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RESEARCH ARTICLE

Fear of COVID 19 and the Relation to Resilience, Meaning in Life and Subjective Well-Being: Comparison Between American and Israeli Health Care Workers

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Abstract

While COVID-19 has had a detrimental impact on most of the world's population, it has especially affected health care workers (HCWs) who are on the front lines fighting the virus. How HCWs cope with the pandemic have recently been explored. Differences across cultural and health care system settings related to fear of COVID 19 and measures of wellbeing may provide further insight to the coping mechanisms and experiences of HCWs during this worldwide pandemic. The overall subjective well-being and meaning in life scores are noticeably higher for the American participants whereas the fear of COVID and resilience scores are close in both studies, with slightly higher resilience and lower fear in the Israeli HCWs. Age, ethnicity and lower resilience were found to be significantly associated with higher fear of COVID-19 in both cohorts. In the Israeli participants, education level and life satisfaction were also associated with lower fear of COVID19 whereas in the American cohort, gender and relationship were also associated. These results suggest that albeit the cultural differences, similar mechanisms namely age and resilience, are important in coping with fear of the COVID-19 pandemic among both cohorts of HCWs. Therefore, it is important to enhance resilience in order to reduce the psychological burden of the pandemic among HCWs. This study was conducted prior to the availability of a vaccine.

Keywords: COVID-19 pandemic, Fear of COVID-19; Health Care Workers; Resilience; Meaning in life; Satisfaction with Life.

Introduction

The COVID-19 pandemic has had and continues to have a deleterious effect on most of the world's population both physically and emotionally. It is especially affecting the health care personnel who are on the front line of fighting the virus[2]. Healthcare professionals are more prone to anxiety and depressive symptoms; however, a time of crisis may also contribute to posttraumatic growth and resilience through influence on meaning of life[3]. Meaning in life appears to be a basic need and a major factor in coping with distressed situations and contributes to general well being[3,4].

In our previous studies we showed that meaning in life is associated with well-being among medical personnel coping with high levels of exposure to death and grief[5]. We also found stress-related growth and resilience among health care providers of survivors of terror attacks; the survivor, themselves, even after a long period of time; as well as caregivers of Alzheimer's patients[6-9].

In this study, we propose to examine resilience, meaning in life and subjective well-being and the association between these variables among medical personnel confronting the COVID-19 pandemic in 2 different medical environments in Israel and in the USA. There is a significant difference between the two countries in terms of racial and ethnic populations as well as medical systems. The samples were gathered from two medical centers associated with universities, and are representative of their respective organizations. We compare these coping mechanisms between the two healthcare providers' populations as well as between healthcare providers who are directly treating COVID-19 patients, and those who are not, in each country.

Methods

Procedures and participants

The study was conducted concomitantly in two tertiary medical centers in Jerusalem, Israel and Richmond, Virginia in the USA during the period of July 2020-February 2021 of the COVID-19 pandemic outbreak and prior to widespread availability of vaccines. The study was approved by the affiliated Institutional Review Boards' protocol. The survey was distributed to healthcare employees through the health care settings' email system and was completed online. In the Israeli cohort, a total of 794 health care personnel voluntarily participated, of which 705 survey responses were deemed complete and eligible for evaluation. Among these, there were 91 responses from physicians that were removed from analysis due to lack of comparison with the US sample, leaving 562 eligible participants. In the American cohort, a total of 714 health care personnel voluntarily participated, resulting in 676 complete survey responses.

Measures

Demographic questionnaire: Demographic data was obtained and tabulated including age, gender, race/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[10]. 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*). For the American and Israel studies, the Cronbach's alpha coefficient for all seven items was calculated to be 0.883 and 0.888 respectively.

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*[11]. Item 5 (I tend to bounce back after illness, injury or other hardships) was removed when calculating the average score of resilience because it seems non-relevant to all other items. For the American and Israel studies, the Cronbach's alpha coefficient for the remaining nine items was calculated to be 0.884 and 0.889, respectively

Subjective Well-being: Subjective well-being was measured using the Satisfaction with Life (SWL) Scale[12]. This is a self-report measure that includes 5 items (e.g., I am satisfied with my life) and each item is rated on a seven-point Likert scale, ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). For the American and Israel studies, the Cronbach's alpha coefficient for all five items was calculated to be 0.883 and 0.873, respectively.

