Fear of COVID-19 among Health Care Workers: Roles of Resilience, Meaning in Life, And Proximity of Working with COVID-19 Patients

Shimon Shiri[1]*, Kanako Iwanaga[2], Anat Marmor[1], Carolyn E. Hawley[2], Meredith Adams[2], Isabella Schwartz[1], Sigal Sviri[3], Amy J Armstrong[2] and Zeev Meiner[1]

[1]Department of Physical Medicine and Rehabilitation, Faculty of Medicine, Hebrew, University of Jerusalem, Jerusalem, Israel.

[2]Department of Rehabilitation Counseling, College of Health Professions, Virginia Commonwealth University, VA, USA.

[3]Internal Medicine Intensive Care Unit, Hadassah Hebrew University Hospital, Jerusalem, Israel.

***Correspondence:**
Shimon Shiri Ph.D, Department of Physical Medicine and Rehabilitation, Hadassah Hebrew- University Hospital – Mount Scopus, Jerusalem, Israel, Tel: +972-2-5844474, FAX: 972-2-5829113.

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ABSTRACT

Background: While the COVID-19 pandemic has had a detrimental impact on most of the world's population, fear of COVID-19 has especially affected health care workers (HCW) who are on the battlefield with the virus. Yet, the factors that determine the level of fear of COVID-19 among HCWs are still obscure.

Methods: A survey whose participants were 705 HCWs including physicians, nurses, administrative and other medical personnel. Multiple regression analysis was implemented to assess the relationship between demographic covariates, psychological variables, and fear of COVID-19. A second survey was conducted following the vaccination program.

Results: Resilience, meaning in life, age, gender, and role in hospital (administration) were found to be significant in explaining the variance in fear of COVID-19 after controlling the effect of other predicting variables in the model. Among them, resilience was the most robust predictor for fear of COVID-19, indicating that HCW with higher resilience were less affected by fear of COVID-19. No difference was found in the level of fear of COVID-19 as well as other psychological variables in the second survey conducted after the vaccination phase in Israel.

Discussion: The results suggest that among HCWs, those who work closely with patients carrying COVID-19, and those with greater resilience, have had significantly less fear of COVID-19. These findings emphasize the need to enhance resilience in order to reduce the psychological burden of the pandemic as well as other prolonged , stressogenic events among HCWs.

Introduction

The World Health Organization declared the coronavirus disease 2019 (COVID-19) a global pandemic in March of 2020 [1]. While COVID-19 has had a negative impact on most of the world's population, it is especially affecting health care personnel who are on the front lines of fighting the virus [2]. Increased work demands, risky work conditions and heightened chance of infection have put additional strains on health care workers' (HCWs) psychological well-being [3]. The WHO has emphasized the extremely high burden on healthcare workers and called for action to prevent serious impact on their physical and mental health [4].

Several recent reviews have described HCWs' mental health during the COVID-19 pandemic [5,6]. It was indicated that more than one of every five HCWs suffered from anxiety and/or depression and nearly two in five reported insomnia. Levels of

anxiety, depression, and sleep disorders among HCW are greater than the general population. In another study, nearly half of the HCWs reported serious psychiatric symptoms, including suicidal ideation, during the COVID-19 pandemic. Perceived workplace culture and supports contributed to symptom severity, as did personal factors [7]

Risk factors that increase stress among HCWs include exposure to COVID-19 patients, female gender, concerns about being infected, as well as concerns about family members being infected [8-10]. On the other hand, several factors were found to act as protective, including social support [11] and self-perceived resilience [12].

Heightened levels of fear of COVID-19 have been documented in HCWs [10], and fear is likely to be a key contributor to the distress of HCws. Earlier studies on the SARS epidemic indicated that this fear is augmented when HCWs are in danger, or believe that they might be likely to spread the disease to families and friends [13]. Factors that mitigate fear of COVID-19 among HCWs need to be explored.

The present study is aimed at assessing the effect of demographic, psychological, and occupational variables on fear of COVID-19 levels among HCWs. Among the psychological factors that were assessed, resilience and a sense of meaning in life seemed particularly relevant, since these variables have been crucial to coping with stressful, life-threatening situations, as imposed by the current pandemic. Resilience has been described as the ability to navigate challenging life events including significant sources of stress allowing one to adapt to, and cope with stressors [14-16]. Meaning in life has the potential to serve as a buffer against death anxiety [17,18].

Methods
Procedures and participants
The study was conducted at a large urban hospital in Israel during the second wave of the COVID-19 pandemic outbreak in Israel, July-August 2020, in accordance with approved affiliated Institutional Review Board protocol. The survey was distributed to all healthcare employees through the hospital's email system. 794 health care personnel voluntarily participated (16% response rate), of which 705 survey responses were deemed complete and eligible for evaluation.

