

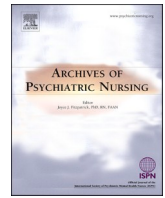


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## Psychiatric distress in family caregivers of patients with COVID-19

Mehdi Jafari-Oori<sup>a</sup>, Abbas Ebadi<sup>b</sup>, Seyyed Tayeb Moradian<sup>a</sup>, Mojtaba Jafari<sup>c</sup>, Manijeh Dehi<sup>d,\*</sup>, Fatemeh Ghasemi Fard<sup>e</sup><sup>a</sup> Atherosclerosis research center, Faculty of Nursing, Baqiyatallah University of Medical Sciences, Tehran, Iran<sup>b</sup> Behavioral Sciences Research Center, Life Style Institute, Faculty of Nursing, Baqiyatallah University of Medical Sciences, Tehran, Iran<sup>c</sup> Faculty of Nursing, Bam University of Medical Sciences, Bam, Iran<sup>d</sup> Department of Nursing, Maragheh University of Medical Sciences, Maragheh, Iran<sup>e</sup> Occupational therapy department, University of Social Welfare and Rehabilitation Sciences, Tehran, Iran

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## ABSTRACT

**Purpose:** Many COVID-19 patients with low to moderate disease severity were cared for at home by family members. Caring for relatives with COVID-19 could have a psychiatric disorder for informal caregivers. Therefore, this study aimed to investigate the psychiatric disorders of family caregivers of relatives with COVID-19, in Iran.

**Methods:** This online survey was conducted with 350 family caregivers over 18 years from April to July 2020, which was guided by the STROBE checklist. The study survey consisted of socio-demographic items, 7-items fear of COVID-19 scale, and a 21-item version of the depression, anxiety, and stress scales.

**Results:** The mean (standard deviation) scores for depression, anxiety, and stress were 20 (0.40), 19.52 (0.39), and 19.72 (0.35), respectively, moreover for fear of COVID-19 was 20.33 (0.43). Of all family caregivers, 77.75%, 75%, and 80% had depression, anxiety, and stress, respectively. Sixty-nine percent of caregivers had fear with moderate to high severity. Being younger, married, having a health-related occupation, not exercising, and high monthly salary were significant predictors of the total score of depression, anxiety, and stress scale ( $P < 0.05$ ). Further, being married, having a health-related occupation, and not exercising, having comorbidity, high income, and being younger were independent predictors of fear of COVID-19 ( $P < 0.05$ ). Only 32% and 33% of the variance of total depression, anxiety, and stress, and fear of COVID-19 scores were predicted by the studied variables ( $p < 0.001$ ).

**Conclusion:** Our study demonstrated the high prevalence of psychiatric disorders in family caregivers, which requires swift and comprehensive attention from authorities.

## Introduction

First cases of COVID-19 disease were seen in China in December 2019 and was declared as a pandemic on March 11, 2020 (Tso & Park, 2020). Many experts have predicted that the pandemic will have a deep and long-lasting impact on public mental health around the world (Holmes et al., 2020). In Iran, the virus was spreading rapidly and by March 2020 had an extent to a total of 31 provinces (Raooofi et al., 2020). The hospitals were filled with COVID-19 patients, and many not critically infected patients, who had no underlying disease, took care by family caregivers (FCs) at home (Raooofi et al., 2020). Then the outbreak, which the world has not seen for more than a century, has become a public health issue and caused an international economic challenge so

that countries decided to quarantine their citizens (Dubey et al., 2020).

There has been no specific treatment for COVID-19 and the patients receive just supportive and symptomatic therapy (Chen et al., 2020). At peak times of the epidemic, severe COVID-19 patients need to be hospitalized. Patients without underlying disease and with mild to moderate severity COVID-19 disease are recommended to be cared for at home by informal caregivers (WHO, 2020; Y. H. Wu et al., 2020).

Informal caregivers are typically family members or close acquaintances who voluntarily care for patients at home (Rosell-Murphy et al., 2014). They bear the burden of complex care and treatment alone (Reinhard, 2019). Caring for patients at home reduces the burden of caring for health care workers (HCWs) (Dixe et al., 2019).

