.9)	298 (18.7)	417 (25.8)	577 (35.8)	620 (38.4)
Work-to-Family conflict (WFC)						
"Work problems make you annoyed at home"	524 (32.8)	734 (46.0)	338 (21.2)	505 (32.3)	658 (40.8)	451 (27.9)
"I dedicate less time to my family because I have to work"	654 (41.0)	755 (47.3)	187 (11.7)	451 (27.9)	663 (41.1)	500 (40.0)
"My work depletes my energy that I feel not able to pay attention to anything at home"	1303 (81.6)	279 (17.5)	14 (0.9)	793 (49.1)	457 (28.3)	364 (22.6)
"I am often out of home for long time due to work need"	844 (52.9)	600 (37.6)	152 (9.5)	531 (32.9)	612 (37.9)	471 (29.2)
Men						
Family-to-work conflict (FWC)						
"Thinking about home troubles can confuse you at work"	2213 (67.7)	949 (29.1)	104 (3.2)	938 (62.7)	415 (27.7)	144 (9.6)
"The work time is reduced due to home-related issues"	2059 (63.1)	1118 (34.2)	89 (2.7)	727 (48.6)	547 (36.5)	223 (14.9)
"Your own time to relax is reduced due to responsibilities at home"	2383 (73.0)	749 (22.9)	134 (4.1)	766 (51.2)	512 (34.2)	219 (14.6)
"Due to housework, you cannot have enough sleeping time you need to accomplish your work"	1733 (53.0)	1194 (36.6)	339 (10.4)	584 (39.0)	577 (38.5)	336 (22.5)
Work-to-Family conflict (WFC)						
"Work problems make you annoyed at home"	1256 (38.5)	1483 (45.4)	527 (16.1)	525 (35.1)	518 (34.6)	454 (30.3)
"I dedicate less time to my family because I have to work"	1694 (51.9)	1368 (41.9)	204 (6.2)	556 (37.1)	572 (38.2)	369 (24.7)
"My work depletes my energy that I feel not able to pay attention to anything at home"	2632 (80.6)	598 (18.3)	36 (1.1)	637 (42.6)	454 (30.3)	406 (27.1)
"I am often out of home for long time due to work need"	1976 (60.5)	1103 (33.8)	187 (5.7)	595 (39.8)	532 (35.5)	370 (24.7)

The mean age in the Japanese cohort was 38.8 years for women and 42.4 years for men, while in the Egyptian survey was 38.4 and 43.3 years, respectively. In both countries, most of the participants were educated to a university level or above (in Japan, 63.6% of females and 87.2% of males, and in Egypt 67.6% of females and 50.8% of males), currently married (58.1% and 75.2% in Japan, and 77.9% and 90.4% in Egypt), and working regular daytime jobs (75.4% and 91.2% in Japan, and 83.8% and 77.8% in Egypt). There were more singles (36.3% females and 22.2% males) and living alone (11.0% females and 7.6% males) Japanese than Egyptian (14.6% and 8.2% single females and males, and 0.6% and 0.8% living alone females and males) civil workers. Larger families (mean family members =3.1 to 3.9 and mean juniors =1.1 to 1.4) were seen in Egypt than in Japan (2.2 to 2.4 and 0.7 respectively). The Japanese civil workers worked on average for 8.2 per day hours for females and 8.4 hours for males, and 12.7% and 14.4% of them worked overtime. On the other hand, the average working hours per day and the proportion of civil workers who worked additional jobs in Egypt were 6.8 hours and 13.5% for females and 7.5 hours and 44.8% for males.

Japanese women had a higher prevalence of FWC (15.0%) than Egyptian women (12.8%), but the opposite was found in men (7.8% in Japanese men and 9.8% in Egyptian men). A higher prevalence of strong WFC and total W_F-Cs was seen in Egypt (24.4% and 23.7% respectively in women and 24.4% and 23.7%, respectively in men) than in Japan (12.5% and 18.2%, respectively in women and 7.5% and 10.5% respectively in men).

