

# Work-to-family conflict rather than family-to-work conflict is more strongly associated with sleep disorders in Upper Egypt

Ehab Salah ESHAK<sup>1,2</sup>

<sup>1</sup>Department of Public Health and Preventive Medicine, Faculty of Medicine, Minia University, Egypt

<sup>2</sup>Public Health, Department of Social Medicine, Graduate School of Medicine, Osaka University, Japan

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**Abstract:** An important factor for which work and family compete is time. Due to lack of evidence, I investigated the associations between work-family conflict (assessed by the National Study of Midlife Development in the US) and sleep disorders (assessed by the Jenkins Sleep Questionnaire) in a cross-sectional study included 1,021 Egyptians aged 18–59 yr. Both work-to-family conflict (WFC) and family-to-work conflict (FWC) were associated with reduced sleep quantity. Moreover, high WFC was associated with sleep disorders; the multivariable ORs (95% CIs) were 2.32 (1.63–3.30) in high versus low WFC, 1.09 (0.79–1.49) in high versus low FWC and 2.41 (1.52–3.83) in high both WFC and FWC vs. low both WFC and FWC. Waking up too early with inability to fall asleep again and waking up tired after the usual amount of sleep were the most common sleep disturbances with high WFC; while insignificant increased risks for waking up several times per night and waking up tired after the usual amount of sleep were observed with high FWC. The study findings suggest the need for occupational and social health promotion programs to help men and women in labor force reach a balanced interaction between work and family life in order to reduce sleep complaints.

**Key words:** Work-family conflict, Sleep quantity, Sleep quality, Egypt

## Introduction

The sum of working and sleeping hours constitutes almost two thirds of the day for normal individuals. However, these two domains; work and sleep hours are most of the times competing, and thus can affect the individuals' health<sup>1, 2</sup>. Evidence from previous research that used the Job Demands-Resources (JD-R) model as a theoretical framework<sup>3</sup> has linked several work attributes such as job strain, stress and demands, night shifts and long working

hours to various sleep disorders<sup>4–7</sup>. On the other hand, the multiple role model theory with several family responsibilities has also been linked to sleep disturbances<sup>7, 8</sup>.

The boundary theory<sup>9</sup> in our proposed theoretical framework describes another example of daily competition between family and work demands in what is known as work-family conflict. This type of conflict is bidirectional; when work infringed on the rights of the family, work-to-family conflict (WFC) arises, while family-to-work conflict (FWC) arises when family responsibilities affect one's job demands<sup>10</sup>. Interestingly, an important factor for which work and family are competing is time<sup>8, 10</sup>. Prior research has suggested that individuals with high work-family conflict might have to reduce their sleep hours to compensate<sup>8, 11</sup>. Accordingly, it seems that work demands,

To whom correspondence should be addressed.

E-mail: ehab@pbhel.med.osaka-u.ac.jp

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family demands and the need to sleep are all interacting in a competitive manner towards the physical and mental health of the individuals<sup>10, 12</sup>.

Several published research articles have pointed to the associations of work-family conflict with sleep quantity and quality in Western and Asian employees and general populations<sup>1-7, 11</sup>. Yet, none has been conducted in the Middle East or Africa, in particular, Egypt.

Recently, Egypt has adopted an economic reform policy that started with floating the Egyptian currency in a move that has reduced its value by almost 50% against the dollar<sup>13</sup>. Meanwhile, according to data of the last Egyptian census, both the unemployment and divorce rates had increased<sup>14</sup>, suggesting a socioeconomic stress that accompanies the ongoing economic reform. With such a stress, the energy, behavior and most importantly the time competition between work and family seems unavoidable; with times for sleep, exercise, recreation, and hobbies appear as sources of compensation to maintain the work/family time balance<sup>8</sup>.

