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The psychosocial impact on frontline nurses of caring for patients with COVID-19 during the first wave of the pandemic in New York City

Christine Kovner, PhD, RN, FAAN[a,d,*], Victoria H. Raveis, MA, MPhil, PhD[b,c], Nancy Van Devanter, DrPh, RN, MEd, FAAN[a,c], Gary Yu, PhD[a,c], Kimberly Glassman, PhD, RN, FAAN[a], Laura Jean Ridge, PhD, RN, ANP-BC[e]

[a]Rory Meyers College of Nursing, New York University, New York, NY
[b]College of Dentistry, New York University, New York, NY
[c]School of Global Public Health, New York University, New York, NY
[d]Grossman School of Medicine, New York University, New York, NY
[e]University of Michigan School of Nursing, Ann Arbor, MI

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ABSTRACT

Background: Infectious disease pandemics, such as COVID-19, have dramatically increased in the last several decades.
Purpose: To investigate the personal and contextual factors associated with the psychological functioning of nurses responding to COVID in the New York City area.
Method: Cross sectional data collected via a 95-item internet-based survey sent to an email list of the 7,219 nurses employed at four hospitals.
Findings: 2,495 nurses responded (RR 35%). The more that nurses cared for COVID patients as well as experienced home-work conflict and work-home conflict the higher the nurses' depression and anxiety. When asked what has helped the nurses to carry out their care of patients the most common responses were support from and to co-workers, training in proper PPE, and support from family/friends.
Discussion: Understanding the potential triggers and vulnerability factors can inform the development of institutional resources that would help minimize their impact, reducing the risk of psychological morbidity.

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Background

Emerging and re-emerging infectious disease pandemics have dramatically increased in the last several decades (Smith et al., 2014). Prior to 2000, pandemics generally emerged once in every decade. In recent years, they have become significantly more frequent. For example, since 2000 six global outbreaks have occurred: Severe Acute Respiratory Syndrome (2003), Influenza A H1N5, bird flu (2007) H1N1 swine flu (2009), Middle East Respiratory Syndrome (2012), Ebola Virus

*Corresponding author: Christine Kovner, Rory Meyers College of Nursing, New York University, 433 First Avenue, 6th Floor, New York, NY 10010
E-mail addresses: ctk1@nyu.edu (C. Kovner), Victoria.Raveis@NYU.edu (V.H. Raveis).
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Disease (2014)) (Ross et al., 2015) and SARS-CoV-2 (COVID-19) (2020).

As the nation's largest healthcare profession, nurses play a significant role in responding to disasters, such as pandemics. Studies consistently show that many nurses feel they are under- prepared to respond effectively (Speroni et al., 2015; Van Devanter et al., 2017). In a study of New York City (NYC) nurses responding to a hospital evacuation due to Superstorm Sandy, nurses reported considerable psychosocial challenges in responding to the disaster due to limited prior disaster experience, training, and education (VanDevanter et al., 2017). A number of studies in the US have shown that nurses responding to disasters experience anxiety, depression and stress (Li et al., 2015; VanDevanter et al., 2017; von Strauss et al., 2017). Global studies have shown that health care workers, in general, are at high risk for developing mental health symptoms, as a result of their exposure to disaster (Mamidipalli et al., 2020). The purpose of this study was to investigate the personal and contextual factors associated with the psychological functioning of nurses responding to the COVID-19 pandemic.

This study was conducted from May through July 2020, in NYC, during the first US wave of the COVID-19 pandemic. The virus, first reported in Wuhan, China in December 2019, quickly spread to other regions of China (Schumaker, 2020). As a result, it was assumed that the virus was most likely to enter the US through West Coast cities and some early cases did. However, due to viral spread from China to Europe, the early major port of US COVID-19 entry was largely through NYC international airports bringing travelers from Europe. The first COVID-19 case in New York State (NYS) was reported on March 1, 2020 (West, 2020). By March 23 there were 21,000 cases statewide, with 12,305 in NYC. Throughout the spring of 2020 NYS had more cases of COVID-19 than any state in the US. The health care infrastructure of the region was unprepared for the scope and intensity of the care needs for the affected population. Registered Nurses (RNs) were the largest group of health professionals responding to the pandemic (Choi et al., 2020).

