RESEARCH ARTICLE

Nurses' resilience in the face of coronavirus (COVID-19): An international view

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Abstract

The purpose of this cross-sectional study was to examine factors associated with nurses' resilience during the COVID-19 pandemic. Data were collected in the latter half of 2020 from 904 nurses across Japan, Republic of Korea, Republic of Turkey, and the United States. The questionnaire included the Connor-Davidson Resilience Scale 10, plus demographics and 20 questions about practice environment, workplace safety concerning infection control, COVID-related experience, and organizational support. Fear of becoming infected, intention to leave nursing, and having had a positive COVID-19 test were inversely associated with resilience ($p < 0.05$). Regression analysis indicated that U.S. nurses had significantly greater resilience than nurses in the other countries examined ($p < 0.001$). Nurses reporting organization support and those who participated in policy and procedure development had higher resilience scores ($p < 0.01$). Organizational support, involving nurses in policy development, and country of practice were found to be important resilience factors in our research, which aligns with other findings. Further research is recommended to determine the optimal practice environment to support nurse resilience.

KEYWORDS
CD-RISC, COVID-19, healthcare workers, nurses, pandemics, resilience, stress

Key points

- The COVID-19 pandemic placed great demands and exerted tremendous stress on the lives of health care workers.
- Resilience is a characteristic that can help nurses to better cope during crises and function more effectively in the workplace.
- Our survey of over 900 nurses working primarily in four countries found that organizational support, involving nurses in policy development, and country of practice were related to resilience.

646   wileyonlinelibrary.com/journal/nhs   Nurs Health Sci. 2021;23:646–657.

1 | INTRODUCTION

1.1 | Background

On March 11, 2020, the World Health Organization (WHO, 2020a) declared the Coronavirus disease 2019 (COVID-19) a pandemic, considering its severity and worldwide spread (WHO, 2020b). The first reported cases had been a cluster occurring in Wuhan, China, in late December 2019 (WHO, 2020b). The overall symptomatic case fatality risk in Wuhan was 1.4% (Wu et al., 2020) – higher than the 2009 influenza H1N1 pandemic. Since then, the case fatality rate has varied widely between countries across time and by patient age, from a low of 0.25% to a high of 10% (Ritchie et al., 2020). By May 13, 2021, the WHO reported a cumulative worldwide total of over 160 million cases and 3.3 million deaths (WHO, 2021c). The causal agent, severe acute respiratory coronavirus virus 2 (SARS-CoV-2), is a highly contagious virus closely related to other coronaviruses that cause the "common cold" as well as serious conditions. Person-to-person transmission occurs among close contacts (within approximately 6 feet) via respiratory droplets produced from coughs or sneezes (Centers for Disease Control and Prevention [CDC], 2019). This puts health care workers (HCWs) at great risk of exposure (Thielking, 2020).

Unfortunately, the unavailability of timely relevant data makes it difficult to estimate the true burden of HCW infection and plan effectively strategies for management (Bandyopadhyay et al., 2020; International Council of Nurses [ICN], 2021). ICN (2021) data through December 31st, 2020, found more than 1.6 million healthcare workers had been infected across 34 countries showing infection rates in HCWs ranging as high as 30% at times. The ICN estimates that, on average, 10% of all confirmed COVID-19 infections are among HCWs (range: 0%–15%). The cumulative number of nurses *reported* to have died from COVID-19 by that time was 2262 in 59 countries (with data missing from other countries), which the ICN estimates is likely a significant undercount. Acknowledging variable reporting methods, coverage, completeness, and timeliness, the WHO (2021b) reported that health workers accounted for close to 1.29 million COVID-19 cases, or 8% of cases for which it received reports. The median age of these health worker cases was 42 years (interquartile range 27 to 60 years); 68% were women (which reflected the proportion of women working in the health and social sectors globally). Gholami et al. (2021), reported a 15.1% hospitalization prevalence and 1.5% mortality from their systematic review and meta-analysis of 28 articles that had addressed HCW's clinical outcomes and risk factors for SARS-CoV-2 infection. The WHO's periodic systematic reviews of published studies of HCW risk factors have found no consistent differences in risk of infection between job titles, including between nurses compared with physicians (the two most commonly reported health worker roles). Infection control training, along with availability and appropriate use of recommended personal protective equipment (PPE) were the key factors to lower the infection risk (WHO, 2021b).