Crowded hospitals, lack of personal protective equipment (PPE) in

\* Corresponding author.

E-mail address: [manigehdehister@gmail.com](mailto:manigehdehister@gmail.com) (M. Dehi).<https://doi.org/10.1016/j.apnu.2021.07.005>

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the early days of the epidemic, lack of treatment and vaccines, high hospitalization costs, and high mortality have pushed heavy psychiatric disorder on both HCWs and FCs globally (Pung et al., 2020; Chew et al., 2020; Gallagher & Wetherell, 2020; Pappa et al., 2020).

A review of the literature indicated that only one study qualitatively explored the experience of FCs of relatives with COVID-19 and suggested the importance of evaluating the mental health of FCs with a quantitative study (Y. H. Wu et al., 2020). FCs face many challenges such as unmet needs, unpleasant physical, psychiatric, and social during caring for their COVID-19 relatives (Y. H. Wu et al., 2020).

To date, most studies have examined the mental health of HCWs, patients, or FCs of non-COVID-19 patients. For example, HCWs suffered from a high rate of depression during the COVID-19 pandemic (Gallagher & Wetherell, 2020; Pappa et al., 2020). Also, FCs of non-COVID-19 patients endured many mental disorders such as anxiety, depression, anger, fear, guilt, irritability (Gallagher & Wetherell, 2020). They have the least opportunity to rest, take care of themselves, or go to work or the community (Czeisler et al., 2020). Because caring for relatives with COVID-19 at home can be a major threat to mental health, and to date, not any study has assessed the degree of psychiatric disorder of FCs, then the present study aimed to investigate the mental health of FCs of COVID-19 patients.

## Methods

### Study design and participants

This online cross-sectional survey was conducted using the STROBE checklist from April to July 2020 in Iran. The respondents were FCs who had the experience of caregiving of relatives with COVID-19 at home, in Iran. Out of 500 caregivers who viewed the survey by the invited link, 350 FCs were entered into the study using convenience sampling. They volunteered to participate in the study by putting a checkmark to the “Yes” option to the item of “After reading the study objects, are you agree to participate in this study?”. All respondents answered the survey online. Inclusion criteria were having care experience of relatives with COVID-19, aged 18 years or over, and having the ability to answer the survey. Disease severity was considered as an exclusion criterion of the study. As severe cases need to be hospitalized and received specialized care.

### Procedure

An electronic file of the study survey was created and used by social media and websites its link distributed generally. The anonymity was fully considered, and no identifying information such as name, contact information, and IP address was requested. The average time consumed by participants in the response to the survey was 10 min.

### Measures

The survey consisted of three sub-parts including demographic and general data, DASS21, and The 7-items Fear of COVID-19 Scale (FCV-19S). The demographic and general part of the survey was about gender, age, education level, marital status, having child, city, occupation type, being infected with the COVID-19, exercising, smoking a cigarette, drinking alcohol, taking hypnotics medicine, daily sleep quality, comorbidity, and income. We used the 21-item version of the Depression Anxiety Stress Scales (DASS-21) for appraising of the mental health over the past week (Lovibond & Lovibond, 1995; Taouk et al., 2001). Each sub-scale has seven items. Each item is scored low (score = 0), medium (1), high(2), and very high(3), and the final score in each sub-scale is obtained from the sum of the scores of items, which the high score indicated further mental health disorder (Lovibond & Lovibond, 1995). A study by Asghari et al. indicated that the Persian version of the DASS-21 has significant Pearson correlations with BDI and FSAQ ( $p <$

$<0.0011$ ), with Cronbach alpha of 0.94 and ICC of 95% (Pezirkianidis et al., 2018).

The 7-items Fear of COVID-19 Scale (FCV-19S) with robust psychometric properties (Concurrent validity = 0.51,  $\alpha = 0.82$ , and ICC = 0.72) was designed by Ahorsu et al. for Iranian general people (Ahorsu et al., 2020). Each item was scored on a five-point Likert-type scale. The least score for each item is one, and the maximum is five. A total score is estimated by summing each item score (ranging from seven to 35). A higher score indicates a greater fear of the coronavirus.