A second survey was conducted after the third wave of COVID-19 infection in May-June 2021 following the vaccination program in Israel. The same questionnaires were send again to all healthcare employees through the hospital's email system. This time only 127 health care personnel voluntarily participated (2.5%).

Participants
The final data includes 650 HCWs after deleting data that has missing in any one of the demographic variables (i.e., gender, ethnicity, education, relationship status, role in hospital, type of employment, COVID exposure level), Demographic

characteristics for the 650 participants are summarized in Table 1. The average age of the participants was 41 years old (SD=12.02), and the majority (78.2%) were female. Most of the participants were Jewish (88.6%), had bachelor or master academic degree (69.7%), and were married or in relationship (76.2%). The largest groups of the participants were nurses (32.3%) and other medical personnel (37.1%) and most of them worked full-time (63.5%). Among the participants, 30% reported that they were exposed to COVID-19 patients at a high level, most of them worked in intensive care units and special departments treating COVID-19 patients in acute phase. 46.9% of the participants reported that they were exposed to COVID-19 remotely, while 23.1% of participants were not exposed to COVID-19 at all.

The demographic characteristics of the responders in the second survey were similar to the first survey except of higher percentage of physicians.

Table 1: Demographic Characteristics of Participants in the first survey (N=650) and in the second survey (n=127).

Variable	First survey (n-650)		Second survey (n=127)	
	n	%	*n*	%
Age (yrs.) mean (SD)	41 (12.02)		46.41 (11.25)	
Gender				
Male	142	21.8	32	25.2
Female	508	78.2	93	73.2
Race/ethnicity				
Jewish	576	88.6	115	90.6
Muslim	21	3.2	3	2.4
Christian	15	2.3	3	2.4
other	38	5.8	6	4.7
Education level				
High school -12 years and below	84	12.9	10	7.87
Bachelor's degree	256	39.4	32	25.2
Master's degree	197	30.3	37	29.13
M.D. and Ph.D.	92	14.2	34	26.77
Professor	21	3.2	13	10.24
Marital status				
Married	466	71.7	97	76.4
In a relationship not married	29	4.5	11	8.7
Single	111	17.1	8	6.3
Divorced	41	6.3	8	6.3
Widowed	3	0.5	0	0
Role in Hospital				
Nurse	210	32.3	40	31.5
Physician	88	13.5	43	33.9
Administration	111	17.1	5	3.9
Other medical personnel	241	37.1	39	30.7
Type of Employment				
Full time	413	63.5	78	61.4
Part time	237	36.5	48	37.8
COVID exposure level				
Not at all	150	23.1	7	5.51
Remotely	305	46.9	55	43.31
High level of exposure	195	30	65	51.18

Measures

Demographic questionnaire: Demographic data was obtained and tabulated including age, gender, ethnicity, education, relationship status, role in hospital, type of employment and level of exposure to COVID-19 during work.

Fear of COVID: The fear of COVID-19 was assessed using the Fear of COVID-19 scale (FCV-19S), which is reliable and valid in assessing COVID-19 fear among the general population [19]. This self-report measure includes 7 items with participants rating their response on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). The scale shows good internal consistency and test-retest reliability ($\alpha = 0.82$ and ICC = 0.72). The Hebrew FCV-19S also demonstrated strong internal consistency ($\alpha=0.86$) [20]. A validation study conducted by the authors has shown that a two-factor structural model, physiological response to fear and psychological response to fear, is the best model accounting for 79.33% of the total variance [21].

Resilience: The CD-Risc 10 Questionnaire is a 10-item self-report measure of resilience with participants rating their response on a 5-point Likert scale ranging from 0 (not true at all) to 5 (true nearly all the time). The scale has good internal consistency (Cronbach's $\alpha = 0.85$), and validity [22].

Subjective well-being: Subjective well-being was measured using "The Satisfaction with Life (SWL) Scale" developed by Diener and colleagues [23]. This is a valid self-report measure that includes 5 items with participants rating their response on a 7-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree). The Hebrew version of the SWL has been shown to have good validity (CFI = 0.996, RMSEA = 0.053) and reliability $\alpha = 0.86$ [24]. The SWL has been utilized in a wide variety of studies and samples, and has been found to be related to other measures of well-being [25, 26].