Theoretical Framework

The nature of the nursing profession increases the risk of encountering situations of personal risk and, multiple causality events, such as the COVID-19 pandemic, that generate role demands which may impede or conflict with personal lives and family responsibilities. Resiliency theory provides the conceptual framework for understanding the personal and contextual factors impacting the psychological functioning of hospital RNs caring for patients during the months-long surge in COVID-19 illness. This conceptual framework focuses attention on the promotive factors – personal characteristics (assets) and social/environmental protective factors (resources) that can positively affect RNs' coping (short-term) and the adaptation, restoration, and recovery process (long term) (Fergus & Zimmerman, 2005), as well as, identifying the vulnerability and risk factors that can adversely impact current functioning or impede post-event recovery (Fergus & Zimmerman, 2005; Garmezy et al., 1984; Rutter, 1987, 2006; Zimmerman, 2013). The resilience framework guided our selection of variables included in this study. In this investigation we examined the short-term impact of various promotive factors (assets and resources) on the RNs' psychological functioning. A long term follow-up is necessary to fully test the model.

Methods

Design

Our approach was cross-sectional, using an internet-based survey. In addition to the quantitative survey, participants were given the opportunity to write-in further comments at the end of the survey.

Setting

The study was conducted at the NYU Langone Health System (NYULH), which includes four hospitals in the NYC area: a major medical center hospital, an urban community teaching hospital, a suburban community teaching hospital and an urban specialty hospital that was converted into a COVID-19 hospital, when all elective surgery was stopped in the early stages of the COVID-19 pandemic. Also included were a rehabilitation facility and the ambulatory care sites that are part of the system.

Sample

All RNs who were employed by NYULH on May 5, 2020 were included. Surveys were sent to 7,219 RNs; 2,495 responded, for a response rate of 35%. Ten surveys were eliminated because the respondents were LPNs and two other surveys were eliminated because respondents did not indicate that they had a professional nursing degree leaving 2,483 respondents. Of these about 1,600 completed more than half of the survey items.

Data Collection

With collaboration from NYULH, all RNs at these sites were contacted by email inviting them to participate in an online anonymous survey. Researchers were blinded to the individual email addresses. Following the Total Design Method (Dillman et al., 2014), we used multiple e-mail reminders. We sent an alert email, an email with a link to the survey and two reminder emails each with a link to the survey. Respondents were anonymous; therefore, reminders were sent to all RNs whether or not they had responded to an earlier request. We collected the survey data between May 27, 2020 and July 11, 2020. Respondents entered their survey responses

electronically into a RED CAP survey located on a secure NYU drive. The survey data were then downloaded to another NYU secure drive and cleaned. The study was approved by the New York University School of Medicine Institutional Review Board.

Measures

Data were collected using a 95-item survey. Items and scales were from our previous work on disasters (Van Devanter et al., 2017), the Newly Licensed Registered Nurse survey (Kovner et al., 2007), and a small advisory group of RNs from NYULH. The survey was pilot tested with two RNs not associated with NYULH. Based on the pilot test small changes were made. These nurses estimated that the survey would take about 15 minutes to complete.

In addition to basic demographic data we assessed psychosocial morbidity, variables that have been identified as important outcomes in prior studies of RNs and other health care workers responding to disasters, such as anxiety and depression, as well as, the stressors, strains, assets and resources that are constructs of Resiliency Theory.

Anxiety was measured using the Generalized Anxiety Disorder 2 Item scale (Kroenke et al., 2007). Depression was measured using the PHQ-2 Screener for depressive disorders (Kroenke et al., 2003). These are count measures with options ranging from 0 to 3, with zero being "not at all" and three being "nearly every day." Variables from the resilience framework included potential personal assets (mastery, prior disaster experience, family support) and strains (personal or home life issues, home-work conflict), as well as, contextual resources, situational stressors and strains (or lack thereof) such as work–related characteristics (shift work, organizational support and constraints, work-group support, new unit support, cared for COVID-19 patients, RN-physician relations, temporary housing, work-home conflict). See Appendix A for a list of all scales, sample items and scoring instructions. Individual item such as "NYU Langone has made sufficient supportive services available to nursing staff" and forced choice lists of items such as "How has the COVID-19 pandemic impacted your person or home life (check all that apply)" were developed by the authors. For the analyses we counted the number items checked in each list.