Therefore, the author thought to examine the cross-sectional associations of work-family conflict with quantity and quality of sleep among residents of Upper Egypt hypothesizing that both WFC and FWC might associate with sleep disorders. According to a conceptual model based on the hypothesis that time for work may be less flexible than non-work times<sup>8, 11</sup>, the author expected a stronger association of WFC, rather than FWC with sleep disorders. In this conceptual model, the financial strain from the currently ongoing economic reform might have forced Egyptians to dedicate more time for work in order to be able not only to face the financial inflation and fulfill their families' financial responsibilities, but also to keep their job secured. Nevertheless, the high unemployment rate and increased daily life cost after the elimination of fuel subsidies in 2018; while salaries remained constant between 2014–2018<sup>15</sup>.

## Subjects and Methods

### *Study subjects and design*

This cross-sectional study encompasses 1,201 men and women aged 18–59 yr from residents of a randomly chosen district of the nine districts of Minia governorates; Minia city and its affiliated rural areas. The sample was recruited by house to house visits via a systematic random sample technique after considering the real distribution of residency as urban/rural. Details of the study protocol and methods of data collection were given previously<sup>16</sup>. In

brief, between June–July, 2017, a total of 1,200 residents were invited to fill in their sociodemographic characteristics, personal habits and medical histories via a self-administered questionnaire. The final sample size reached 1,021 subjects after the exclusion of 179 subjects who refused to participate or were with histories of chronic diseases that could affect life quality or sleep quality and quantity.

### *Work-family conflict*

The eight items of the National Study of Midlife Development in the United States were used to assess both WFC and FWC<sup>17</sup>. This tool uses a three scale assessment for each item (0=never, 1=to some extent, 2=often). The first four items measured the WFC as follows (i) “Your job takes so much energy; so, you do not feel up to doing things that need attention at home”; (ii) “Your job reduces the amount of time you can spend with the family”; (iii) “Your work involves a lot of travel away from home”; (iv) “Problems at work make you irritable at home”. The remaining four items assessed FWC and were (v) “Family worries about problems distract you from your work”; (vi) “Family obligations reduce the time you need to relax or be yourself”; (vii) “Family activities stop you getting the amount of sleep you need to do your job well”; and (viii) “Family matters reduce the time you can devote to your job”.

The total sum scores of the four items for WFC and FWC ranged from 0 to 8 was stratified by the median value of each sum score (3 for WFC and 2 for FWC) into low and high WFC and FWC categories, respectively. Moreover, the author cross-matched the low/high WFC and FWC categories into the following groups (i) low WFC and low FWC; (ii) high WFC and low FWC; (iii) low WFC and high FWC; and, (iv) high WFC and high FWC and this four categorical variable represents the work-family conflict measure mentioned later on in this article. The internal consistency of the questionnaire was 0.78; 0.77 for WFC items and 0.79 for FWC items by Cronbach's alpha test.

### *Sleep duration and disorders*

Data on self-reported sleep duration, frequency and duration of napping were collected. The sleep disturbances over the preceding month were measured with the four items of the Jenkins Sleep Questionnaire (JSQ)<sup>18</sup>. The questionnaire assessed the sleep quality on basis of having any of the following four sleep disorders: 1- difficulties falling asleep, 2- difficulties staying asleep by waking up several times per night, 3- having the experience of

waking up too early or 4- feeling tired after the usual amount of sleep. The response for each item was rated on a 6-point scale (1=not at all, 2=1 to 3 d, 3=4 to 7 d, 4=8 to 14 d, 5=15 to 21 d, 6=22 to 28 d). On light of previous research<sup>19, 20)</sup> and the Diagnostic and Statistical Manual of Mental Disorder, Fourth Edition, Text Revision (DSM-IV-TR) which required the presence of difficulties in initiating, maintaining, or restoring sleep for at least three nights per week within 4 wk at minimal<sup>21)</sup>, I created a dichotomous index for sleep disorders (1=any of the above-mentioned four sleep disturbances occurred  $\geq 15$  nights during the previous month, and 0=none of the previous disturbances lasted for  $>15$  nights).

#### *Other covariates*

Data on age, sex, residence, marital status, smoking habits, education, employment status, occupation, shift of work, working hours, monthly income, frequency and duration of napping, and histories of diabetes mellitus and hypertension were collected. Weight in light clothing and height in stocking feet were also measured by calibrated digital scales. Body mass index as weight in kg divided by the square of height in m<sup>2</sup> was then calculated.