Meaning in Life: The Meaning in Life (MIL) Questionnaire is a valid 10-item self-report measure with participants rating their response on a 7-point Likert scale from 1 (Absolutely True) to 10 (Absolutely Untrue) [27]. The Meaning in Life Questionnaire assesses two dimensions of meaning in life (Presence of meaning and Searching for meaning) using 10 items rated on a seven-point scale from "Absolutely True" to "Absolutely Untrue." The MLQ has good internal consistency, with coefficient alphas ranging in the low to high .80s for the Presence subscale and mid .80s to low .90s for the Search subscale [28].

Data Analysis

A quantitative correlational design [29] was used for the present study. IBM SPSS Statistics (Version 26) [30] was used for all data analyses. Multicollinearity was assessed using the variance inflation factors (VIFs) and tolerance. No VIF values exceeded 5, with values ranging from 1.08 to 1.75. None of the tolerance valued was less than .10 with range from .57 to .93. These analyses demonstrated no evidence of multicollinearity for this data. Descriptive statistics were computed to report frequencies and mean values for the independent and dependent variables, and a multiple regression analysis (MRA) was used to examine the relationship between the predictor variables (demographic variables, resilience, meaning in life, and life satisfaction) and fear of COVID, the dependent variable.

Multiple regression analysis of fear of COVID-19

A multiple regression analysis was conducted with the following parameters: Demographic covariates (age, gender (male is the reference group), ethnicity (non-Jews is the reference group), marital status (not married is the reference group), educational attainment (treated as continuous variable), employment (part time is the reference group), roles in a hospital (nurses is the reference group), exposure level of COVID-19 (high exposure is the reference group), and psychological variables (life satisfaction [total score], resilience [average score], and meaning in life [average score]) and the dependent variable (fear of COVID [average score]).

Results

Correlation's matrix of fear of COVID-19 with demographic and psychological parameters

Intercorrelations, means, and standard deviations for the fear of COVID, demographic covariates, and psychological variables are presented in Table 2, and several highlights from that table are summarized here. Mean scores on the dependent variable of the fear of COVID of 14.80 ($SD = 5.96$), with the maximum rate as 35 and the minimum rate as 1, suggests that the participants as a whole had a medium level of fear of COVID. Looking at correlations between the fear of COVID and the demographic covariates and psychological variables, correlations were statistically significant for Jewish participants ($r = -.43$, $p < 0.001$) and for resilience ($r = -.50$, $p < 0.001$). Looking at the 136 intercorrelations among the 17 predictors presented in Table 2, only 4 were greater than 0.5 and were thus considered large, while another 7 were in the moderate range of 0.3 to 0.5.

Regression analysis of fear of COVID-19 with demographic and psychological parameters

As can be observed in Table 3, this set of demographic covariates and psychological variables accounted for 36% of the variance in fear of COVID-19, $R = 0.60$, $R^2 = 0.36$, $f^2 = 0.56$ (large effect size), $F(14, 635) = 25.61$, $p < .001$, 95% confidence interval (0.29, .040). Upon examining the standardized partial regression coefficients, age, gender, ethnicity, role in hospital, exposure of COVID-19, and resilience were found to significantly contribute to explaining the variance in fear of COVID-19 scores after controlling for the effect of other predictor variables in the model.

Specifically, participants who are older or female had higher fear of COVID-19 scores, controlling for other demographic and psychological variables in the model. Jews had lower fear scores than non-Jews. It is particularly worth noticing that participants who were minimal exposure to COVID-19 patients had higher fear of COVID-19 scores than participants who are highly exposed to COVID-19 patients. Similarly, administrative staff had higher

Table 2: Correlations, Means, and Standard Deviations for Variables in the Multiple Regression Analyses (N=677).