Data Analysis

Data were analyzed using SPSS. The number of items in the scales varied from 3 (Work-Life conflict) to 8 (Organizational constraints). In our sample, all scales had Cronbach Alphas of .82 or above.

Descriptive statistics were computed. We analyzed data for normality using the Shapiro-Wilks test. Both anxiety and depression were skewed. For variables that did not satisfy the normality assumption, the nonparametric bivariate rho (Spearman) correlation test was performed. We corrected for the effects of multiple correlations on potentially related variables by performing multivariate partial correlations on variables found to be significant in the bivariate analysis. For the multivariate partial correlation analysis, variables that did not satisfy

Table 1 – Sociodemographic Characteristics of Nurses

		Percent	Number
Age	20-29	25.1	364
	30-39	29.7	430
	40-49	17.3	250
	50-59	17.3	251
	60-69	10.3	149
	70 or over	0.3	4
Gender	Female	91.4	1332
	Male	6.4	94
	Other	0.2	3
	Prefer not to answer	2.0	29
Race	Asian	15.4	221
	Black	9.9	142
	White	68.6	986
	Native American, American Indian, Native Hawaiian, Pacific Islander, Other	6.2	89
Marital status	Married/partnered	52.4	762
	Never married, widowed, divorced, separated	47.6	712
Children	No children or none living at home	45.5	652
	Children living at home	54.6	785
Job Title	Clinical RN (excludes advanced practice nurse)	87.7	1437
	Manager/administrator	6.7	109
	Advanced practice nurse	5.7	93
First Professional Nursing Degree – line 5686	Baccalaureate in Nursing (BSN)	77.2	1116
	Associate degree/diploma	16.4	236
	Masters or doctoral	6.5	94

the normality assumption were transformed using the ranks of the values to achieve normality.

Findings

The **sociodemographic characteristics** of respondents are shown in Table 1 and are similar to those of the most recent RN National Sample Survey (NSS) (U. S. Department of Health and Human Services, 2019) with the exception of first professional degree and age. Baccalaureate graduates made up 77.2% of our sample and only 39.2% in the NSS sample. In the NSS, 50% of respondents were less than 50 years old, and in our sample more than 50% were less than 40 years old. However, in terms of highest degree the samples were similar; 22.7% of our and 19.3% in the NSS had a masters or higher degree (not shown). Sixty-eight percent of our respondents were white, while in the NSS sample 73.3% were white. The large majority (87.7%) of our respondents were non-Nurse Practitioner clinical RNs.

Characteristics of the RNs' **work life** are shown in Table 2. Almost 75% of the respondents worked in an inpatient setting with 25.1% working in ICUs. More than 75% did not have any prior epidemic experience or experience with the most recent natural disaster, Superstorm Sandy, which impacted the functioning of a number of hospitals in the NYC metropolitan region and required the sudden evacuation and temporary closure of the NYULH major medical center (Van Devanter et al., 2017). More than half of the respondents had been assigned to a new unit as part of NYULH's response to the pandemic. Of those, 75.9% thought that they had received sufficient support from staff at the new unit. Most RNs had cared for COVID-19 patients at least for a few days and the majority having cared for COVID-19 patients all or most days.

	Median (IQR)	Range (IQR)	
Hours worked previous week	37.5 (36-40)	(36-40)	2483

RNs experienced COVID-19's impact not only at work but in their **home life** as well (Table 3). In addition to specific forced choice items, we included a scale that measures work-family conflict, the degree to which the respondent's job interferes with their home life (mean 3.31; SD 1.63; range 1-5) and the scale that measures family-work conflict, the degree to which home life interferes with their job (mean 1.62; SD 1.09; range 1-5). Only 16.5% of the RNs wrote that COVID-19 has no or minor impact on their personal or home life. Almost half of the RNs reported needing to self-isolate and more than 18% resided in some temporary place (NYULH provided housing, usually hotel space near the hospital for any RN who wanted or needed to isolate from their family). Fully 29% of the RNs had a family member or close friend who was critically ill or died from COVID-19 and for most of those RNs, they were unable to be with those family members or friends during their illness or when they died. When asked what has helped them to carry out their care of patients, the most common responses were co-worker support, training in proper Personal Protective Equipment (PPE), support from family/friends, providing support to others, and previous infectious disease patient care experience.