The Code of Ethics of the ICN (2012) states that nurses' primary commitment is to the patient. Indeed, there have been a plethora of stories from the pandemic describing nurses' and other healthcare workers' extraordinary response to the increased, often overwhelming, demand for acute care as well as preventive, diagnostic, school health, and home-care services. Damery et al. (2010), who investigated HCW perceptions following a flu pandemic in the National Health Service in the United Kingdom, found that along with the workers' duty to care was the expectation of reciprocity: that the health care institution which employed them also had a duty to provide them with optimal working environments and not place them at undue risk of illness.

Lorente et al. (2021) found fear of infection, lack of support, work overload, and insufficient preparation were associated with psychological distress among 421 nurses at the peak of the COVID-19 epidemic in Spain from April to May 2020, but the distress was mediated by emotion-focused coping and resilience. Similarly, a survey of 180 nurses at the peak of the initial epidemic in Wuhan found higher resilience and positive affect were associated with less burnout, negative affect, and emotional exhaustion (Zhang, et al., 2021).

Resilience is both a process and a trait. The American Psychological Association (2018) defines resilience as a process that allows individuals to adapt to adversity and maintain hope. Measures of resilience evaluate the ability of individuals to seek and utilize social support and supportive networks, individual capacity to improve self-perception and to accept circumstances, and the ability to grow following a stressful event (Leys et al., 2020). Wei et al. (2019) maintain that nurses' resilience helps them survive and thrive amidst adversities at work.

This paper reports findings about nurses' resilience during the COVID-19 pandemic from a four-country (Japan, Republic of Korea, Republic of Turkey, United States) survey during the second half of 2020. The survey addressed nurses' work experience and professional quality of life during the COVID pandemic, whether or not they cared directly for patients with COVID. Specifically, our aims were as follows: (i) to describe nurses' level of resilience; and (ii) to identify factors associated with resilience. These data about resilience are from a larger study examining nurses' professional quality of life during the pandemic (Reifsnider, 2021).

We used an ecological framework to examine how resilience is associated with selected intrapersonal, interpersonal, organization, community, and policy variables. The socio-ecological model (SEM; McLeroy et al., 1988), which considers the interplay of intrapersonal, interpersonal, organizational, community, and public policy factors and processes on individual behavior, points to how diverse factors can impact nurses' professional and personal response to pandemic-related stressors. With potentially far-reaching impact on multiple factors at each of these five levels, the COVID-19 pandemic has challenged the resilience of all concerned. Thus, the SEM could also suggest targets for developing interventions to support and enhance resilience. Figure 1 depicts our study variables in the SEM frame.
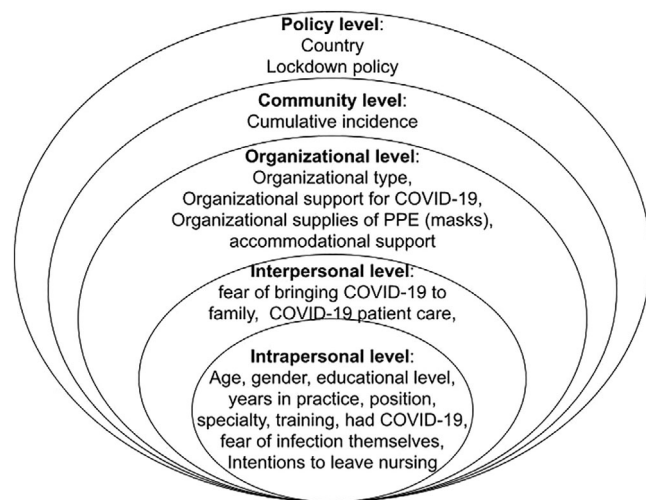
FIGURE 1 Socio-ecological model for resilience in nurses