### Statistical analysis

The mean, standard error (SE), and frequency were used to describe the characteristics of the samples and the score of the main variables. The one-sample Kolmogorov-Smirnov test was performed to check the normality of data distribution and the result showed normal distribution of data ( $p > 0.05$ ). Univariate analysis methods such as *t*-test and ANOVA were used to assess the different scores of the main variables based on the demographic data. The Scheffe test was used for post hoc tests. Additionally, the multivariate linear regression method was used to determine the predictors of participants' psychiatric disorders.

### Ethics

The ethics committee of Baqiyatallah University of Medical Sciences (BUMS) approved the proposal of the study (Ethics Code: IR.BMSU.REC.13990.082). All samples participated in the study with consent. The authors of the study also committed that they have not done any plagiarism, fabrication of data, falsification, and repeated publication of findings.

## Results

### Participant characteristics

Out of 350 FCs, 54.57% were female, 54.86% were in the age range of 21–40 years old, 66.29% were married, 48% had a health-related occupation, 38.86% were infected with COVID-19, 45% did exercise daily, 8.86% and 30.66% consumed anti-stress and hypnotics medication, respectively, 20% suffered from comorbidity, and finally 5.7% and 14.29% were drinking alcohol and smoking cigarettes, respectively. Out of all FCs, 32%, 35%, and 30% of participants always suffered from depression, anxiety, and stress, respectively and 7.32% of them were with very high FCV. Other Characteristics of the FCs are presented in Table 1.

### Mental health

#### Depression, anxiety, stress, and FCV

According to Table 2, the mean (SE) of depression, anxiety, and stress scores were 20 (0.40), 19.52 (0.39), and 19.72 (0.35), respectively. Based on the cut-off scores provided by Lovibond and Lovibond (1995a), of all subjects, 77.75%, 75%, and 80% had depression, anxiety, and stress, respectively. The mean (SE) score of FCV-19 was 20.33 (0.43).

#### Difference of DAS, and FCV-19 scores based on sociodemographic variables

The results of the univariate analysis of psychiatric disorders of all FCs were indicated in Table 3. Being younger and married, having a child and health-related occupation, not being infected with COVID-19, not taking exercise, taking anti-anxiety medications, poor sleep, having comorbidity, and high income were associated with higher DAS, and FCV-19 scores ( $P < 0.05$ ). The posthoc Scheffe test revealed that the subjects younger than 20 years had significantly higher DAS and FCV scores compared to other groups ( $P < 0.05$ ). In addition, the married participants had higher DAS and FCV scores than the single group. Moreover, the never-married group was in more DAS and FCV severity

**Table 1**  
Demographic characteristics of the study sample (n = 350).

Variable		Freq.	Percent	
Gender	Male	159	45.43	
	female	191	54.57	
Age	<20	25	7.14	
	21–40	192	54.86	
	41–60	110	31.43	
	>60	23	6.57	
	Never married	112	32	
Marital status	Married	232	66.29	
	Divorced	2	0.57	
	Others	4	1.14	
	Having a child	197	43.71	
Having a child	No	153	56.29	
	City	155	44.29	
City	Tehran	36	10.29	
	Tabriz	10	2.86	
	Karaj	8	2.29	
	Kashan	31	8.86	
	Ardabil	8	2.29	
	Zanjan	15	4.29	
	Qazvin	11	3.14	
	Kurdistan	13	3.71	
	Isfahan	7	2	
	Bam	16	4.57	
	Gilan	4	1.14	
	Shiraz	20	5.71	
	Urmia	2	0.57	
	Mashhad	8	2.29	
	Golestan	2	0.57	
	Kerman	2	0.57	
	Hamadan	2	0.57	
	Ahvaz	168	48	
	Occupation	Related to the health	182	52.00
		Unrelated to the health	136	38.86
Being infected with COVID-19	Yes	214	61.14	
	No	157	44.86	
Exercising	Yes	193	55.14	
	No	50	14.29	
Smoking Cigarette	Yes	300	85.71	
	No	20	5.71	
Drinking Alcohol	Yes	330	94.29	
	No	31	8.86	
Taking anti-stress medications	Yes	319	91.14	
	No	139	39.71	
Daily Sleep quality	Good	211	60.29	
	Bad	107	30.66	
Taking hypnotics medication	Yes	242	69.34	
	No	70	20	
Comorbidity	Yes	280	80	
	No	66	18.86	
Income	0–2.5 m	73	20.86	
	2.6–5 m	111	31.71	
	5–7.5 m	100	28.57	
	≥7.6 m	34	9.75	
Depression	Sometimes	126	36	
	Often	112	32	
	Always	66	19	
Anxiety	Sometimes	102	29	
	Often	122	35	
	Always	40	11.46	
Stress	Sometimes	136	39	
	Often	105	30	
	Always	27	7.32	
FCV	Very high	102	29.27	
	High	112	32	
	Moderate			