Meaning in Life: The Meaning in Life Questionnaire (MLQ) was used to assess meaning in life[13]. The MLQ assesses two dimensions of meaning in life, presence of meaning and searching for meaning, a sample item of this scale is "I understand my life's meaning." It is a 10-item measure and each item is rated on a seven-point scale from 1 (*Absolutely True*) to 10 (*Absolutely Untrue*). For the American and Israel studies, the Cronbach's alpha coefficient

for all ten items was calculated to be 0.715 and 0.775, respectively.

All score variables for the above measurements are calculated by averaging ratings across items. A higher score indicates a higher level in the corresponding measurement.

Data analysis

Descriptive statistics were reported for the mean and standard deviation of the above score variables. An aggregation clustering analysis was used to identify patterns associated with the measurements among participants from the two cohorts. The distances between all pairs of sample variables were based on the Euclidean distance. The clustering algorithm used was the Ward method,[14] which minimizes the within cluster total variance. The optimal number of clusters was determined by a majority vote among 26 indices consisting of all but six computationally expensive options available[1]. Descriptive statistics and clustering analysis were implemented using the software R (version 4.0.2) with the package 'NbClust' (version 3.0). A multivariate regression analysis was performed for Fear of COVID against the demographic variables and the rest of the psychological variables in pursuit of understanding the associations of all other variables to fear.

Results

a. Demographic

Comparison of the demographic characteristics between American and Israeli participants are summarized in Table 1. The average age of the participants in both cohorts was 40.8 years, and the majority (91.4% and 82.7% in the American and Israeli participants, respectively) were female. In the Israeli cohort most of the participants were Jewish (89.5%), whereas in the American cohort most of the participants were Caucasian (83.3%). Educational level and the percentage of people who were married or in a relationship was similar between the cohorts. In the American cohort most of the participants were nurses (70.3%) and most worked full time (84.3%) whereas in the Israeli cohort 37.4% were nurses and 42.9 % were other medical personnel, with a higher percentage working part time (39.3%). In the American cohort a higher percentage (51.9%) reported that they were exposed to COVID-19 patients at a high level, whereas in the Israeli group only 28.1% were exposed to COVID-19 patients at a high level and a higher percentage (25.3%) reported that they were not exposed at all to COVID-19 patients.

Table 1. Comparison of the demographic characteristics between American and Israeli participants

Variable	*American n=676*	*Israeli n=562*	*P*
Age (yrs.) Mean (SD)	40.8 (12.82)	40.8 (12.15)	.94
Gender (%)			
Male	54 (8.0)	97 (17.3)	<.0001
Female	618 (91.4)	465 (82.7)	
Other	4 (0.6)		
Race/ethnicity			
	White 563 (83.3)	Jewish 503 (89.5)	
	African-American 53 (7.8)	Muslim 18 (3.2)	
	Asian 21 (3.1)	Christian 15 (2.7)	
	Hispanic 14 (2.1)	Other 26 (4.6)	
	Native American 6 (0.9)		
	Middle Eastern 2 (0.3)		
	Other 17 (2.5)		
Education level			<.0001
High school -12 years and below	2 (0.3)	84 (14.9)	
Bachelor's degree	322 (47.6)	256 (45.6)	
Master's degree	221 (32.7)	178 (31.7)	
M.D. and Ph.D.	25 (3.7)	44 (7.8)	
Some College/Technical Degree	106 (15.7)		
Marital status			.1879
Married/In a relationship	472 (69.9)	416 (74.1)	
Single	132 (19.5)	103 (18.3)	
Divorced	63 (9.3)	40 (7.1)	
Widowed	9 (1.3)	3 (0.5)	
Role in Hospital			<.0001
Nurse	475 (70.3)	210 (37.4)	
Administration	31 (4.6)	111 (19.7)	
Other medical personnel	170 (25.1)	241 (42.9)	
Type of Employment			<.0001
Full time	570 (84.3)	341 (60.7)	
Part time	106 (15.7)	221 (39.3)	
COVID exposure level			<.0001
Not at all	24 (3.6)	142 (25.3)	
Remotely	301 (44.5)	262 (46.6)	
High level of exposure	351 (51.9)	158 (28.1)	