#### *Statistical analysis*

Among subjects with and without sleep disorders, the levels of perceived WFC and FWC and other participants' characteristics were compared. The  $\chi^2$  test was used to compare the significance of differences in these proportions. The main analyses were conducted by the use of the multiple linear regression models that assessed the sleep duration by one point increment in each of the WFC and FWC scores, and the logistic regression model that assessed the relationship of WFC, FWC, and work-family conflict with sleep disorders in crude and multivariate models. The multivariable-adjusted analyses controlled for age, sex, residence, marital status, education, occupation, shift of work, working hours, monthly income, frequency and duration of napping, body mass index, smoking habit and histories of hypertension and diabetes. The SPSS version 22 software were used for data analysis.

#### *Ethical consideration*

The study protocol was in accordance with the Helsinki declaration and was approved by the research ethics committee of Minia University. All participants gave verbal consent to participate.

## **Results**

Among 1,021 Upper Egyptians residents participated in this study, the proportion of subjects who had sleep disorders within the last month was 39.0% (398 subjects). Of whom, 46.7% had high WFC, 50.8% had high FWC, 28.2% had high levels of both WFC and FWC.

Table 1 shows that subjects with sleep disorders when compared with those without sleep disorders were more likely to be younger, never smoked, urban residents, diabetic and hypertensive patients, educated to university level or more, doing office work, mostly day shift and rotatory work, and with low income. Considerable proportions of the subjects with sleep disorders were divorced or widowed, while none of those without sleep disorders were as so. The proportion of subjects with high WFC and FWC were larger in the group of sleep disorders; 55.3% and 58.8% respectively than in the group without sleep disorders; 41.3% and 53.5% respectively. Moreover, while one third of the subjects with sleep disorders were suffering from high WFC and high FWC, only one fourth of the participants without sleep disorders experienced the same high conflicts levels.

One point increment in WFC and FWC scores were associated with 12 (20% of an hour) and 7 (11% of an hour) minutes reduction in the self-reported amount of sleep, respectively (Table 2).

Table 3 shows significant positive associations between high levels of WFC but not FWC with the likelihood of having sleep disorders. Controlling for the participants' characteristics and other sleep associated factors did not change the associations materially. The multivariable ORs (95% CIs) for the likelihood of having sleep disorders were 2.32 (1.63–3.30) for high vs. low WFC and 1.09 (0.79–1.49) for high vs. low FWC. Using the group of participants with low WFC low FWC as our reference group; the multivariable-adjusted ORs (95% CIs) for sleep disorders were 2.70 (1.62–4.49) for the group with high WFC low FWC, 1.17 (0.74–1.84) for the group with low WFC high FWC, and 2.41 (1.52–3.83) for the group with high WFC high FWC.

Examining the associations between work-family conflict and each of the four sleep disturbances of the JSQ revealed that WFC was associated with both waking up too early with difficulty to fall asleep again and waking up tired after the usual amount of sleep. No significant association between work-family conflict and waking up several times per night was detected, and because of the small number of cases reported having difficulty falling