There were always higher proportions of Egyptians selecting the highest frequency option “often” in responding to each conflict statement than the Japanese counterparts.

The prevalence of poor self-rated health among the Japanese civil workers was 19.3% in females and 17.3% in males. In contrast, the Egyptian civil workers reported a lower prevalence, 16.9% in females and 5.5% in males.

The gender-and country-specific participants’ characteristics according to the categories of W_F_Cs levels are shown in **Supplemental Table 1**. There were significant differences in the family-related factors across increasing categories of W_F_Cs in the Japanese but not the Egyptian women and men. On the other hand, the work-related factors showed similar variations in both genders of both countries.

Linear regression for factors predicting the conflicts’ score in Tables 3 and 4

Table 3
Multiple linear regression for factors associated with work-family conflict among Japanese and Egyptian female civil workers

	Japan				Egypt					
	Family-to-work conflict (FWC)		Work-to-family conflict (WFC)		Total work-family conflicts (W_F-Cs)		Family-to-work conflict (FWC)		Work-to-family conflict (WFC)	
	Standardized β	P-value	Standardized β	P-value	Standardized β	P-value	Standardized β	P-value	Standardized β	P-value
Age	0.05	0.17	0.08	0.14	0.07	0.14	-0.11	0.0005	-0.14	<0.0001
Education, ($\geq$ university ref)	-0.01	0.64	0.002	0.92	-0.001	0.81	-0.10	0.0007	-0.07	0.01
Junior high/ High	-0.05	0.12	-0.04	0.16	-0.05	0.07	-0.05	0.11	-0.007	0.81
Vocational										
Marital status, (Married ref)	0.01	0.83	-0.007	0.90	0.003	0.05	-0.02	0.51	-0.06	0.85
Divorced	-0.05	0.14	-0.04	0.21	-0.05	0.10	-0.06	0.11	-0.05	0.20
Widow	-0.19	0.03	-0.02	0.71	-0.13	0.15	-0.21	0.003	-0.11	0.09
Single										
Living with spouse, (no ref)	-0.15	0.10	-0.04	0.71	-0.11	0.22	-0.07	0.27	-0.6	0.29
Yes										
Living with children, (no ref)	0.29	<0.0001	-0.006	0.91	0.18	<0.0001	0.05	0.15	-0.01	0.65
Yes										
Living with father, (no ref)	-0.18	0.0001	-0.24	<0.0001	-0.24	<0.0001	-0.07	0.10	-0.02	0.64
Yes										
Living with mother, (no ref)	0.11	0.14	0.08	0.17	0.10	0.16	0.05	0.23	0.07	0.11
Yes										
Living with others, (no ref)	-0.14	0.0008	-0.005	0.90	-0.07	0.05	0.05	0.03	0.01	0.94
Yes										
Living alone, (no ref)	-0.18	<0.001	-0.04	0.12	-0.13	<0.001	0.04	0.08	0.007	0.77
Yes										
Number of family members	-0.03	0.48	0.18	0.002	0.07	0.11	0.05	0.08	0.04	0.19
Number of children < 14 years old	0.21	<0.0001	0.06	0.14	0.17	<0.0001	0.03	0.35	0.02	0.58
Occupation, (Professional ref)	-0.04	0.18	-0.10	0.002	-0.08	0.01	-0.001	0.92	-0.06	0.02
Cleric										
Technical										
	—	—	—	—	—	—	-0.001	0.97	-0.04	0.17

The linear regression model included all the factors in the table simultaneously.

	Japan						Egypt			
	Family-to-work conflict (FWC)		Work-to-family conflict (WFC)		Total work-family conflicts (W_F-Cs)		Family-to-work conflict (FWC)		Work-to-family conflict (WFC)	
	Standardized β	P-value	Standardized β	P-value	Standardized β	P-value	Standardized β	P-value	Standardized β	P-value
Regular daytime work, (Yes ref) No	0.13	0.64	0.07	0.02	0.03	0.32	0.03	0.36	0.25	<0.0001
Job hours per day	0.03	0.37	0.13	<0.0001	0.05	0.04	0.04	0.12	0.12	<0.0001
Time to reach work	-0.02	0.41	0.002	0.99	0.01	0.60	0.01	0.63	0.06	0.03
Working overtime/extra job (no ref) Yes	0.06	0.04	0.21	<0.0001	0.15	<0.0001	0.12	<0.0001	0.10	<0.0001
The linear regression model included all the factors in the table simultaneously.										