b. Comparison of the psychological variable between American and Israeli cohorts

The means and standard deviations for all score variables in the study was calculated in Table 2. The fear of COVID and resilience scores are close in both studies, with slightly higher resilience and lower fear in the Israeli participants. The overall subjective well-being and meaning in life scores are noticeably higher for the American participants than the Israeli participants.

Table 2. The summary statistics for the variables in both American and Israeli cohorts.

		Fear of COVID (1~5)	Resilience (1~5)	Subjective Well-being (1~7)	Meaning in Life (1~7)
USA	Mean (SD)	2.23 (0.85)	3.91 (0.57)	5.08 (1.20)	5.02 (0.80)
Israel	Mean (SD)	2.13 (0.82)	4.58 (0.50)	3.01 (1.21)	2.99 (0.85)
	P	.035	<.0001	<.0001	<.0001

c. The patterns for the variables in both American and Israeli cohorts.

The aggregation clustering was performed with the number of clusters being three. The cluster centers and cluster sizes were reported in Table 3, along with the range of the variable scores. In addition, the cluster centers were also displayed via the radar plot in Figure 1. Three out of the four top-performer indices[1] favor three clusters for the American as well as the Israeli cohorts consisting of relatively balanced sizes. The cluster center represents the average performance in the study variables in that cluster group. The groups are formed such that the within cluster variances are the smallest, indicating group members are more alike within groups than across groups.

As can be seen in Table 3, all three clusters for the American cohort have higher subjective well-being and meaning in life scores than any Israeli cluster. Conversely, between the two cohorts there is no clear differential for Fear of COVID and resilience scores, which is not revealed from the average trend in Table 2. For example, the group with the highest/lowest Fear of COVID score lies in the Israeli data. For resilience, two Israeli groups (over 76%) have significantly higher scores than all the American groups, the remaining group (23%) is similar to the American groups. Among all three clusters in each cohort, the centers for fear of COVID and resilience scores were negatively associated. It is not surprising that the "high fear and low resilience" group (cluster 3) is accompanied by the lowest subjective well-being score in the American participants as compared to the highest subjective well-being (opposite to the American) in the Israeli counterpart (cluster 3).

Table 3. The cluster centers and the percentages of subjects for the American and the Israeli study.

	Clusters (%)	Fear of COVID (1~5)	Resilience (1~5)	Subjective Well-being (1~7)	Meaning in Life: (1~7)
American	35.65	1.84 (L)	4.21 (H)	5.21 (M)	4.50 (L)
	32.10	2.09 (M)	4.11 (M)	5.72 (H)	5.77 (H)
	32.25	2.79 (H)	3.39 (L)	4.29 (L)	4.84 (M)
Israel	49.29	1.73 (L)	4.70 (M+)	3.09 (M)	3.44 (H)
	27.93	1.89 (M-)	4.76 (H)	2.37 (L)	2.03 (L)
	22.78	3.27 (H)	4.10 (L)	3.61 (H)	3.18 (M)

d. Comparison of variables predictors of fear of COVID-19 between American and Israeli cohorts.

A multiple regression analysis was conducted with the demographic covariates: age, gender, ethnicity, relationship status, educational attainment, employment, roles in a hospital, exposure level to COVID-19 patients, and psychological variables (life satisfaction, resilience, and meaning in life), with Fear of COVID-19 as the dependent variable. As can be observed in Table 4, this set of demographic covariates and psychological variables accounted for 31% of the variance in fear of COVID-19 in the Israeli cohort and 12% in the American cohort. The power analysis (with power at 0.8) for the hypothesis that the predictors explain the achieved variability in fear of covid shows that sample sizes 149 and 54 are needed for the VCU and Israel cohort correspondingly. Both studies fulfill the sample size requirement.