compared to the divorced and the other groups ( $P < 0.05$ ). The group with the income between 5.1 and 7.5 million Tomans had higher DAS and FCV scores than the group with an income between 2.6 and 5 million Tomans ( $P < 0.05$ ). Gender, drinking, smoking, and using hypnotic medications had no significant association with FCV and DASS.

*Predictors of health and mental health status of FCs*

Being married, having a health-related occupation, not taking

**Table 2**  
Means and standard deviations (SD) for DASS-21 scales, the fear scales.

Variable	Mean	SD	Mean	Std. Err.	95% Conf. Interval
DASS	Total Score	37.84	1.13	35.60	40.07
	Depression	12.59	0.40	11.82	13.37
	Anxiety	12.52	0.39	11.74	13.30
	Stress	12.72	0.35	12.01	13.42
Fear	20.33	0.43	19.47	21.19	

exercise, having a high income, and being younger were independent predictors of higher DAS total score ( $P < 0.05$ ) ( $F = 180.07$  ( $p < 0.001$ ), R-squared = 0.34, Adj. R-squared = 0.32). Also, being married, having a health-related occupation, not taking exercise, having comorbidity, having a high income, and being younger independently predicted high FCV score ( $P < 0.05$ ) ( $F = 140.00$  ( $p < 0.001$ ), R-squared = 0.33, Adj. R-squared = 0.31) (Table 4).

For the depression subscale, being married ( $p < 0.001$ ), having a health-related occupation ( $p = 0.005$ ), not taking exercises ( $p < 0.001$ ), having a high income ( $p = 0.006$ ), and being younger ( $p < 0.001$ ) were predictors of high scores of depression. For the anxiety subscale, being married ( $p < 0.001$ ), having a health-related occupation ( $p = 0.001$ ), being infected with COVID-19 disease ( $p = 0.040$ ), not taking exercises ( $p < 0.001$ ), having comorbidity ( $p = 0.041$ ), having a high income ( $p = 0.035$ ), and being younger ( $p < 0.001$ ) were predictors of high anxiety scores. Finally, for the stress subscale, being married ( $p < 0.001$ ), having a health-related occupation ( $p = 0.014$ ), not taking exercises ( $p < 0.001$ ), having bad sleep ( $p = 0.025$ ), having a high income ( $p = 0.050$ ), and being younger ( $p < 0.001$ ) significantly predicted higher stress scores.

**Discussion**

Our study aimed to determine the mental health of FCs of relatives with COVID-19. Our study showed important data concerning the effect of the COVID-19 pandemic on the mental health of FCs. Most of the FCs of our study had depression, anxiety, and stress. Furthermore, more than half of them had moderate to very high levels of FCV. A recent study in Iran revealed that the high burden of FCs of COVID-19 patients can greatly endanger their mental health which could be an alarm for mental health policy-makers (Mirzaei et al., 2021). Additionally, our findings were in line with some studies conducted in the UK, US, and Italy. According to a study in Italy, FCs whose children had COVID-19 were more disposed to PTSS, anxiety, and depressive symptoms (Orsini et al., 2021). Another longitudinal study in the UK with data of 1349 caregivers and 6178 non-caregivers demonstrated that the rate of depression in FCs increased during the COVID-19 pandemic (21.6%) than pre-COVID-19 period (16.7%); similarly, for the non-FCs depression rate increased from 12.1% in the pre-COVID-19 period to 17.9% at COVID-19 pandemic, however, FCs had upper rates of depression than non-FCs (Gallagher & Wetherell, 2020). Furthermore, in the United States during COVID-19, FCs mostly suffered from declined mental health, increased stress, and lack of support (Lightfoot et al., 2021; Russell et al., 2020).