**Table 1. Participants' demographic and work-family conflict characteristics according to sleep disorders**

Characteristic	Participants with sleep disorders		Participants without sleep disorders		<i>p</i> value <sup>a</sup>
	N=398	%=39.0	N=623	%=61.0	
Work-to-family conflict					
Low	178	44.7	366	58.7	<0.0001
High	220	55.3	257	41.3	
Family-to-work conflict					
Low	164	41.2	290	46.5	0.04
High	234	58.8	333	53.5	
Work-family conflict					
Low WFC and low FWC	79	19.8	186	29.9	<0.0001
High WFC and low FWC	85	21.4	104	16.7	
Low WFC and high FWC	99	24.9	180	28.8	
High WFC and high FWC	135	33.9	153	24.6	
Age					
<30	120	30.2	98	15.7	<0.0001
30–39	84	21.1	222	35.6	
40–49	73	18.3	39	6.3	
≥50	121	30.4	264	42.4	
Sex					
Male	148	37.2	234	37.6	0.48
Female	250	62.8	389	62.4	
Residence					
Urban	204	51.3	239	38.4	<0.0001
Rural	194	48.7	384	61.6	
Household income, EGP/ month					
<1,200	54	13.6	50	8.0	0.01
1,200–<5,000	201	50.5	353	56.7	
≥5,000	143	35.9	220	35.3	
Education					
Illiterate	86	21.6	98	15.7	<0.0001
Up to junior high school	87	21.9	186	29.9	
High school	36	9.0	154	24.7	
University or more	189	47.6	185	29.7	
Employment status					
Full-time governmental work	167	42.0	276	44.3	<0.0001
Part-time governmental work	29	7.3	42	6.7	
Full-time private work	20	5.0	102	16.4	
Part-time private work	182	45.7	203	32.6	
Occupation					
Office work	204	51.3	280	44.9	0.002
Unemployed	26	6.5	37	6.0	
Farmer	80	20.1	98	15.7	
Technical	35	8.8	65	10.4	
Manual	53	13.3	143	23.0	
Shift of work					
Day shift only	234	58.8	422	67.7	0.04
Night shift only	15	3.8	17	2.8	
Rotatory	149	37.4	184	29.5	
Working hours per day					
≤4	80	20.1	126	20.2	0.99
5–8	182	45.7	284	45.6	
≥9	136	34.2	213	34.2	

**Table 1. continued**

Characteristic	Participants with sleep disorders		Participants without sleep disorders		<i>p</i> value <sup>a</sup>
	N=398	%=39.0	N=623	%=61.0	
Napping for $\geq 1$ h/d					
Never	244	61.3	390	62.7	0.98
<3 d/wk	50	12.5	74	11.9	
3–5 d/wk	82	20.7	125	20.1	
Everyday	22	5.5	34	5.3	
Body mass index $\geq 25$ kg/m <sup>2</sup>	155	39.1%	236	37.9%	0.18
Marital status					
Married	338	84.9	523	83.9	<0.0001
Single	22	5.5	100	16.1	
Divorced	16	4.1	0	0	
Widow	22	5.5	0	0	
Smoking habit					
Never smoker	260	65.3	285	45.7	<0.0001
Ex-smoker	10	2.5	72	11.6	
Current smoker	128	32.2	266	42.7	
History of diabetes mellitus					
Yes	48	12.1	34	5.5	<0.0001
No	350	87.9	589	94.5	
History of hypertension					
Yes	52	13.1	51	8.2	0.01
No	346	86.9	572	91.8	

<sup>a</sup>*p* value for  $\chi^2$  test. WFC: work-to-family; FWC: family-to-work.

**Table 2. Hierarchical linear regression analysis for sleep hours by one point increment in work-to-family conflict and family-to-work conflict scores**

	B (95% CI)	Standardized beta	<i>p</i> -value	Part correlation	Partial correlation
Work-to-Family conflict score					
Simple model	−0.21 (−0.26, −0.16)	−0.24	<0.0001	−0.24	−0.24
Multivariate model <sup>a</sup>	−0.20 (−0.25, −0.14)	−0.23	<0.0001	−0.21	−0.23
Family-to-Work conflict score					
Simple model	−0.08 (−0.13, −0.04)	−0.08	<0.0001	−0.11	−0.11
Multivariate model <sup>a</sup>	−0.11 (−0.15, −0.06)	−0.14	<0.0001	−0.13	−0.14

<sup>a</sup>Multivariable model was adjusted for age residence, sex, marital status, monthly income, education, occupation, shift of work, working hours, body mass index, frequency and duration of napping, smoking habit, history of diabetes mellitus and history of hypertension.

R<sup>2</sup> for the model included WFC=0.24 without controlling for any other factors, and R<sup>2</sup> after adding for the above mentioned confounding factors=0.46.

R<sup>2</sup> for the model included FWC=0.11 without controlling for any other factors, and R<sup>2</sup> after adding for the above mentioned confounding factors=0.43.

asleep within the WFC group, there were no enough power to generate an estimate for this item (Table 4). There were increased risks of waking up several times per night and waking up tired with high levels of FWC; however, these associations did not reach any level of statistical significance.