1.2 | Literature review

1.2.1 | Resilience

Individuals' resilience was initially considered to be a personal trait (Fletcher & Sarkar, 2013). The Connor-Davidson Resilience Scale (Connor & Davidson, 2003) operationalized it as stress-coping ability in relation to outcomes of treatment for stress reaction, and for depression and anxiety associated with stress. When one considers resilience as a positive trait rather than only a reaction to stress, an outcome is positive adaptation (Windle, 2011). Fletcher and Sarkar (2013) defined resilience as the mental and behavioral process to promote personal resources and protect oneself from the negative effects of adverse events. Others have described the influence on resilience of previous experiences, genetic factors, and environments (Kim-Cohen & Turkewitz, 2012). A study of practice environment ($n = 507$ nurses) found that a positive workplace environment (defined as leader support, unit management, collegial support, social capital among nurses, and a sense of accomplishment in work) was associated with high resilience to workplace stress and accounted for 24% of the variance in participant decisions to stay in their current position (Gensimore et al., 2020).

1.2.2 | Healthcare worker stress

As front-line HCWs, nurses provide most of the personal care to patients who are too ill to care for themselves. They spend a higher proportion of time in contact with patients than other disciplines and this face-to-face interaction not only raises their risk of getting infected, but it also exposes them to the emergent suffering of patients and their families when they confront the unprecedented health challenges of COVID-19 (WHO, 2021b).

Literature about HCW responses to previous pandemics, such as SARS, H1N1, avian flu, and MERS, describes multiple perspectives regarding nurses' experiences and expectations and suggests ways to sustain resilience and support coping (De Brier et al., 2020; Duncan, 2020; Maunder, 2004; Oh et al., 2017). During the SARS pandemic in Taiwan, Shih et al. (2009) linked nurses' professional identity to seeking resources to clarify the disease, the contagion, prevention, and treatment. Common sources of knowledge were their own and others' practice experience and knowledge, nurse leaders, professional organizations and WHO. There was less trust for hospital administrations, especially when they did not provide the necessary PPE.

Past pandemics and epidemics also demonstrate the potential negative psychological impact of COVID-19 on HCWs (Magill et al., 2020; Oh et al., 2017). During the H1N1 pandemic, HCWs reported anxiety, psychological distEress, and concerns about possible infection of their families and friends in Greece (Goulia et al., 2010). During the SARS epidemic in Hong Kong, emergency department nurses reported that despite adequate knowledge for the tasks involved, the increased workload and focus on disease surveillance and prevention rather than life preservation created conflicts and induced role ambiguity, which was a major stressor that depleted job satisfaction (Lam et al., 2019).

Not surprisingly, studies during the COVID-19 pandemic found that HCWs experience multiple stressors with both physical and psychological impact (Loriente, 2020), including sleep problems (Huang & Zhao, 2020) and high burnout (Sahin et al., 2020). In the early phases of the epidemic in Wuhan, 52.8% of nurses reported insomnia (Zhan et al., 2020). Tan et al. (2020) found front-line nurses experienced both positive and negative impacts, including fear, anxiety, and frustration, but also empathy, compassion, and enhanced confidence in their professional skills. They expressed the need for predictable work schedules and psychological counseling.

Nurses whose healthcare organizations provided them with PPE and/or accommodations during the COVID pandemic experienced lower burnout (Jo, 2021). Nurses in Hong Kong who worked during the SARS epidemic stated that a major role strain was due to role ambiguity (Lam et al., 2019). This was especially true for nurses who worked in emergency departments, who are truly the first HCWs to encounter patients seeking care for illness or injury. However, with a shortage of personnel trained in disease surveillance, they had to adopt new roles, which caused role strain, ambiguity, and increased fatigue.