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1. Fear of COVID	-																
2. Age	.09*	-															
3. Gender (Female)	.08*	-.00	-														
4. Ethnicity (Jewish)	-.43**	.02	.09*	-													
5. Relationship (Married or In a relationship)	-.00	.19**	-.06	-0.01	-												
6. Education	.02	.12**	-.19**	-.27**	.19**	-											
7. Employment (Full time)	-.05	.20**	-.18**	.10*	-.04	-.01	-										
8. Role Nurse	-.04	.04	.16**	-.03	.00	-.11**	-.11**	-									
9. Role Physician	-.05	.05	-.28**	-.07	.13**	.53**	.15**	-.27**	-								
10. Role Administration	.09*	.08*	-.02	.12**	-.01	-.36**	.22**	-.31**	-.18**	-							
11. Role Other medical staff	.00	-.14**	.06	-.02	-.09*	.02	-.17**	-.53**	-.30**	-.35**	-						
12. COVID exposure NO exposure	-.01	.06	.02	.07	.01	-.12**	-.01	-.25**	-.13**	.24**	.15**	-					
13. COVID exposure Remotely exposed	.13**	.11**	.04	-.08*	.06	.10*	.01	-.02	.02	-.01	.01	-.52**	-				
14. COVID exposure High exposure	-.14**	-.17**	-.06	.02	-.08	.00	-.01	.25**	.10**	-.21**	-.16**	-.36**	-.62**				
5. Life satisfaction	-.15**	.01	.02	.09*	.28**	.06	-.09*	.01	.03	.01	-.04	.00	-.01	.01	-		
16. Resilience	-.50**	.09*	-.06	.46**	.03	-.13**	.19**	.04	-.03	.05	-.05	.01	-.05	.04	.24**	-	
17. Meaning in life	.02	.05	-.09*	-.07	-.01	.13**	-.07	.05	.08	-.03	.07	-.04	-.01	-.19**	-.13**	-	
Mean	14.80	41.00	-	-	-	-	-	-	-	-	-	-	-	-	25.04	3.83	30.01
(SD)	(5.96)	(12.02)	-	-	-	-	-	-	-	-	-	-	-	-	(6.05)	(0.74)	(8.91)

*$p < .05$, **$p < .01$

Table 3: Demographic and Psychological Variables Predictors of fear of COVID-19 (N=650).

	R^2	B	SE B	β	p	CI
	.36***					[0.29, 0.40]
Age		0.06	0.02	0.12***	0.00	[0.03, 0.10]
Gender[a]		1.01	0.49	0.07*	0.04	[0.05, 1.98]
Ethnicity[b]		-5.62	0.70	-0.30***	0.00	[-6.99, -4.25]
Relationship[c]		0.14	0.48	0.01	0.77	[-0.81, 1.08]
Education		-0.47	0.25	-0.08	0.07	[-0.96, 0.03]
Employment[d]		0.29	0.44	0.02	0.50	[-0.56, 1.15]
Role in hospital[e]						
Physician		0.01	0.74	0.00	0.99	[-1.44, 1.45]
Administration		1.89	0.65	0.12**	0.00	[0.62, 3.16]
Other medical staff		0.37	0.49	0.03	0.45	[-0.59, 1.32]
Exposure of COVID-19[f]						
Remotely exposed		0.22	0.58	0.02*	0.03	[0.11, 1.94]
No exposure		-0.05	0.03	-0.05	0.71	[-0.93, 1.36]
Life satisfaction		-0.05	0.03	-0.05	0.17	[-0.12, 0.02]
Resilience		-3.06	0.31	-0.38***	0.00	[-3.67, -2.46]
Meaning in life		-0.05	0.02	-0.07*	0.03	[-0.09, 0.00]

* $p < .05$, **$p < .01$, ***$p < .01$,

Note: [a] Male=0, Female=1; [b] Gentiles=0, Jewish=1; [c] Single, Divorced, or Widowed=0, Married or In a relationship not married=1; [d] Part time=0, Full time = 1; [e] Nurse = 0, Physician, Administration, or Other medical staff=1; [f] High exposure=0, Remotely exposed, or No exposure=1.

fear of COVID-19 than nurses did. In addition, participants with higher resilience scores had lower fear of COVID-19 scores. Further, participants who have higher scores in meaning in life had lower fear of COVID-19 scores. Although, life satisfaction had a significant zero-order correlation with fear of COVID-19, the effect of this variable dissipated in the presence of other demographic and psychological variables.

Comparison of the findings between the second survey and the first survey

Although the second survey was conducted after the vaccination phase in Israel, no difference was found in the level of fear of COVID-19 as well as other variables. These findings were found when we compared the entire samples in both surveys as well as when comparing only the 56 participants participated in both surveys that we were able to identify (Table 4).

Table 4: Comparison of study parameters between the first and the second survey.

	First survey				Second survey				P-Value
	N	Mean (SD)	Median (IQR)	Range	N	Mean (SD)	Median (IQR)	Range	
Well-being	710	14.85 (6.04)	14 (10, 18)	(5, 35)	127	14.32 (6.08)	13 (10, 17)	(5, 31)	0.363
Life meaning	709	14.83 (5.97)	14 (10, 18)	(7, 35)	127	14.19 (5.77)	13 (10, 17.5)	(7, 34)	0.264
Presence of meaning	709	33.52 (8.31)	34 (28, 39)	(10, 64)	127	34.53 (8.65)	35 (30, 41)	(10, 63)	0.210
Search for meaning	689	7.89 (5.36)	8 (4, 11)	(-2, 34)	126	7.84 (5.39)	7 (4, 11)	(-2, 25)	0.923
Resilience	707	17.63 (6.89)	17 (13, 22)	(5, 35)	127	18.44 (7.45)	17 (13, 23)	(5, 35)	0.229
Fear of COVID	709	36.92 (6.58)	38 (34, 41)	(10, 50)	127	37.25 (6.59)	39 (33, 41)	(15.6, 50)	0.603