## Discussion

This is the first study in the Middle East and Africa to investigate the associations between work-family conflict and sleep disorders. Findings among 1,021 Egyptian men and women showed higher likelihood of sleep disorders in participants with high levels of work-family conflict

**Table 3. Multivariate logistic regression analysis for the associations of work-to-family conflict, family-to-work conflict, and work-family conflict with sleep disorders**

	Participants with sleep disorders cases, n (%)	Crude OR (95%CI)	Multivariable OR (95% CI)*
Work-to-family conflict			
Low	198 (44.8)	1.00 (reference)	1.00 (reference)
High	220 (55.2)	1.76 (1.37–2.27)	2.32 (1.63–3.30)
Family-to-work conflict			
Low	164 (41.2)	1.00 (reference)	1.00 (reference)
High	234 (58.8)	1.24 (0.96–1.60)	1.09 (0.79–1.49)
Work-family conflict			
Low WFC and low FWC	79 (19.9)	1.00 (reference)	1.00 (reference)
High WFC and low FWC	85 (21.4)	1.92 (1.30–2.84)	2.70 (1.62–4.49)
Low WFC and high FWC	99 (24.8)	1.30 (0.90–1.86)	1.17 (0.74–1.84)
High WFC and high FWC	135 (33.9)	2.08 (1.46–2.95)	2.41 (1.52–3.83)

WFC: work-to-family; FWC: family-to-work.

\*Adjusted for age, residence, sex, marital status, monthly income, education, occupation, shift of work, working hours, body mass index, frequency and duration of napping, smoking habit, history of diabetes mellitus and history of hypertension.

**Table 4. Multivariate logistic regression analysis\* for the associations of work-to-family conflict, family-to-work conflict, and work-family conflict with individual sleep disturbances**

	Having trouble falling asleep <sup>b</sup>	Wake up several times per night <sup>c</sup>	Wake up too early and can't fall asleep again <sup>d</sup>	Wake up tired after usual amount of sleep <sup>e</sup>
Work-to-family conflict				
Low	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)
High	-----	0.63 (0.32–1.22)	3.52 (2.16–5.74)	2.04 (1.32–3.15)
Family-to-work conflict				
Low	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)
High	-----	1.71 (0.95–3.09)	0.92 (0.62–1.38)	1.38 (0.94–2.03)
Work-family conflict				
Low WFC and low FWC	1.00 (reference)	1.00 (reference)	1.00 (reference)	1.00 (reference)
High WFC and low FWC	-----	0.44 (0.17–1.14)	3.01 (1.59–5.73)	2.57 (1.36–4.86)
Low WFC and high FWC	-----	1.34 (0.61–2.97)	0.68 (0.34–1.34)	1.59 (0.95–2.68)
High WFC and high FWC	-----	1.03 (0.44–2.43)	2.89 (1.56–5.34)	2.65 (1.50–4.67)

WFC: work-to-family; FWC: family-to-work.

\*Adjusted for age, residence, sex, marital status, monthly income, education, occupation, shift of work, working hours, body mass index, frequency and duration of napping, smoking habit, history of diabetes mellitus and history of hypertension.

<sup>b</sup>The number of cases having trouble falling asleep were 22 in low WFC versus 35 in high WFC; 14 in low FWC versus 43 in high FWC; and 4, 10, 18 and 25 in low WFC low FWC, high WFC low FWC, Low WFC high FWC and High WFC high FWC groups respectively.

<sup>c</sup>The respective numbers for waking up several times per night were 50 in low WFC versus 56 in high WFC; 37 in low FWC versus 69 in high FWC; and 19, 18, 31 and 38 in low WFC low FWC, high WFC low FWC, Low WFC high FWC and High WFC high FWC groups respectively.

<sup>d</sup>Those who wake up too early were 65 in low WFC versus 100 in high WFC; 75 in low FWC versus 90 in high FWC; and 34, 41, 31 and 59 in low WFC low FWC, high WFC low FWC, Low WFC high FWC and High WFC high FWC groups respectively.