2 | POLICIES REGULATING NURSING EDUCATION AND PRACTICE BY COUNTRIES

Nursing regulation varies widely by country, although there have been efforts toward regional harmonization in recent decades. Recognizing that intercountry differences among the countries we sampled could be associated with nurses' experiences, educational level, and responses to the local epidemics in their respective countries, we also compare whether nurses with education beyond the entry to practice (MSN or doctorate) or advanced practice credentials report differences in their levels of resilience from other nurses (Table 1).

TABLE 1 Summary of country nursing statistics

	United States	Japan	Rep. of Korea	Turkey
Education for RN	Diploma, associate, and BS degree	BS degree	BS degree	Diploma, associate, and BS degree
No. of RN per 1000 people (2018)	11.9	11.8	7.2	2.34
Health expenditure (USD) per person	$11 072	$4823	$3384	$1340
Licensure required to practice	Yes	Yes	Yes	No
Mortality Rates from COVID-19; deaths Per 100 000[a]	132	4.4	2.7	31

Note: Johns Hopkins Coronavirus Resource Analyses https://coronavirus.jhu.edu/data/mortality.
[a]As of January 29, 2021.

2.1 | Japan

Japanese nursing professionals are public health nurses, midwives, and nurses (Japanese Nursing Association, n.d.). In 2016, there were 1 660 071 nurses in Japan, and 81% are working in hospitals and clinics (Japanese Nursing Association, 2015). There were 11.8 nurses and 12.1531 nurse and midwives per 1000 persons in 2018 (Organisation for Economic Cooperation and Development [OECD], 2020b; WHO, 2020a). The Japanese population spent 4823 US dollars per person for health care in 2019 (OECD, 2020a).

2.2 | Republic of Korea

In Korea, the baccalaureate degree in nursing at the college or university level is required to take the nursing license exam to be a nurse (Korean Nurses Association, n.d.). There are 355 772 nurses which accounts for 29% of total health care providers in 2016 (Ministry of Health and Welfare of South Korea, n.d.). There were 7.2 nurses per 1000 population in 2018 (OECD, 2020b; WHO, 2020a). Koreans spend 3384 US dollars per person for health care (OECD, 2020a).

2.3 | Republic of Turkey

According to the 2019 OECD data, there are 2.3 nurses per 1000 population and the ratio of nurses to physicians is 1.2 in Turkey. Over 250 000 nurses work in ministry-related health care organizations (OECD, 2020b) while 67 464 nurses are employed at universities and in the private sector. In March 2020, the Turkish government recruited 11 000 nurses, with the majority at the baccalaureate level. In December 2020, they recruited an additional 7000 nurses, again with the majority at the baccalaureate level (Ministry of Health of Turkey, 2020).

2.4 | United States

In 2018, there were a total of 3 059 800 of registered nurses in the United States and this number is expected to increase by about 12% by 2028 (Bureau of Labor Statistics, 2020). Sixty percent of nurses in the U.S. work in hospitals (Bureau of Labor Statistics, 2020). There were 11.9 nurses per 1000 people in 2018 and 14.48 nurses and midwives per 1000 in 2017 (OECD, 2020b; WHO, 2020a). In 2019, the U.S. population spent 11 072 US dollars per person on health, the highest among the OECD countries (OECD, 2020a). Registered nurses in the United States are prepared at the associate degree (community college), diploma (healthcare institution), or baccalaureate (four-year college or university level). All nurses who graduate from these programs take the same licensing exam and are recognized by the state boards of nursing as registered nurses upon passing the licensing exam.

3 | METHODS

3.1 | Design

This cross-sectional descriptive survey used an anonymous online self-report questionnaire distributed using the REDCap secure web application for data collection. The countries for sampling were selected by convenience, reflecting the residence of the research team members. An online invitation to participate was sent to known networks of research team members. This recruitment outreach included social media, listservs and membership lists of nursing societies, hospitals, etc. Initial recipients of the survey link were encouraged to send the survey on to other actively practicing nurses in their networks. It included the study description and URL links to the survey in five languages (English, French, Japanese, Korean, and Turkish). The invitation and study description explicitly indicated that study inclusion required currently active practice, but not experience with COVID-19 patients.