Some studies assess the mental health of formal caregivers, FCs of other patients, or the public. For example, Among the 95 FCs of depressed patients, 61.1%, 63.2%, 63% had severe depression, anxiety, stress, retrospectively (El-Bilsha, 2019); Of the 150 informal caregivers of patients living with HIV, the frequency of depression, anxiety, and stress was 46%, 27%, and 8% respectively (Khan et al., 2018). Further, in a study by Sandesh et al. (2020), most of HCWs suffered from DAS in Pakistan (Sandesh et al., 2020). Another study showed that among 1257 HCWs in China, 50.4%, 44.6%, 71.5% were with depression, anxiety and disorder symptoms, respectively (Lai et al., 2020). Also, In the initial period of the outbreak of COVID-19, 64.7%, 51.6%, and 41.2% of physicians in Turkey had depressive, anxiety, and stress symptoms,

**Table 3**  
Difference of DAS, and FCV-19 scores based on sociodemographic variables.

Variables	Categories	Nu	DASS									Fear		
			Depression			Anxiety			Stress			Mean (SD)	Test	P
			Mean (SD)	Test	P	Mean (SD)	Test	P	Mean (SD)	Test	P			
Gender	Male	159	12.46 (7.00)	-0.30	0.761	12.25 (6.93)	-0.61	0.534	12.34 (6.69)	-0.95	0.34	12.69 (7.70)	-1.51	0.13
	Female	191	12.7 (7.68)			12.74 (7.82)			13.03 (6.72)			14.00 (8.38)		
Age	<20 = g1	25	15.68 (4.32)	10.31	<.001 <sup>a</sup>	15.2 (4.19)	9.70	<.001 <sup>b</sup>	15.36 (3.96)	12.31	<.001 <sup>c</sup>	17.4 (5.83)	12.20	<.001 <sup>d</sup>
	21–40 = g2	192	13.86 (7.30)			13.77 (7.51)			14.04 (6.33)			14.90 (7.89)		
	41–60 = g3	110	10.8 (7.36)			10.92 (7.16)			10.92 (6.97)			11.11 (7.87)		
	>60 = g4	23	7.26 (6.29)			6.86 (6.47)			7.39 (6.29)			7.56 (7.33)		
Marital status	Not married = g1	112	15.05 (7.25)	35.36	<.001 <sup>e</sup>	14.58 (7.35)	41.58	<.001 <sup>f</sup>	15.50 (8.52)	28.51	<.001 <sup>g</sup>	15.77 (8.22)	28.51	<.001 <sup>h</sup>
	Married = g2	232	22.07 (6.12)			22.19 (5.93)			22.04 (5.25)			22.19 (6.85)		
	Divorced = g3	2	8.21 (3.82)			9.56 (1.41)			9.56 (1.12)			9.56 (1.32)		
	Others = g4	4	6.56 (2.56)			8.5 (1.22)			8.5 (1.29)			8.5 (1.14)		
Having a child	Yes	197	20.49 (7.21)	2.61	0.009	20.35 (7.56)	2.38	0.017	20.56 (6.61)	2.69	0.007	21.59 (8.26)	3.28	0.001
	No	153	18.43 (7.43)			18.45 (7.12)			18.63 (6.70)			18.74 (7.64)		
Having related Occupation	Yes	168	20.98 (6.60)	3.42	<0.001	21.03 (6.44)	3.72	<0.001	20.83 (6.03)	3.01	0.002	21.66 (6.52)	2.93	0.003
	No	182	18.31 (7.82)			18.13 (7.99)			18.69 (7.14)			19.13 (9.16)		