Discussion

In this study, we assessed the fear of COVID-19 among HCWs in a large hospital in Israel. We found that older age, female gender, non-Jewish ethnicity, administrative role in hospital, remote exposure to COVID-19, lower resilience and decreased sense of meaning in life were significantly associated with increased fear of COVID-19. Several findings are particularly intriguing. First, it was found that greater proximity of workers to patients infected with COVID-19 is associated with less fear of COVID-19. It is likely that those who closely treated patients with COVID-19 were highly informed about the means to prevent infection and were optimally equipped with protective facilities to avoid infection, both means that have the potential of reducing fear and increasing sense of mastery and control.

This finding apparently differs from the conclusions of previous studies, done in the early phases of the COVID-19 pandemic, in which greater proximity to infected patients was associated with higher stress related symptoms such as depression, anxiety and insomnia [3,31,32]. One possible explanation is that habituation to fear of COVID-19 occurred, as was reported in a large study in Germany [33].

We also found that older HCWs had higher levels of fear of COVID-19 compared to younger personnel. This finding is congruent with two studies of HCWs caring for patients with COVID-19, in which older age seemed to be a risk factor for psychological symptoms [34,35]. Old age was also a risk factor for fear of COVID-19 in a study in the Israeli general population [20], possibly because infection with COVID-19 has more consequences that are hazardous for older individuals [36]. Similar to findings in previous studies [6], in the present study women had higher psychological reactions to COVID-19 and higher fear of the virus. This finding is also congruent with many previous studies that examined gender differences with regard to reactions stress and found that women suffered more than men from chronic stress and minor daily stressors [37] and were more vulnerable to develop mental disorders following stressful life events [38]. The same differential emotional reaction to fear of COVID-19 between women and men was found in previous studies in the general Israeli population and in other populations worldwide [20,39,40].

Psychological variables seem to be also significant in determining the levels of fear of COVID-19. As expected, high levels of resilience predicted less fear. This is not surprising given that resilience reflects the ability to regain homeostasis when facing stressful life events [14-16]. In the context of fear of COVID-19, a study that included a sample of psychiatrists and neurologists showed the significance of resilience in their coping with fear of COVID-19 [12]. Similarly, Cai et al. [41] compared experienced with inexperienced frontline workers and found that inexperienced workers with low levels of resilience presented higher levels of mental health symptoms.

Resilience training has been found to have a positive impact on mental health and subjective well-being [42]. It may also play an important role in public health and disease prevention by enhancing the long-term health and well-being of employees [43]. Various strategies may enhance resilience including mindfulness training, relaxation training, setting meaningful goals, and more [42-45]. Employing these strategies in the workplace may assist in coping with the psychological burden of the pandemic.

Regarding meaning in life, Victor Frankl stressed the importance of finding meaning in life in the concentration camps and learning to thrive [46]. Recent studies validate Frankl's premise and indicate that meaning in life serves as a buffer that reduces death fear when awareness of death is elevated [17,18]. These studies are corroborated with the salutogenic model, which stresses the significance of comprehensibility, manageability and meaningfulness in coping with health stressors and in maintaining resilience and well-being [47].

Our second survey was conducted after a large-scale vaccination program held in Israel during the first months of 2021 [48]. We assumed that being vaccinated would have a large impact on the fear of COVID-19 among HCW; however, the findings indicated that fear of COVID-19 remained stable across time. One possible explanation to the persistence of fear of COVID-19 is that attitudes toward the vaccine may be ambivalent and associated with concerns [49]. Yet, it seems that the considerable difference in the sample size between both samples narrows the ability to draw valid conclusions with regard to this comparison.

This study had some limitations. First, this study used a cross-sectional second design of HCWs from a hospital in Israel, which limits the external validity of our findings. Another important limitation is the low response rate especially during the second survey. However, we believe that the study results reflect the authentic psychological impact of COVID-19 on HCWs in real time.

Conclusions

This study demonstrated that HCWs working closely with COVID-19 patients and having higher resilience and meaning in life experiencing less fear of COVID-19. These findings emphasize the need that those responsible for mental health of HCWs in hospitals and in other medical centers are equipped with tools such as practicing mindfulness, learning relaxation techniques and setting meaningful goals to enhance coping and well-being of HCW routinely and particularly during prolonged crisis periods.

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