Table 4
Multiple linear regression for factors associated with work-family conflict among Japanese and Egyptian male civil workers

	Japan					Egypt				
	Family-to-work conflict (FWC)		Work-to-family conflict (WFC)		Total work-family conflicts (W_F-Cs)	Family-to-work conflict (FWC)		Work-to-family conflict (WFC)		
	Standardized β	P-value	Standardized β	P-value	Standardized β	P-value	Standardized β	P-value	Standardized β	P-value
Age	-0.09	0.0005	-0.04	0.10	-0.008	0.002	-0.09	0.01	-0.18	<0.0001
Education, ($\geq$ university ref)	-0.009	0.63	-0.04	0.07	-0.02	0.19	-0.03	0.46	-0.15	<0.0001
Junior high/ High	-0.01	0.56	-0.02	0.38	-0.02	0.39	-0.02	0.50	-0.09	0.0007
Vocational										
Marital status, (Married ref)	-0.04	0.46	-0.13	0.007	-0.09	0.05	0.01	0.62	-0.005	0.82
Divorced	0.01	0.77	-0.08	0.08	-0.04	0.30	-0.03	0.24	-0.05	0.08
Widow	-0.17	0.03	-0.37	0.01	-0.31	0.03	-0.06	0.04	0.03	0.44
Single										
Living with spouse, (no ref)	-0.08	0.58	-0.33	0.13	-0.24	0.11	-0.005	0.90	-0.02	0.66
Yes										
Living with children, (no ref)	0.12	0.0002	-0.01	0.06	0.07	0.03	-0.003	0.93	0.05	0.10
Yes										
Living with father, (no ref)	-0.02	0.06	0.004	0.89	-0.01	0.69	0.008	0.80	-0.03	0.35
Yes										
Living with mother, (no ref)	0.02	0.55	-0.02	0.49	-0.001	0.99	0.01	0.69	0.03	0.29
Yes										
Living with others, (no ref)	-0.005	0.84	-0.007	0.06	-0.04	0.09	-0.002	0.93	0.05	0.07
Yes										
Living alone, (no ref)	-0.13	<0.001	-0.08	<0.0001	-0.13	<0.001	0.003	0.92	0.005	0.84
Yes										
Number of family members	-0.05	0.15	0.007	0.84	0.03	0.42	0.02	0.63	0.02	0.53
Number of children < 14 years old	0.19	<0.0001	0.09	0.0002	0.17	<0.0001	0.03	0.43	0.02	0.46
Occupation, (Professional ref)	0.03	0.12	-0.007	0.71	0.01	0.42	0.04	0.15	0.02	0.49
Cleric	—	—	—	—	—	—	0.01	0.67	0.03	0.39
Technical										
Regular daytime work, (Yes ref)	0.05	0.01	0.08	<0.0001	0.07	0.0001	0.03	0.36	0.10	0.0004
No										
Job hours per day	0.05	0.01	0.12	<0.0001	0.09	<0.0001	0.12	<0.001	0.14	<0.0001
The linear regression model included all the factors in the table simultaneously.										

	Japan						Egypt			
	Family-to-work conflict (FWC)		Work-to-family conflict (WFC)		Total work-family conflicts (W_F-Cs)		Family-to-work conflict (FWC)		Work-to-family conflict (WFC)	
	Standardized β	P-value	Standardized β	P-value	Standardized β	P-value	Standardized β	P-value	Standardized β	P-value
Time to reach work	-0.003	0.87	0.04	0.02	0.02	0.25	-0.002	0.92	0.06	0.01
Working overtime/extra job (no ref)	0.09	<0.0001	0.24	<0.0001	0.19	<0.0001	0.17	<0.0001	0.26	<0.0001
Yes										
The linear regression model included all the factors in the table simultaneously.										