Being infected with COVID-19	Yes	136	18.16 (7.71)	-2.93	0.003	18.38 (7.51)	-2.29	0.022	18.18 (7.24)	-3.46	<0.001	18.57 (7.69)	-3.26	0.001
	No	214	20.50 (7.01)			20.24 (7.28)			20.69 (6.17)			21.45 (8.19)		
Exercising	Yes	157	16.23 (7.39)	8.42	<0.001	16.05 (7.29)	8.70	<0.001	16.50 (5.34)	8.93	<0.001	16.37 (7.58)	9.03	<0.001
	No	193	22.33 (6.13)			22.35 (6.25)			22.33 (5.35)			23.51 (7.06)		
Smoking Cigarette	Yes	50	20.98 (7.24)	1.43	0.152	20.78 (7.11)	1.29	0.197	20.74 (6.56)	1.16	0.246	22.00 (7.25)	1.57	0.116
	No	300	19.36 (7.38)			19.31 (7.41)			19.55 (6.73)			20.05 (8.22)		
Drinking Alcohol	Yes	20	19.95 (6.97)	0.22	0.825	19.45 (7.61)	-0.04	0.962	19.95 (6.00)	0.15	0.874	20.40 (7.35)	0.03	0.969
	No	330	19.57 (7.40)			19.53 (7.42)			19.70 (6.75)			20.32 (8.016)		
Anti-stress and anti-depressant medications	Yes	31	22.12 (6.81)	2.01	0.045	22.29 (6.60)	2.18	0.029	22.29 (5.88)	2.24	0.025	23.22 (7.26)	2.09	0.037
	No	319	19.35 (7.38)			19.25 (7.45)			19.47 (6.74)			20.04 (8.14)		
Daily Sleep quality	Yes	136	17.16 (7.17)	5.19	<0.001	16.97 (7.12)	5.43	<0.001	17.56 (6.53)	5.03	<0.001	17.38 (7.70)	5.68	<0.001
	No	210	21.19 (7.07)			21.20 (7.14)			21.13 (6.45)			22.24 (7.80)		
Taking hypnotics medication	Yes	105	20.19 (6.10)	1.03	0.301	20.02 (6.14)	0.85	0.392	20.02 (5.89)	0.60	0.547	20.53 (6.83)	0.315	0.752
	No	240	19.30 (7.87)			19.28 (7.93)			19.55 (7.04)			20.23 (8.63)		
Comorbidity	Yes	70	21.44 (7.03)	4.50	<0.001	21.72 (6.99)	5.37	<0.001	21.56 (6.72)	4.96	<0.001	22.76 (8.08)	5.48	<0.001
	No	280	17.98 (7.29)			17.60 (7.27)			18.11 (6.22)			18.16 (7.51)		
Income	<2.5 m = g1	66	18.57 (7.74)	3.40	0.018 <sup>i</sup>	18.37 (7.63)	2.94	0.033	18.81 (7.03)	3.20	0.023 <sup>j</sup>	19.32 (8.90)	2.18	0.090
	2.6–5 m = g2	73	17.82 (7.65)			17.97 (7.61)			18.09 (7.02)			18.76 (8.22)		
	5.1–7.5 m = g3	111	21.03 (6.83)			20.86 (6.87)			20.90 (6.24)			21.54 (7.28)		
	> 7.6 m = g4	100	19.97 (7.23)			19.93 (7.52)			20.18 (6.53)			20.78 (8.21)		

**a** = S g1&g4 = 8.41 (p = 0.001), g2&g4 = 6.60 (p = 0.001), g1&g3 = 4.88 (p = 0.023), g2&g3 = 3.06 (p value = 0.005); **b** = S g1&g4 = 8.33 (p = 0.001), g2&g4 = 6.90 (p < 0.001), g2&g3 = 2.84 (p = 0.012); **c** = S g1&g4 = 7.96 (p < .0001), g2&g4 = 6.65 (p < .0001), g1&g3 = 4.43 (p = .0022), g2&g3 = 3.11 (p < .0001); **d** = S g1&g4 = 9.83 (p = 0.001), g2&g4 = 7.22 (p = 0.001), g1&g3 = 6.28 (p = 0.004), g2&g3 = 3.67 (p = 0.002); **e** = g2&g1 = 7.01 (p value < 0.001), g3&g2 = 13.07 (p =