The mean score for **anxiety** was 1.97 (s.d. 1.81) and median of 2.0 (Interquartile Range (0.0-3.0). About 27.4% of the RNs scored 3 or higher, which is cut off score for further evaluation for anxiety. The data were skewed (two items; range 0-3). The mean score for **depression** was 1.42 (s.d. 1.57) and the median was 1.0 (Interquartile Range 0.0-2.0). About 16.5% of the RNs scored 3 or higher, which is the cut off score for further evaluation for depression.

For the multivariate analyses, we first controlled for demographic variables. Table 4 shows the relationship between the control variables and both anxiety and depression. We report medians and interquartile ranges because the data are skewed. Anxiety scores were higher for younger RNs compared to older RNs, White RNs compared to Black and Asian RNs, those working in the ICU compared to other sites, clinical nurses compared to managers, and those with Baccalaureate degrees compared to other degrees. RNs without children had higher anxiety scores than those with children. Although the median anxiety score for married/partnered RNs compared to widowed, divorced, and never married was identical, the ranges varied with married RNs having a lower range.

There were fewer differences in depression among the RNs. Younger nurses scored higher on the depression scale than older RNs. Nurses in ICUs were more likely to be depressed than those working in other sites as were RNs with a baccalaureate degree.

Table 5 shows the Spearman Partial Nonparametric correlations between variables of interest and depression and anxiety, while controlling for the control variables described above (e.g., age, race, work location and role, and educational background). In terms of level of anxiety and Assets and Resources consistent with the resilience framework, higher scores of quality of physician-nurse work relations were associated with less anxiety. More support is associated with less anxiety, as was NYULH support services. More assets and resources were associated with less anxiety as was residing in temporary housing. More mastery was associated with less anxiety.

In terms of stressors and strains consistent with the resilience framework, more stress was associated with more anxiety as was higher frequency of caring for COVID-19 patients. More organizational constraints, as well as, higher number of ways in which COVID impacted one's home life was associated with more anxiety. More work-home and home-work conflict was associated with more anxiety, as well as, having a family member die and higher number of ongoing issues due to COVID-19.

Relationships with depression followed a similar pattern. In terms of assets and resources,

Table 2 – Work-Life Characteristics of Nurses

NYU Site		Percent	Number
	Tisch/Kimmel	46.5	814
	NYU Winthrop	35.4	620
	NYU Langone Brooklyn	12.7	222
	NYU Langone Orthopedic	5.3	93
Unit type			
	Intensive Care Unit	25.1	403
	Inpatient-non ICU	49.2	788
	Other	25.7	412
Participated in evacuation of hospital during Super Storm Sandy			
	Yes	8.2	120
	No	91.8	1336
Prior to admission of COVID-19 patients had experience in previous epidemic/pandemic	yes	24.4	356
	No	75.6	1102
Since March 15, 2020 was assigned to a new unit			
	Never	46.6	747
	Once	14.5	232
	Twice	10.8	173
	Three or more times	28.1	451
Received sufficient support from staff at new work unit			
	Yes	43.7	694
	No	13.9	220
	Not assigned to a new unit	42.4	674
NYU Langone has made sufficient supportive services available to nursing staff			
	Yes	55.8	842
	No	16.4	247
	Don't know	29.9	421
Typical work schedule			
	Days	66.6	1170
	Other	33.4	588
How often cared for patients with COVID-19			
	All/most days	55.1	969
	About half of days	15.8	277
	A few days	17.3	304
	Not at all	11.8	208
Kind of communication received from nurse manager			
	Frequent, valuable	31.5	554
	Good	20.7	364
	Adequate	26.4	465
	Insufficient	15.5	273
	Poor to no	5.9	104
Years worked as RN			
	<1 year	5.3	77
	≥1 year	94.7	1371
Days absent from work since March 15, 2020			
	None	55.6	868
	1-3	29.0	453
	4-6	6.1	96
	≥7	9.3	145

consistent with the resilience framework, the higher the perceived quality of physician-nurse relations the lower the depression level. Higher perceived NYULH support services was also associated with a lower depression level, as was residing in temporary housing. The strongest relationship was between higher mastery scores and lower depression scores.