FWC

In Japanese women and men, living with children was positively associated, while living with a father or alone was inversely related to the FWC. The number of children in the family (standardized $\beta = 0.21$, $p < 0.001$) and living with others (standardized $\beta = -0.14$, $p = 0.0008$) was related to the FWC in Japanese women. Meanwhile, overtime work in both women (standardized $\beta = 0.06$, $p < 0.04$) and men (standardized $\beta = 0.09$, $p < 0.001$), and job hours per day (standardized $\beta = 0.05$, $p = 0.01$) and shiftwork (standardized $\beta = 0.05$, $p = 0.01$) in Japanese men were positively associated with the FWC.

On the other hand, working an extra job in Egyptian women (standardized $\beta = 0.12$, $p = < 0.0001$) and men (standardized $\beta = 0.17$, $p = < 0.0001$) was associated with the FWC. Junior high/high school education in reference to university education or more (standardized $\beta = -0.10$, $p = 0.0007$) and living with other family members (standardized $\beta = 0.05$, $p = 0.03$) in women were associated with the FWC; while Job hours in men was related to the FWC (standardized $\beta = 0.12$, $p = < 0.0001$).

WFC

The regression coefficient of WFC for Japanese female clerics in reference to professionals was (standardized $\beta = -0.08$, $p = 0.01$). Shift work, job hours per day, overtime work in Japanese women and men, and commuting time to work in Japanese men were associated with the WFC. Japanese women living with fathers had lower WFC. Single, divorced, and living alone Japanese men had lower WFC, while the standardized β of Japanese men's WFC with the increasing number of family members was 0.84, $p < 0.03$.

The level of WFC in Egyptian women and men was positively correlated with shift work, job hours per day, working an extra job, and commuting time to work, while inversely associated with the education level. The standardized β of the WFC in Egyptian female clerics in reference to professionals was -0.06, $p = 0.02$.

Logistic regression for the association between the conflicts and self-reported health in Table 5

Table 5
Odds ratio and (95%CI)s for poor self-rated health in Japanese and Egyptian civil workers according to gender-and country-specific categories of work-family conflict