<sup>e</sup>The respective numbers for those who wake up tired were 129 in low WFC versus 141 in high WFC; 105 in low FWC versus 165 in high FWC; and 54, 51, 75 and 90 in low WFC low FWC, high WFC low FWC, Low WFC high FWC and High WFC high FWC groups respectively.

irrespective to other factors. The associations were robust for WFC where its high levels were associated with 2.32 increased odds for sleep disorders; mainly odds for waking up to early with inability to fall asleep again (OR=3.52) and waking up tired after usual amount of sleep (OR=2.04).

On the other hand, FWC was associated with insignificant 71% and 38% increased odds for waking up several times per night and waking up tired after the usual amount of sleep, respectively.

Both the quantity and quality of sleep are important pre-



requisites for human functioning<sup>22)</sup>. Our findings confirm those from previous research in other populations; Americans<sup>4, 8, 11)</sup>, Europeans<sup>1, 23)</sup>, Japanese<sup>7)</sup> and Malaysians<sup>2)</sup> Asians.

The self-reported duration of sleep was significantly shorter in participants with high vs. low work-family conflict in the current study. Although, the calculated 12 and 7 min reduction in sleep duration could seem lacking clinical meanings in health perspectives; however, we should point here that these calculated minutes of sleep loss were for one point increment in WFC and FWC scores respectively, which range from 0 to 8. Thus, a person with 5 points higher in the WFC could suffer an hour shorter sleep, irrespective to other factors.

The stronger association between WFC rather than FWC with sleep disorders in the current study has also been reported among 799 US employee where WFC was associated with shorter nighttime sleep duration, less sleep sufficiency, more insomnia symptoms and poorer sleep quality; whereas workers with high FWC exhibited more consistency in their wake time, a “rigid” wake time routine<sup>11)</sup>. The exact reasons for these different associations of WFC and FWC with different sleep disorders are not clear. However, having specific family demands such as childcare responsibilities might contribute to the increased likelihood of waking up several times per night to give care to children and thus waking up tired.

Strengths to be mentioned in the current study are the community-based design, relatively large sample size, and incorporation of variant sleep indicators such as the self-reported sleep duration and the JSQ-sassed different types of sleep quality disorders. Moreover, besides the adjustment for demographic, financial and social attributes, the author has controlled for various factors that have been shown to be associated with sleep disturbances. For examples, for job characteristics<sup>1, 2, 5)</sup>, the author controlled for type and shift of work and working hours; for health status<sup>24)</sup>, not only did the author exclude subjects with chronic diseases, but also he adjusted for the medical history of diabetes or hypertension which were shown to associated with both family-work conflict and sleep disorders<sup>16, 25, 26)</sup>; for obesity<sup>27)</sup>, adjustment was made for body mass index; and for nap episodes<sup>11)</sup>, further adjustment for frequency and duration of napping was conducted.

On the other hand, besides its cross-sectional design, limitations of the current study include the inability to use actigraphs-measured sleep quality and quantity, due to limited resources. However, our results are consistent with findings from actigraphs-based studies<sup>11)</sup>, and we used one

of the commonest self-report scales that measure sleep disorders; the JQS which has been shown as a valid organizational Psychology instrument to conduct field studies on sleep<sup>28)</sup>. Last, we have not collected data on physical activity, a factor that was associated with sleep disturbances<sup>27)</sup>; however, the adjustment for the different occupations as farmers, technical, manual and office work might have partially expressed the level of physical activity.

In conclusion, work-family conflict was associated with unfavorable sleep quantity and quality among residents of Upper Egypt. Our study has important public health implications including, as sleep disorders appeared prevalent among residents of Upper Egypt and were strongly related to WFC, occupational and social health promotion programs are needed to help Egyptians in labor force reach a balanced interaction between work and family life in order to cope with psychosocial stress and to reduce sleep complaints and the subsequent risk of chronic diseases attributable to poor sleep. Another worth-mentioned implication is the need for health education program to enlighten employees about the effects of poor sleep on attitudes, behaviors and productivity at both work and family. Low work performance, and increased family violence are perhaps the most salient among these effects. However, further longitudinal research is needed to confirm these associations and to explore its possible mechanisms and consequences.

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## Conflict of Interests

The author declares that has no conflict of interest.

## Data Availability Statement

Data are available up one request from the corresponding author.

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