0.046),  $g4 \& g2 = 13.57$  ( $p = 0.001$ );  $f = g2 \& g1 = 7.61$  ( $p \text{ value} < 0.001$ ),  $g3 \& g2 = 13.19$  ( $p = 0.039$ ),  $g4 \& g2 = 13.69$  ( $p = 0.001$ ),  $g = g2 \& g1 = 6.53$  ( $p \text{ value} < 0.001$ ),  $g3 \& g2 = 13.54$  ( $p = 0.014$ ),  $g4 \& g2 = 13.54$  ( $p < 0.001$ );  $h = g2 \& g1 = 7.06$  ( $p \text{ value} < 0.001$ ),  $g4 \& g2 = 14.09$  ( $p = 0.002$ ),  $i = g3 \& g2 = 3.21$  ( $p = 0.038$ );  $j = g3 \& g2 = 2.81$  ( $p = 0.050$ ).

**Table 4**  
Hierarchical linear regression analysis predicting FCV and DASS.

Variable	DAS TOTAL SCORE					FCV						
	$\beta$	SE	t	P value	95% CI	$\beta$	SE	t	P value	95% CI		
Marital status	-11.10	1.91	5.81	0.000	7.34	14.87	3.47	0.74	4.68	0.000	2.01	4.94
Having child	1.89	2.44	0.78	0.438	-2.90	6.69	1.10	0.95	1.16	0.245	-0.76	2.97
Health-related occupation	5.97	1.89	3.16	0.002	2.25	9.69	1.96	0.73	2.68	0.008	0.52	3.41
Being infected with COVID-19	-3.09	2.16	-1.43	0.153	-7.34	1.15	-0.88	0.83	-1.06	0.290	-2.54	0.76
Exercising	-16.43	3.23	-5.09	0.000	-22.79	-10.08	-6.1	1.24	-4.90	0.000	-8.58	-3.66
taking anti-anxiety medications	-2.47	3.39	-0.73	0.468	-9.15	4.21	-0.63	1.31	-0.48	0.629	-3.22	1.94
Daily Sleep quality	5.59	3.14	1.78	0.076	-0.58	11.77	1.69	1.21	1.39	0.165	-0.70	4.08
Comorbidity	3.32	2.15	1.54	0.124	-0.91	7.57	1.61	0.83	1.93	0.054	-0.03	3.26
Income	1.77	0.87	2.02	0.045	0.04	3.50	0.49	0.34	1.46	0.145	-0.17	1.17
Age	-8.10	1.68	-4.81	0.000	-11.41	-4.79	-2.94	0.65	-4.53	0.000	-4.22	-1.66
_cons	71.00	6.51	10.89	0.000	58.18	83.82	24.89	2.52	9.87	0.000	19.93	29.85

SE = Standard error;  $\beta$  = Standardized beta coefficient; CI: Confidence Interval.

respectively (Elbay et al., 2020). Tso and Park in their online survey of psychiatric disorder in the community indicated that, from out of 432 general population, 50.4%, 28.1% and 59.6% had moderate or above levels for depression, anxiety, and stress, respectively (Tso & Park, 2020). During the previous epidemics, studies displayed similar results of a high prevalence of the psychiatric disorder in both HCWs and the general population (Chua et al., 2004; Lee et al., 2007; Lu et al., 2006; Maunder et al., 2003).

A comparison of the findings shows that the rate of mental disorders in different studies are close to each other, but the rate of psychiatric disorders in our study was high. A possible reason could be that family members in our study, unlike other studies, cared for a relative with COVID-19 and were in direct daily contact with the virus. Besides, the virus was novel with high morbidity and mortality, and with limited knowledge about the disease.

Our study indicated that being younger and married, having a child and health-related occupation, not being infected with COVID-19, not taking exercise, having poor night's sleep, taking anti-stress medications, having comorbidity and high monthly salary led to a high level of mental disorder in caregivers. As in line with our study, younger FCs, with high monthly income, in the anti-stress treatment regimen, were more likely to have psychiatric disorders (Cansel et al., 2021). However, contrary to the findings of our study, married or having a child (Elbay et al., 2020), being single or infected by COVID-19 (Cansel et al., 2021) have a direct correlation with high DAS disorder. Our findings did not show a significant relationship between gender and psychiatric disorder and males non-significantly had lower mean scores of DAS and FCV than females, which is consistent with the findings of a recent study (Paz et al., 2020). There were contrary findings related to gender and psychiatric disorder, for example in one study females had a lower psychiatric disorder (Cansel et al., 2021), while in other studies, there were no significant relationships between the DAS and FCV scores with gender (Mertens et al., 2020; Pezirkianidis et al., 2018). Also, There was no difference between smokers and non-smokers in terms of DAS score which is similar to another study (Cansel et al., 2021).