	Japan				Egypt			
	Case/total	Model 1	Model 2	Model 3	Case/total	Model 1	Model 2	Model 3
Women	308/1596				273/1614			
Family-to-work conflict (FWC)								
Weak	116/746	1.00	1.00	1.00	95/690	1.00	1.00	1.00
Fair	115/611	1.49 (1.08-2.04)	1.65 (1.19-2.28)	1.61 (1.16-2.24)	121/717	1.32 (0.98-1.78)	1.29 (0.95-1.74)	1.30 (0.96-1.76)
Strong	77/239	3.30 (2.25-4.86)	4.14 (2.70-6.35)	4.08 (2.66-6.27)	57/207	2.58 (1.76-3.78)	2.54 (1.71-3.76)	2.57 (1.73-3.82)
p-trend		<0.0001	<0.0001	<0.0001		<0.0001	<0.0001	<0.0001
Work-to-family conflict (WFC)								
Weak	67/562	1.00	1.00	1.00	70/557	1.00	1.00	1.00
Fair	171/835	2.09 (1.53-2.87)	2.22 (1.60-3.09)	2.20 (1.58-3.07)	114/664	1.61 (1.16-2.23)	1.59 (1.13-2.23)	1.61 (1.14-2.26)
Strong	70/199	4.71 (3.14-7.08)	5.33 (3.41-8.33)	5.45 (3.47-8.54)	89/393	2.50 (1.73-3.59)	2.61 (1.78-3.84)	2.63 (1.79-3.88)
P-trend		<0.0001	<0.0001	<0.0001		<0.0001	<0.0001	<0.0001
Total work-family conflicts (W-F-Cs)								
Weak	122/859	1.00	1.00	1.00	101/752	1.00	1.00	1.00
Fair	92/447	1.89 (1.37-2.60)	1.89 (1.35-2.64)	1.88 (1.34-2.62)	77/479	1.34 (0.97-1.86)	1.36 (0.97-1.90)	1.37 (0.98-1.92)
Strong	94/290	3.74 (2.63-5.31)	4.27 (2.92-6.26)	4.28 (2.91-6.30)	95/383	2.44 (1.76-3.38)	2.44 (1.74-3.42)	2.46 (1.75-3.47)
p-trend		<0.0001	<0.0001	<0.0001		<0.0001	<0.0001	<0.0001
Men	563/3266				83/1497			
Family-to-work conflict (FWC)								
Weak	232/1874	1.00	1.00	1.00	15/563	1.00	1.00	1.00
Fair	242/1137	2.31 (1.88-2.85)	2.36 (1.90-2.93)	2.38 (1.91-2.96)	32/592	2.29 (1.21-4.32)	2.25 (1.18-4.29)	2.33 (1.21-4.47)
Strong	89/255	4.98 (3.66-6.77)	4.99 (3.61-6.89)	5.16 (3.73-7.15)	36/342	5.12 (2.67-9.81)	4.98 (2.50-9.93)	5.06 (2.52-10.17)
p-trend		<0.0001	<0.0001	<0.0001		<0.0001	<0.0001	<0.0001
Work-to-family conflict (WFC)								
Weak	143/1428	1.00	1.00	1.00	36/773	1.00	1.00	1.00
Fair	310/1593	2.44 (1.96-3.03)	2.37 (1.89-2.97)	2.35 (1.88-2.95)	30/577	1.17 (0.71-1.93)	1.12 (0.67-1.88)	1.15 (0.68-1.94)
Strong	110/245	8.84 (6.45-12.14)	8.39 (5.98-11.81)	8.45 (6.01-11.87)	17/147	2.86 (1.55-5.29)	2.73 (1.45-5.15)	2.77 (1.45-5.30)
P-trend		<0.0001	<0.0001	<0.0001		0.004	0.009	0.009
Total work-family conflicts (W-F-Cs)								
Weak	252/2103	1.00	1.00	1.00	25/787	1.00	1.00	1.00
Model 1: Adjusted for sociodemographic factors (age, education, occupation and marital status).								
Model 2: Adjusted further for family factors (family structure, number of family members and the presence of family members below 14 years old), and work factors (job hours per day, time to commute to work, shift work, working overtime or extra job).								
Model 3: Adjusted further for behavioral factors (smoking status and physical activity), and the Japanese cohort was adjusted for alcohol drinking status.								

	Japan				Egypt			
	Case/total	Model 1	Model 2	Model 3	Case/total	Model 1	Model 2	Model 3
Fair	179/821	2.39 (1.92-2.98)	2.37 (1.89-2.97)	2.35 (1.87-2.95)	32/424	2.67 (1.54-4.60)	2.53 (1.45-4.41)	2.79 (1.58-4.92)
Strong	132/342	5.98 (4.57-7.83)	5.83 (4.39-7.76)	6.01 (4.50-8.01)	26/286	3.31 (1.85-5.92)	3.18 (1.72-5.86)	3.11 (1.67-5.80)
P-trend		<0.0001	<0.0001	<0.0001		<0.0001	<0.0001	<0.0001
Model 1: Adjusted for sociodemographic factors (age, education, occupation and marital status).								
Model 2: Adjusted further for family factors (family structure, number of family members and the presence of family members below 14 years old), and work factors (job hours per day, time to commute to work, shift work, working overtime or extra job).								
Model 3: Adjusted further for behavioral factors (smoking status and physical activity), and the Japanese cohort was adjusted for alcohol drinking status.								