3.2 | Data collection and ethics approval

Demographic questions, initially constructed in English, required adaptation for cross-cultural fit to facilitate translation of questions related to nursing education and hospital organizational structures. Research team members in countries for which translation was needed had at

least intermediate level English fluency and coordinated the processes of translation and validation (Bennett et al., 2021). The digital REDCap web application facilitated hard copy availability in languages that used the Latin alphabet, but this facility was unavailable in Japanese or Korean. In these countries, authors and collaborators loaded the data for their countries into the online data collection methods used in their countries.

Data were collected between July 1 and November 30, 2020. As our aim was an exploratory cross-sectional study, we included all responses in the analyses regardless of whether a respondent was currently working in a country targeted for data collection. The study was determined exempt by the Arizona State University Institutional Review Board (IRB) at the primary investigator's institution (IRB no: STUDY00012060). Each collaborating investigator obtained the needed ethics permission from their respective ethics boards and/or their country's ministry of health.

3.3 | Instruments

Resilience was measured using the Connor-Davidson Resilience Scale 10 (CD-RISC 10) (Davidson, 2018). It consists of 10 items using 5-point Likert scales (0 = not true at all, 1 = rarely true, 2 = sometimes true, 3 = often true, 4 = true nearly all the time). The total score was calculated by summing all items, producing a total score with the possible range of 0–40. A higher score means greater resilience. Scores can be categorized as low (0–10), intermediate (11–30), and high (31–40). The Cronbach's alpha was 0.89 in this study.

Organizational types were categorized as inpatient, outpatient/non-acute (including public/community health), or other/could not determine, which included educators, school nurses, advanced practice, and mental health nurses. Educational levels were categorized as basic education (diploma and associate degree), bachelor's degree, or higher education (master's and doctoral degree). History of COVID-19 testing was categorized as negative result, positive result, or never been tested.

Organizational support for preventing the spread of COVID-19 was measured using three 4-point Likert scales (1 = strongly disagree to 4 = strongly agree). The items asked whether the organizations were equipped with sufficient supplies/facilities, applied the best infection control guideline equipment, and discussed prevention regularly. The total score was calculated by summing all items, and a higher score means satisfaction with organizational support for COVID-19 management (possible score: 3 to 12). The Cronbach's alpha was 0.89.

Three 10-point Visual Facial Scales (Cao et al., 2017) measured whether respondents had "considered leaving nursing because of the workload, stress, and fear", "fear of being infected with COVID-19 at work" or "bringing COVID-19 home from work to family" (Kim & Choi, 2016). Possible scores are 0 to 10; a higher score means greater fear of infection (for self or family, respectively) or greater intention to leave nursing.

We coded history of COVID-19 testing as a negative result, a positive result, or never been tested. Other pandemic-related variables were coded as yes/no: COVID-19 patient care experience, employer-provided masks, other PPE, involvement in developing policies/procedures to prepare for COVID-19, having had training/courses regarding related to COVID-19 patient care and/or precautions, and having been asked to work with patients at higher acuity levels than usual practice. We also asked, "has any accommodation been offered for you by your institution/hospital?" Possible responses were no, yes – at the hospital, yes – at a place/hotel that is close, yes – at a far-away place/hotel. Responses were then categorized as yes/no for analysis.

Demographic variables included age, gender, years of practice, certification in a specialty, position, country of practice, type of organization where employed, and highest education level. The highest level of education was categorized as basic education (diploma, associate degree, or bachelor's degree) or higher education (master's and doctoral degree).

3.4 | Analysis

Basic descriptive statistics and frequencies were conducted to identify implausible values using SPSS software version 26. Possible violations of assumptions were screened including normality and linearity. Measures of multicollinearity and influence were examined to identify potential influential observations. To examine factors associated with resilience among nurses during the COVID-19 pandemic, multiple regression was used with all predictors entered simultaneously.