Table 3 – Home Life, Well-Being and COVID-19

Question/Variable	Response Options	%	N
Since caring for patients with COVID-19, has resided in a temporary place for at least part of the time to protect family or persons one lives with			
	Yes	18.6	326
	No	71.2	1247
	Have not cared for any patients with COVID-19	10.2	178
What has helped to carry out care of patients with COVID-19 (check all that apply)			
	Received support from co-workers	75.0	1321
	Support of my family/friends	58.4	1029
	Provided support to others	56.3	992
	Received training in the proper donning (putting on), doffing (taking off), and disposal of personal protective equipment (PPE)	53.9	949
	Usually very resourceful in difficult situations	37.5	661
	Have previous infectious disease/infection control patient care experiences	34.4	607
	Faith/spirituality/religion	30.0	529
	Was provided with adequate supplies of personal protective equipment (PPE)	27.0	475
	Received training in infectious disease/infection control	25.9	456
	Received support from Nursing leadership	25.7	452
	Professional nursing education	23.3	410
	Felt the hospital was well-equipped) to provide care to COVID-19 patients	16.0	282
	Others remained calm	16.1	283
	Have not cared for any patients with COVID-19	11.1	196
	Other	3.5	62
COVID-19 pandemic impacted personal or home life in the following ways (check all that apply)			
	Needed to self-isolate	44.5	784
	Family member/close friend needed to self-isolate	29.4	518
	Health professional diagnosed family member/close friend with COVID-19	23.5	414
	Had no or minor impact	16.5	291
	Family member/close friend died from COVID-19	15.9	281
	Healthcare professional diagnosed you with COVID-19	13.5	238
	Family member/close friend was critically ill with COVID-19 complications	12.7	223
	Family member/close friend died, but not from COVID-19	5.4	96
	Other	6.7	118
Other ongoing issues as a result of COVID-19 (check all that apply)			
	Spouse/partner lost their job	12.8	225
	Pension or other savings negatively impacted	26.6	469
	Unable to pay mortgage or rent	3.6	64
	Had to move into a relative's or friend's home	3.3	59

(*continued*)

Table 3 – (*Continued*)

Question/Variable	Response Options	%	N
	Relatives or friends moved into your home	4.5	80
	Had new caregiving responsibilities for children, other family and/or friends	26.4	466
	Irreparable harm to you, your family, and/or your community	9.5	168
If a family member/close friend was critically ill or died from COVID-19 able to be present with them (check all that apply)			
	Yes	2.8	38
	No	26.2	355
	DNA, no family member/close friend was critically ill or died from COVID-19	71.0	964

In terms of stressors and strains, knowing that COVID-19 patients were being cared for in the RNs hospital, as well as, the higher the frequency of caring for COVID-19 patients were associated with higher levels of depression. Higher frequency of organizational constraints and personal impacts were associated with higher levels of depression. Greater work-home and home-work conflict were associated with high levels of depression. Having a. family member or friend die from COVID-19 and other ongoing personal issues were also associated with higher levels of depression.

Discussion

The COVID-19 pandemic is a public health crisis. Since the World Health Organization (WHO) designated "the novel coronavirus outbreak a public health emergency of international concern (PHEIC)" on January 30, 2020, (WHO, 2020), the pandemic has continued unabated with the number of COVID-19 related mortality and morbidity in the US and world-wide at high levels. The virus's impact on the public health infrastructure continues to mount. RNs, primary front-line workers in the COVID-19 pandemic, encounter not only the stresses and risk of a serious and potentially fatal health condition, but also the increased risk of a mental health impact. The pandemic has subjected RNs, and other front-line healthcare workers, to situations of unparalleled stress, as routine roles and responsibilities are disrupted and there is a necessity to work outside of their normal routine.