We found dose-response positive associations between increasing total W_F-Cs and its two forms with poor self-reported health status in Japanese and Egyptian civil workers (p-trend <0.001). The multivariable ORs (95% CIs) of poor health for the fair and strong categories of FWC, in reference to the weak category, were 1.61 (1.16-2.24) and 4.08 (2.66-6.27) in Japanese women, 1.30 (0.96-1.76) and 2.57 (1.73-3.82) in Egyptian women, 2.38 (1.91-2.96) and 5.16 (3.73-7.15) in Japanese men, and 2.33 (1.18-4.47) and 5.06 (2.52-10.17) in Egyptian men. The respective ORs (95% CIs) for the fair and strong categories of WFC, in reference to the weak category, were 2.20 (1.58-3.07) and 4.45 (3.47-8.54) in Japanese women, 1.61 (1.14-2.26) and 2.63 (1.79-3.88) in Egyptian women, 2.35 (1.88-2.95) and 8.45 (6.01-11.87) in Japanese men, and 1.15 (0.68-1.94) and 2.77 (1.45-5.30) in Egyptian men.

Discussion

In this large cross-cultural study, we compared the prevalence of W_F-Cs and its two forms FWC and WFC, factors associated with each form of conflict, and the association of these conflicts with the poor self-rated health status among Japanese and Egyptian civil workers. A higher prevalence of the conflicts was evident in Egyptians than Japanese (except for a higher prevalence of FWC in Japanese than Egyptian women), while a higher prevalence of poor self-rated health was estimated for Japanese than Egyptian civil workers of both genders. Work environment, family size, and being single was associated with the conflicts score in both countries. On the other hand, cohabitants in Japan and education in Egypt were associated with conflicts between work and family. For both genders in both countries, the odds for rating one's physical health status as poor was strongly related to the level of FWC, WFC, and total W_F-Cs. Even with longer working and commuting time in Japanese civil workers, their lower W_F-Cs score may imply a difference in family function's ideal or cultural expectation.

The prevalence and correlates of W_F-Cs

A previous study conducted among 1021 Egyptian community dwellers revealed that 46.7% had high WFC, and 50.8% had high FWC [11]. Burke and El-Kot found higher mean W_F-Cs (≈ 3.0) in 242 (146 males and 96 females) Egyptian managers than that in the US (≈ 2.6) [16]. Kobayash et al reported the prevalence of high WFC and FWC among Japanese residents as 36.6% and 36.4% in men and 28.4% and 56.8% in women [8]. The prevalence of W_F-Cs estimated by Koura et al was much higher; 54.0% in 1258 male and 72.5% in 550 female civil servants on the west coast of Japan [12]. In contrast, Shimazu et al reported lower WFC and FWC prevalence of 15.2% and 21.2% in male and 22.5% and 16.3% in female Japanese dual-earner couples with preschool children [17]. The estimated prevalence in other working populations varied largely by culture, study design, and conflicts' diagnostic tool. Still, it was, in general, comparable to our estimated prevalence and indicative of the higher prevalence in women than men. Lallukka et al estimated it as 17%, 18%, 19% in male and 22%, 19%, and 20% in female British, Finnish, and Japanese civil employees [5]. The prevalence of high W_F-Cs was 18% and 24% among full-time employed European men and women according to the European Working Conditions Survey 2015 [21]. Griep et al reported a prevalence of 16.0% for WFC and 7.5% for FWC among Brazilian men and 25.0% and 6.8% among Brazilian women [26].

Byron suggested that work-related factors are more associated with WFC than FWC, while some family factors are associated more with FWC than WFC [3]. The work-related factors in our study were associated, in both countries, with the WFC in both genders. This result was consistent with previous studies that working longer, overtime, and shift work [14–16, 18] representing high job demands and low job control [27] were positively associated with WFC. The workload could have negative consequences for workers who struggle to balance the demands of work and family roles.