Maximum likelihood estimation with robust standard errors (MLR) was used to estimate parameters using Mplus software, version 8.5 (Muthén & Muthén, 1998/2020). This estimation procedure obtains optimal parameter estimates in the presence of incomplete data (Enders & Bandalos, 2001), provided data are missing at random. If we had used listwise deletion, 17.5% of the cases would have been excluded from the analysis. With the MLR estimation, no cases were excluded. The z test available in Mplus was used to test regression coefficients as well as the proportion of outcome variation due to the predictors (i.e., model r square). Standardized regression coefficients were obtained for each predictor. For dummy-coded variables, a Cohen's d type effect size was calculated by dividing the unstandardized coefficient by its maximum likelihood estimate of the outcome standard deviation. All statistical tests used alpha = 0.05.

4 | RESULTS

4.1 | Demographics

A total of 904 responses were received. The largest number of respondents (405) were from the U.S., followed by Republic of Turkey (237), Japan (182), and Republic of Korea (73). The mean age of respondents was 38.0 (±11.9) years and 91.7% were female. Mean years of practice was 13.3 (±11.4) and 37.3% had a specialty. Most

TABLE 2 Sample characteristics (N = 904)

Variable	n	% or M ± SD
Age	846	38.0 (±11.9)
Gender		
Female	824	91.7%
Male	75	8.3%
Years of practice	880	13.3 (±11.4)
Certified in a specialty		
Yes	337	37.3%
No	567	62.7%
Country of practice		
United States	405	44.8%
Turkey	237	26.2%
Japan	182	20.1%
Korea	73	8.1%
Other[a]	7	0.8%
Types of organization		
Inpatient	622	69.6%
Outpatient or non-acute	204	22.8%
Could not determine	68	7.6%
Education		
Diploma and Associate degree	234	26.0%
BSN	461	51.2%
Graduate degree (MSN, DNP, PhD)	206	22.9%
Position		
Bedside staff	528	60.3%
APRN	85	9.7%
Others	262	29.9%
Cared for COVID-19 patients		
Yes	359	40.0%
No	538	60.0%
Provided PPE or mask from workplace		
Yes	689	76.9%
No	207	23.1%
Involved with developing policies/procedures to prepare for COVID-19		
Yes	289	32.4%
No	602	67.6%
Had taken a training/course on caring for COVID-19 patients and protecting oneself		
Yes	583	64.5%
No	316	35.0%
Was asked to work at higher acuity levels to care for patients beyond the usual practice		
Yes	370	41.4%
No	524	58.6%
Offered accommodation from institution		
Yes	206	23.3%
No	677	76.7%

(Continues)

TABLE 2 (Continued)

Variable	n	% or M ± SD
COVID-19 test		
Received negative test result	401	44.5%
Received positive test result	55	6.1%
Was not tested	445	49.4%
Fear of contracting COVID-19	900	5.3 (±3.2)
Fear of spreading COVID-19 to family	900	6.7 (±3.3)
Intention to leave their job	899	3.1 (±3.6)
Had organizational support to prevent spread of COVID-19	874	8.4 (±2.4)

Note: Sample characteristics are based on pairwise deletion.
[a]One nurse participated from each of the following countries: Canada, China, Germany, Lebanon, Marshall Islands, United Arab Emirates, and the United Kingdom.

respondents were working in inpatient nursing (69.6%). Responses from those working in outpatient or non-acute organizations (including nursing education) accounted for 22.8% of the sample. Only 7.6% of responses were from advanced practice nurses. The highest education level held by most respondents was a bachelor's degree (BSN, 51.2%), followed by a diploma or associate degree (26.0%) and graduate degree (22.9%). Almost two-thirds of the (60.3%) responses came from bedside staff. Almost half (40.0%) of respondents reported experience caring for patients with COVID-19.

Almost a quarter (23.1%) indicated that they had not been provided adequate PPE or masks at their workplace. A third (32.4%) were involved in policy development for preparing COVID-19 and more than half (64.8%) had had training about caring for COVID-19 patients and protecting themselves. Almost half (41.4%) of respondents were asked to work with more acutely ill patients than their usual practice, and 23.3% were offered accommodation support from their institution. Although half the sample (49.4%) had not been tested for COVID-19, 6.1% reported having had a positive test and 44.6% reported having had a negative test. Table 2 shows the distribution of sample characteristics.