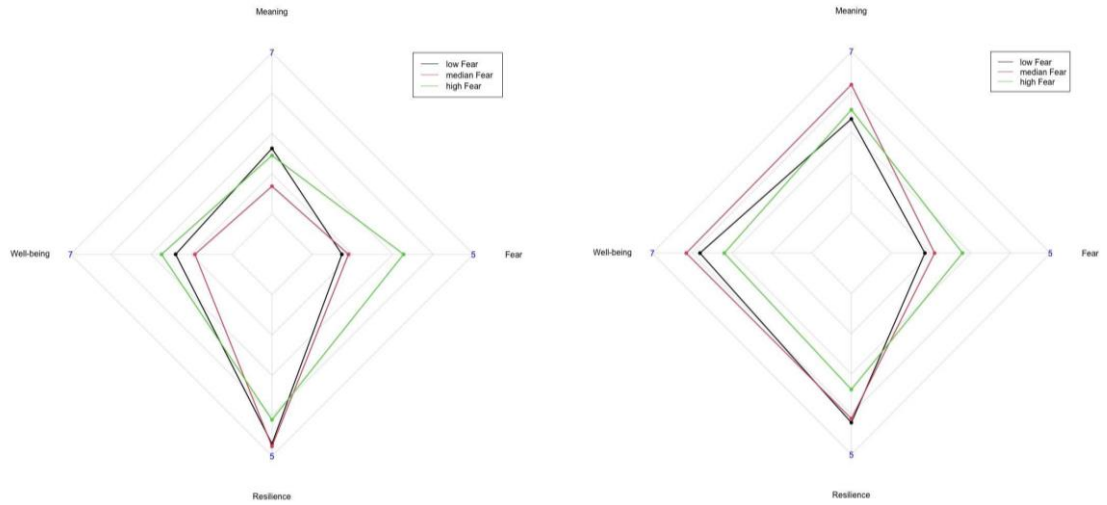
Upon examining the standardized partial regression coefficients, age, race/ethnicity, and resilience were found to contribute significantly to explaining the variance in Fear of COVID-19 scores in both cohorts after controlling for the effect of other predictor variables in the model. Relationship

status and gender were found to be significantly associated with Fear of COVID-19 only in the American cohort whereas educational level, role in hospital, and life satisfaction were significantly associated with Fear of COVID-19 only in the Israeli cohort.

Table 4. Demographic and Psychological Variables Predictors of fear of COVID-19 in the Israeli cohort (N=562) and the American cohort (N=676).

Parameters	Israeli cohort (n=562) R^2=.31***				American cohort (n=676) R^2=.12***			
	B	*SE B*	*P*	*CI*	*B*	*SE B*	*P*	*CI*
Age	0.008	0.003	0.003	[0.003, 0.013]	-0.006	0.003	0.021	[-0.011,-0.001]
Gender[a]	0.096	0.080	0.231	[-0.061, 0.252]	0.329	0.114	0.004	[0.106,0.552]
Ethnicity[b]	-0.555	0.113	0.000	[-0.776, -0.334]	-0.266	0.085	0.002	[-0.434,-0.099]
Relationship[c]	0.050	0.071	0.483	[-0.090, 0.190]	0.153	0.067	0.023	[0.021,0.285]
Education								
BA	-0.290	0.096	0.003	[-0.479,-0.102]	0.016	0.095	0.870	[-0.172,0.203]
MA or Ph.D.	-0.299	0.098	0.002	[-0.492,-0.107]	0.060	0.097	0.534	[-0.130,0.250]
Employment[d]	0.044	0.065	0.502	[-0.084, 0.172]	0.058	0.088	0.510	[-0.114,0.230]
Role in hospital[e]								
Administration	0.127	0.097	0.193	[-0.064, 0.318]	-0.095	0.155	0.541	[-0.398,0.209]
Other medical staff	0.005	0.072	0.947	[-0.137, 0.146]	-0.003	0.081	0.978	[-0.162,0.156]
Exposure of COVID-19[f]								
High exposure	-0.140	0.074	0.057	[-0.285, 0.004]	0.063	0.066	0.340	[-0.067,0.193]
No exposure	-0.124	0.075	0.099	[-0.271, 0.023]	-0.156	0.173	0.367	[-0.496,0.184]
Life satisfaction	0.071	0.026	0.007	[0.020, 0.122]	-0.042	0.029	0.139	[-0.099,0.014]
Resilience	-0.592	0.069	0.000	[-0.729, -0.456]	-0.368	0.058	0.000	[-0.482,-0.253]
Meaning in life	-0.050	0.036	0.160	[-0.121, 0.020]	0.056	0.041	0.171	[-0.024,0.136]