On the other side, the family structure affected the Japanese civil workers' perception of FWC. The results match previous findings in Japan [14, 15, 18] and Europe [28, 29]. Living with children adds significantly to FWC, and the effect is more substantial when the children are in the youngest age group. Similar to our results, *Fujimura et al* reported an increased odds of FWC among Japanese civil servants living with children; OR= 1.65, 95%CI: 1.33-2.05, and a decreased odds of FWC among those living with parents; OR= 0.86, 95%CI: 0.71-1.04 [18]. The null association between cohabitants and W_F-Cs in the Egyptian civil

workers might be attributed to the high proportion of Egyptians living in multigeneration families in the same household; thus, the load of children in the family could be compensated by the presence of grandparents [30]. An interesting finding was that living with other family members was inversely associated with the Japanese women's but positively associated with the Egyptian women's FWC. As polygyny is allowed in Egypt, it paved the way for jealousy and conflict when other family members in Egyptian women's lives include co-wife, stepchildren, and co-sister-in-law [31], and might explain the positive association with the FWC.

Findings among Egyptian civil workers agreed with those from other working populations, where *Griep et al in Brazil* [26] and *Carnicer et al in Spain* [28] found higher education related to higher WFC. Highly educated subjects are expected to attain higher rank jobs with greater job demands, competitive edge, and expectations. The majority of civil workers in the Japanese cohort were educated to high levels (only 5.8% were junior high or high school graduates); this might explain why education did not show such association among the Japanese civil workers.

The reported self-related health status and its associations with W_F-Cs in both countries:

Similar to our findings, the previous studies indicated a higher prevalence of poor self-rated health in Japanese; 13.9% in men and 17.7% in women [8], 35.2% in men and 36.0% in women [12] than Egyptians; 16.9% [11].

Despite the observed gender difference in the prevalence of W_F-Cs (Egypt: 19.1% in men vs. 23.7% in women, Japan:10.5% in men and 18.2% in women) and poor self-rated health (Egypt: 5.5% in men vs. 16.9% in women, Japan: 17.2% in men vs. 19.3% in women), our results are in line with the previous research showing associations of W_F-Cs and its two forms WFC and FWC with poor self-rated health of both genders in Japan [8, 12, 20], Egypt [11], and other populations [4, 19, 21, 26]. Increased inter-role conflicts between work and family domains can reduce the time for sleep [25] or leisure activities, thus increasing psychological stress [9] and affecting the physical health conditions [3].

Strengths And Limitations

The present study has several strengths and limitations. Thanks to the relatively large sample of recruited Egyptian and Japanese civil workers, there was no problem with the statistical power for the gender- and country-specific analyses in the current study. Also, the participants were working in a wide range of public occupational sectors, rather than one-company samples. In addition, we did not assess the targeted variable (W_F-Cs) via a simple question; to the contrary, we used an expanded validated questionnaire that was widely used internationally and in both populations. Regarding the limitations, the cross-sectional design, the convenience sampling, and the self-reported data could have introduced some sorts of time-lead, selection, and misclassification bias. Thus, the causal inference and the generalizability of the results to the whole working population; nevertheless, those in the private enterprise are not possible.

Conclusions

The prevalence and the factors related to W_F-Cs and self-rated health varied by gender among the Japanese and Egyptian civil workers. However, the robust associations between W_F-Cs and poor self-rated health were evident for both countries' civil workers of both genders. Our findings suggest that governmental measures are required to improve the working environment of both the Japanese and Egyptian civil workers to prevent work-family role conflicts from adding to their risk of poor health status. More family social interactions are suggested to the Japanese workers. While more flexible work arrangements should be targeting the highly-educated Egyptian civil workers.

Declarations

Ethics approval: According to the declaration of Helsinki, the ethical review board in Osaka University has also approved this cross-cultural study (approval no 19501).

Consent to participate: All participants provided written informed consent.

Consent for publication: Not applicable.

Availability of data and material: Data are available upon reasonable request to the corresponding author.

Competing interests: None for all authors.

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Authors' contribution: For the Egyptian survey, AOK, EES, MEM, IH, YH, MES, GER, BS, ESA, and HEE participated in data curation, investigation, and acquisition. For the Japanese data, YH participated in data curation, investigation, and acquisition. EES, IH, YH, and BS participated in fund acquisition and research design. EES analyzed the data. EES, AOK, and HEE drafted the manuscript. MEM, IH, YH, MES, GER, BS, ESA, and EAS provided a critical review of the research article.

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