Coping with this changed work environment, one that is now a site for exposure to life threatening infection, presents a challenge the health care work force may be ill-prepared to address. This daunting task is complicated further by concerns not only about personal risk but also worry about infecting family members and others in their social network. These situational factors increase the risk for psychological morbidity and burnout. Indeed, there is growing recognition that a critical part of the public health response to the COVID-19 pandemic should be supporting the mental health of the healthcare workers (Chew et al., 2020; Walton et al., 2020).

Although it not possible to fully eliminate the risk of psychosocial morbidity, an achievable goal is to promote the factors that can build and sustain resiliency in the health care workforce. Understanding the potential triggers and vulnerability factors (e.g. stresses and strains) that contribute to psychological morbidity, such as depression and anxiety in the nursing workforce, can inform the development of institutional resources and services that would help reduce or minimize their impact, thereby, reducing the risk of psychological morbidity.

A review of the limited early studies that explored the COVID-related psychological morbidity experienced by healthcare workers, primarily nursing and medical personnel, noted that in addition to depression and anxiety symptoms, extensive stress-related strain was reported as well (Bohlken et al., 2020); as we have observed in the present investigation. Consistent with the strategies to decrease morbidity are both peer and institutional support including temporary housing. Similarly decreasing organizational constraints such as insufficient protective gear and incorrect directions is likely to decrease morbidity.

In a rapid review and meta-analysis of the occurrence, prevention and management of the adverse psychological impact of emerging virus outbreaks (e.g. SARS, MERS, Ebola, H1N1, H7N9, as well as, COVID-19) on healthcare workers, consistent with the resilience framework, the factors associated with reduced psychological morbidity included situational and psychosocial resources, such as access to adequate PPE, clear communication, adequate rest and practical as well as emotional support (Kisely et al., 2020). The importance of social support in promoting resilience was noted in a review of COVID-19-related research (Bohlken et al., 2020). These finding echo the relationships we have observed in the present study.

We observed that institutional resources and support (i.e., adequacy of PPE, sufficient communication,

Table 4 – Relationship Between Control Variables and Anxiety and Depression

Variable Name	Response Options	Median Anxiety (Interquartile Range)	Median Depression (Interquartile Range)
Age	20-29	2.0 (1.0–4.0) a	2.0 (0.0–2.0) b
	30–39	2.0 (1.0–3.0)	1.0 (0.0–2.0)
	40–49	2.0 (0.0–3.0)	1.0 (0.0–2.0)
	50–59	1.0 (0.0–2.0)	1.0 (0.0–2.0)
	60–69	1.0 (0.0–2.0)	1.0 (0.0–2.0)
	70 and over	0.0 (0.0–0.0)	0.0 (0.0–1.5)
Gender	Male	2.0 (0.0–3.0)	1.5(0.0–2.0)
	Female	2.0 (1.0–3.0)	1.0 (0.0–2.0)
Race	White	2.0 (1.0–3.0) c	1.0 (0.0–2.0)
	Asian	1.0 (0.0–3.0)	1.0 (0.0–2.0)
	Black	1.0 (0.0–3.0)	0.0 (0.0–2.0)
	Other	2.0 (0.0–2.0)	1.0 (0.9–2.0)
Unit type	ICU	2.0 (1.0–4.0) d	2.0 (0.0–2.75) e
	Inpatient non ICU	2.0 (0.0–3.0)	1.0 (0.0–2.0)
	Other	2.0 (0.0–2.0)	1.0 (0.0–2.0)
Job Title	Clinical RN	2.0 (1.0–3.0) f	1.0 (0.0–2.0)
	Advanced practice RN	1.0 (1.0–3.0)	1.0 (0.0–2.0)
	Manager/Administrator	1.0 (0.0–2.0)	1.0 (0.0–2.0)
First professional nursing degree	BSN	2.0 (1.0–3.0) g	1.0 (0.0–2.0) h
	Associate degree/Diploma	1.0 (0.0–2.0)	1.0 (0.0–2.0)
	Masters/Doctoral	1.0 (0.0–2.0)	0.0 (0.0–2.0)
Marital status	Married/partnered	2.0 (0.0–2.0) ***	1.0 (0.0–2.0)
	Widowed, divorced, separated, never married	2.0 (1.0–3.0)	1.0 (0.0–2.0)
Children	No children or no children living at home	2.0 (1.0–3.0) ***	1.0 (0.0–2.0)
	Children living at home	1.0 (0.0–2.0)	1.0 (0.0–2.0)