Figure 1. Radar plot for four variables, meaning in life, subjective well-being, resilience and fear, obtained by averaging over the item measurements. The left panel corresponds to the Israeli group. The right panel is for the American group. The numbers on the vertices denote the maximum score accordingly.



Discussion

Distinctions between the two samples are worth noting and warrant further exploration. Overall Israeli HCWs resilience is slightly higher with a lower fear of COVID-19. At the time of this data collection, HCWs reported less exposure to COVID-19 which may have influenced the level of fear. COVID-19 variants, at the time, were not present.

The differences between the two cohorts

The COVID-19 pandemic has exposed HCWs and their families to unprecedented levels of risk while carrying out their duties. Although the wellbeing and emotional resilience of healthcare professionals are key components of continuing healthcare services during the COVID-19 pandemic, healthcare professionals have been observed in this period to experience serious psychological problems and to be at risk in terms of mental health[15]. Various studies among frontline physicians, nurses, paramedical and administrative staff around the world, revealed a high prevalence of stress, anxiety and depression [16,17]

We found that the overall subjective wellbeing and meaning in life scores are noticeably higher for the American participants whereas the fear of COVID-19 and resilience scores are close in both studies, with slightly higher resilience and lower fear in the Israeli HCWs. This difference may be explained by the Israeli geo-political-social context, related to the potential of persistent and pervasive threat and risk exposure, which may influence the perception of resilience and result in effective coping strategies of the Israeli cohort [18,19].

Fear of COVID-19 and level of exposure to COVID-19 patients

Interestingly, American HCWs reported a higher level of exposure to patients with COVID-19, yet their level of fear is similar to Israeli HCWs who had lower exposure. A consideration may be that the majority of the American cohort were full time personnel. The risk of infection for HCWs as well as risk of exposure of family members has been found to have a strong association to fear[20]. This risk of infecting family members and friends has been a prominent factor contributing to HCW stress and wellbeing[21,22]. The American cohort reported a higher level of wellbeing/life satisfaction as well as meaning of life, in spite of higher level of exposure. Age, ethnicity, and lower resilience were associated with higher fear of COVID in both cohorts, with older HCWs experiencing higher levels of resilience. Israeli education and life satisfaction/wellbeing was associated with lower fear of COVID-19 and for the American cohort, gender and relationships were associated with lower fear. As shared in the Results section, relationship status was found to be significantly associated with Fear of COVID-19 only in the American cohorts whereas educational level, role in hospital, life satisfaction and exposure level to COVID-19 patients were significantly associated with Fear of COVID-19 only in the Israeli cohort.