Our regression analysis showed that being younger and married, having a health-related occupation, not taking exercise, and having a high monthly salary were independent predictors of high DAS scores. Also, having comorbidity, being infected with COVID-19, and having poor sleep were predictors of anxiety and stress. In Elbay's study, being young, having a history of psychiatric disorder and working at the forefront were independent predictors of DAS scores in physicians (Elbay et al., 2020). FCs who had a health-related occupation suffered more from psychiatric disorders (Sandesh et al., 2020), which is in line with the findings of our study. Similar to our findings, exercising is a

significant predictor of mental health in people living in the community during the COVID-19 pandemic (Malesza & Kaczmarek, 2021; Paz et al., 2020). In another study that assessed the psychiatric impact of SARS outbreaks on HCWs, younger caregivers of the SARS wards were more likely to have symptoms of PTSD (P. Wu et al., 2009). In the prevalence of SARS, being single was associated with high symptoms of depression in hospital staff (Liu et al., 2012), which is contrary to our findings. Our study showed that being married and living with family predict high psychiatric disorders among caregivers. The probable cause could be fear of transmitting the disease to the other family members.

The prediction rate of psychiatric disorders by the studied variables was 33% for DAS and 34% for FCV scores. This means that about 65% of psychiatric disorder FCS is predicted by other variables. In the study by Paz and et al. (2020) the variables of gender, region, maintaining a regular schedule, exercising, and time spent getting information about the COVID-19 explained 11.8% of the total anxiety score and 17% of depression which was measured by Generalized Anxiety Disorder (GAD-7) and Patient Health Questionnaire (PHQ-9) respectively, respectively (Paz et al., 2020). In another similar study, being female, being older, being married or cohabiting, and having children, comorbidity explored 36% of the variance of anxiety score of the general population during the COVID-19 pandemic (Malesza & Kaczmarek, 2021).

#### Limitations

This is the first quantitative study in Iran to examine the psychiatric impact of the COVID-19 on FCs. Our study has some limitations; first, we conduct this study by cross-sectional design, however, the findings of prospective and longitudinal studies could be stronger. Because the study was online, the proportion of participants in different cities were not equal. However, most of the participants were from Tehran, and since Tehran is the capital of Iran, it has the largest population compared to other cities; Therefore, its large sample size can be justified. Another limitation of our study was the sampling method, which due to the gender of the study and the unavailability of participants, the convenience sampling method was used to select FCs.

Despite these limitations, the findings of this study provide valuable information about the early psychiatric effects of COVID-19 on FCs across the country, which can be an alarm for community health authorities to facilitate the care condition and reduce the amount of psychiatric disorder to FCs.

#### Conclusion

Based on our findings, FCs suffer from mental health disorders and

persistent fear of COVID-19. In addition, FCs mostly worry about transmitting the disease to other relatives due to close and constant contact with the COVID-19 patients. Personal characteristics such as younger age, marital status, having chronic underlying diseases, exercising could worsen the severity of psychiatric disorders. The novelty of COVID-19, limited data regarding the disease, its high morbidity, and mortality, and inaccessibility of vaccines or treatment could exacerbate the poor mental health of FCs. Given the reality evidenced in our study, the contribution of psychiatric nursing can help reduce or control mental disorders of FCs by providing support and counseling in person or by phone call.

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## Ethics approval

The ethics committee of Baqiyatallah University of Medical Sciences (BUMS) approved the proposal of the study (Ethics Code: IR.BMSU.REC.1399.082). All samples participated in the study with consent. The authors of the study also committed that they have not done any plagiarism, fabrication of data, falsification, and repeated publication of findings.

## Declaration of competing interest

The authors mention no any conflict of interest.

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