Significance *$p < .05$, **$p < .01$, ***$p < .001$ Kruskal-Wallis (non-parametric equivalent to ANOVA) for categorical variables and Mann-Whiney for dichotomous variables.
*** $p < .001$, ** $p < .01$, $p < .05$
Anxiety
a-70+to 60-69*, 70+-50-59*, 70+-40-49, 70+to 30-39**, 70+to 20-29***, 60-69 to 40-49*, 60-69 to 30-39**, 60-69 to 20-29***, 50-59 to 30-39 **,50-59 to 20-29***, 40-49 to 20-29***, 30-39 to 20-29***
c-Black-White**, Asian-White*
d- other-ICU***, inpatient-ICU***,
f-administrator-direct care RN**
g- Masters – BSN**, associate/diploma-BSN***, *
Depression
b 60-69 to 30-39**, 60-69 to 20-29***, 60-69 to 40-49*. 50-59 to 30-39*, 50-59 to 20-29***, 40-49 to 20-29**, 30-39 to 2029 ***
e-Other-ICU**, Inpatient-ICU***
h-masters – BSN*, Diploma-BSN

supportive staff relationships and sufficient supportive services) were associated with lower levels of anxiety and depression in the nursing workforce. It also merits noting that institutional resources devoted to professional development were particularly important. We found that training in the proper donning, doffing, and disposal of PPE was one of the top factors the majority of RNs identified as having helped them in caring for patients with COVID-19. Of concern, less than one quarter of the RNs in this study reported that their professional nursing education, the foundational resource for the nursing workforce, was helpful in caring for this patient population. Given the health care challenges posed by the emergence of this highly, infectious agent, this nursing education issue merits further attention.

An important concept in resiliency theory is stress-related growth and psychological thriving – the triumphs and opportunity for personal growth one may achieve by living through and coping with an adverse experience, facing a profound challenge or adapting to a changed reality (Calhoun and Tedeschi, 2010; O'Leary & Ickovics, 1995; Park, 1998). Those who have successfully endured this type of strengths-building experience, emerge better enabled to psychologically recover from future events, continuing to grow and function, e.g. thrive, even when faced with additional hardships (Ledesma, 2014; O'Leary, 1998). These benefits or gains include acquisition of newly developed skills and knowledge, a sense of mastery or increased confidence, a strengthening of personal relationships and a changed philosophy of life (Carver, 2010; Tedeschi &

Table 5 – Spearman Partial Nonparametric Correlation: Depression and Anxiety Levels When Controlling for Age, Gender, Race, Unit Type, Title, First Professional Nursing Degree, Marital Status, Children

Variable	Correlation with Anxiety (sig)	Correlation with Depression (sig)
ASSETS AND RESOURCES		
Quality of communication with nurse managers (Lower score, higher quality)	0.044	0.043
Quality of physician-nurse work relations (Higher score, higher quality)	-0.095*	-0.107**
Sufficient support from staff at new unit (Lower score, higher support)	0.117 **	0.040
NYU Langone made sufficient supportive services available to nursing staff (Lower score, higher support)	0.109**	0.143***
Number of assets and resources helpful in carrying out care of COVID-19 patients	-0.049	-0.074*
Resided in temporary housing to protect others in household	-0.083*	-0.082*
Prior epidemic experience	0.006	-0.011
Mastery (Lower score, higher mastery)	0.402***	0.405***
STRESSORS AND STRAINS		
Stressful knowing that COVID-19 patients were being cared for in your hospital (Lower score, higher stress)	-0.250***	-0.156 ***
Frequency of caring for Covid-19 patients (Lower score higher frequency)	-0.152***	-0.129 **
Frequency of organizational constraints that impeded ability to do job (Higher score, higher frequency)	0.252***	0.202***
Number of ways in which COVID-19 pandemic impacted your personal or home life	0.179***	0.134***
Days absent from work	0.056	0.056
Hours worked previous week	0.036	0.024
Work schedule shifts	-0.006	-0.049
Work-home life conflict (Higher score, higher conflict)	0.265***	0.254 ***
Home-work life conflict (Higher score, higher conflict)	0.244***	0.244***
Family member or close friend died	0.146***	0.083*
Number of other ongoing issues due to COVID-19 pandemic	0.208***	0.171***