The relationship between resilience and fear of COVID-19 and wellbeing in both cohorts

Lower resilience has been found to impact quality of life of HCWs[23]. Resilience is a significant predictor of fear of COVID-19 in our respective cohorts, with individuals who have higher levels of resilience showing less fear. For Americans, those with higher resilience have lower wellbeing, whereas for the Israeli cohort high resilience is associated with higher wellbeing. In terms of the American cohort, factors related to health care workplace engagement, workplace stressors such as high burn-out, staffing, and attrition (Munn et al) may impact the perception of wellbeing. Munn et al have found HCWs high level of wellbeing was related to having positive perceptions about the supports, resources, leadership and culture of the organization. Compounding current workplace stressors, the social-political environment due to historical racial and gender inequities, may also have impacted the perception of wellbeing,[24] further exacerbating the public health crisis presented by the pandemic. The results of the American sample is counterintuitive to the Israeli cohort results and previous research which has found resilience to be a protective factor enhancing wellbeing and quality of life. Huffman, et al., [25] found, in a sample of healthcare workers during the COVID-19 pandemic, that individuals with higher resilience and grit experienced lower stress, anxiety, fatigue, and sleep disturbances. Wong et al., [26] found that higher levels of compassion satisfaction and lower levels of stress and burn-out, were reported by those who experience higher levels of resilience.

Health disparities

Several studies have noted the increased exposure, health risk and outcomes posed by COVID-19 particularly for racial and ethnic populations as well as women [27-29]. Research further suggests that, among health care workers, people

of color are more likely to report reuse of or inadequate access to PPE and to work in clinical settings with greater exposure to patients with COVID-19[27]. These studies reinforce the anecdotal experiences of Health Care professionals which further indicate that this pandemic risk and the associated implications, including high mortality rates, exacerbates the existing disparities for women and racial/ethnic minorities calling for equity in health care access and services, as well as social and economic systems. With respect to race and ethnicity, the variability in threat perceptions of COVID-19 could also be explained from prior evidence that shows historically marginalized racial and ethnic groups tend to have less access to services and quality care,[30] making them perceive more risk in light of fewer healthcare resources[29]. Compounding these disparities, many individuals within these populations are considered "essential workers," [31] including HCWs, heightening potential exposure to COVID-19. In both samples, Israeli and American, we found heightened levels of fear with non-majority ethnic populations. In spite of the varying racial/ethnic composition of the two countries, the results concur with prior research findings indicating higher levels of perceived threat or fears associated with health conditions as well as the health care system. This pattern is also seen with gender, with women more likely to report higher levels of fear or threat. This higher level, again, may be associated with concern regarding the threat of transmission to families. The majority of HCWs in this sample are women.

Study Limitations

This study does have limitations that may impact the generalizability of the results. The study compares two culturally distinct populations, including differences in ethnic and racial diversity. It is important to note that the generalizability may be limited given the heterogeneity of the populations across the American and Israeli samples related to diversity, including religion and racial demographics. The data is also self-report from a self-selecting, overwhelmingly female sample.

Conclusion

As the pandemic continues to be a global health concern, the impact upon healthcare professionals' psychological, emotional and physical wellbeing, as well as the pressure upon health care facilities, including resources and staffing challenges, supporting HCWs remains an immediate concern. Experiences with compassion fatigue are particularly prevalent in the healthcare profession at this time. Compassion fatigue consists of a physical and emotional exhaustion when caring for others during times of high stress or trauma, often occurring as a result of the work environment, limited resources, and extended work hours. Enhancing resilience by addressing such wellbeing factors as sufficient sleep, cultivating positive emotions and life satisfaction is paramount for health care professionals[23]. This is challenging, given staffing shortages and a crisis response environment, including the unknowns of COVID-19 variations. Health care disparities remain a ubiquitous concern in terms of equity within a diverse workforce. Additional education and awareness for leadership is suggested. Wu et al., [32] recommends skill development in effective crisis management, planning and action; as well as consistent communication that provides up-to-date information and encourages employee self-determination; and the provision of a 'continuum of staff support' that offers a range of initiatives, normalizes feelings of distress and encourages their expression. Empathy, compassion, understanding and adaptability are necessary traits of leadership to support personnel as well as awareness of employee's personal life circumstances. Beyond leadership and personnel support, targeting interventions, access to PPEs and vaccines for diverse personnel may be beneficial to reduce fear of exposure. As the pandemic moves toward becoming endemic, HCWs and the facilities in which they work will benefit from building promising and sustainable practices to ensure equity and a focus upon the resilience and wellbeing of our health care workforce.

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