*** $p <= .001$, ** $p <= .01$, * $p < .05$

Calhoun, 1996). Long-term follow-up is required to determine the extent to which frontline RNs will experience stress-related growth and psychological thriving in the post COVID-19 pandemic era,. However, the potential for such a positive outcome in the future, supports the value of maintaining adequate, evidence-based, institutional resources to facilitate and maintain resilience in the healthcare workforce, ensuring their readiness to respond to future public health emergencies.

Author Contribution

Christine Kovner: 1) substantial contributions to conception and design, acquisition of data, and analysis and interpretation of data; 2) drafting the article or revising it critically for important intellectual content; and 3) final approval of the version to be published

Victoria Raveis: 1) substantial contributions to conception and design, acquisition of data, or analysis and interpretation of data; 2) revising it critically for important intellectual content; and 3) final approval of the version to be published

Nancy Van Devanter: 1) substantial contributions to conception and design, and interpretation of data; 2) revising it critically for important intellectual content; and 3) final approval of the version to be published

Gary Yu: 1) substantial contributions to acquisition of data, analysis and interpretation of data; 2) final approval of the version to be published

Kimberly Glassman: 1) substantial contributions to conception and design, acquisition of data, and interpretation of data; 2) revising it critically for important intellectual content, 3) final approval of the version to be published

Laura Ridge: 1) substantial contributions to conception and interpretation of data; and 2) final approval of the version to be published

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Scale	Sample Question or Statement (number of items)	Response Range	Mean (sd)	Cronbach's Alpha
Organizational Constraints (degree to which employees cannot turn knowledge and effort into strong job performance)	How often do you find it difficult or impossible to do your job because of conflicting job demands? (7)	1 = Never, 2 = less than once a month, 3 = 1-3 days per month, 4 = 1-2 days per week, 5 = 3-4 days per week, 6 = 5 or more days per week	2.55 (1.11)	.908
Collegial RN-MD Relations (degree to which there is a positive working relationship between nurses and physicians)	Physicians and nurses have good working relationships (3)	1 = strongly disagree, 2 = disagree, 3 = agree, 4 = strongly agree	3.25 (1.05)	.969
Pearlin Mastery Scale	I can do just about anything I set my mind to (7)	1=strongly disagree, 2=disagree, 3=neither agree nor disagree, 4=agree, 5=strongly agree	2.79 (0.56)	0.84
PHQ-4: Depression	Over the last two weeks, how often have you been bothered by feeling down, depressed, or hopeless (2)	1 = not at all, 2 = several days, 3 = more than half the days, 4 = nearly every day	3.44 (1.57)	0.87
PHQ4: Anxiety	Over the last two weeks, how often have you been bothered by feeling nervous, anxious or on edge (2)	1 = not at all, 2 = several days, 3 = more than half the days, 4 = nearly every day	3.98 (1.81)	0.88
Work-family conflict (degree to which the respondent's job interferes with their homelife)	How often did you experience your job keep you from spending the amount of time you would like to spend with your family? (3)	1 = Never, 2 = less than once a month, 3 = 1-3 days per week, 4 = 1-2 days per week, 5 = 3-4 days per week, 6 = 5 or more days per week	3.31 (1.63)	0.88
Family-Work conflict (degree to which the respondent's job interferes with their homelife)	How often did you experience your home-life interfered with your job or career (3)	1 = Never, 2 = less than once a month, 3 = 1-3 days per week, 4 = 1-2 days per week, 5 = 3-4 days per week, 6 = 5 or more days per week	1.62 (1.09)	0.89
Commitment to Nursing	Do you stand by your choice of the nursing profession? (3)	1-6, 1-not at all to 6-very much	1.55 (0.83)	0.82

Appendix A

Scales

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