4.2 | Factors associated with resilience

Mean resilience for the total sample was 26.5 (±7.0) which is an intermediate level (Connor & Davidson, 2003; Davidson, 2018). Table 3 shows subgroup differences in mean resilience for each categorical variable in the regression analysis. These descriptive statistics indicate that the greatest mean differences occurred for country of practice, where mean resilience was greater for the United States compared to other counties. For other variables in the regression analysis, mean fear of contracting and mean fear of infecting family members with COVID-19 was 5.3 (±3.2) and 6.7 (±3.3), respectively (possible score 0 to 10). In addition, mean intention to leave nursing was 3.1 (±3.6), and mean organizational support to prevent spread of COVID-19 was 8.4 (±2.4; possible score 3 to 12).

TABLE 3 Resilience means by subgroups (N = 883)

Variable	n	M (±SD)
Cared for COVID-19 patients		
Yes	351	27.8 (±6.5)
No	525	25.6 (±7.3)
Provided PPE or mask from workplace		
Yes	674	27.2 (±6.8)
No	201	24.2 (±7.3)
Involved with developing policies/procedures to prepare for COVID-19		
Yes	279	28.1 (±6.9)
No	591	25.8 (±7.0)
Had taken a training/course on caring for COVID-19 patients and protecting oneself		
Yes	568	27.6 (±6.8)
No	310	24.6 (±7.0)
Was asked to work at higher acuity levels to care for patients beyond the usual practice		
Yes	364	24.6 (±6.8)
No	509	27.9 (±6.9)
Offered accommodation from institution		
Yes	203	26 (±6.9)
No	660	26.7 (±7.1)
COVID-19 test		
Negative result	392	26.6 (±7.0)
Positive result	55	25.3 (±7.3)
Was not tested	433	26.5 (±7.0)
Gender		
Female	805	25.1 (±6.9)
Male	74	26.6 (±6.9)
Certified in a specialty		
Yes	328	28.9 (±6.2)
No	555	25.1 (±7.1)
Country of practice		
US	393	30.7 (±5.2)
Turkey	230	24.7 (±6.3)
Japan	182	19.9 (±6.2)
Korea	71	25.8 (±4.3)
Other	7	29.0 (±5.1)
Types of organizations		
Inpatient	607	26.6 (±6.9)
Outpatient or non-acute	201	25.3 (±7.4)
Could not determine	65	29.9 (±6.0)
Education		
Diploma or Associate degree	234	24.1 (±7.9)
BSN	452	26.4 (±6.5)
Graduate degree	197	29.5 (±6.0)
Position		
Bedside staff	516	26.0 (±6.8)

TABLE 3 (Continued)

Variable	n	M (±SD)
APRN	81	29.9 (±5.3)
Other positions	257	26.1 (±7.7)
Overall	883	26.5 (±7.0)

Note: Analysis is based on pairwise deletion for participants who provided resilience scores.

Table 4 summarizes the results of the multiple regression model, with the predictors accounting for 44% of the variation in resilience ($p < 0.001$). Lower resilience was reported by nurses who expressed greater fear of contracting COVID-19 ($B = -0.5$, $p < 0.001$) and greater intention to leave nursing ($B = -0.2$, $p = 0.001$), as well as those who reported receiving a positive rather than negative COVID-19 test result ($B = -1.9$, $p = 0.032$). In contrast, increased resilience was reported by nurses who expressed greater fear of infecting family members ($B = 0.3$, $p = 0.014$), organizational support ($B = 0.3$, $p = 0.002$), and involvement in policy development ($B = 1.4$, $p = 0.001$). In addition, country of practice was also a significant predictor of resilience, as nurses practicing in the Republic of Turkey ($B = -4.1$, $p < 0.001$), Japan ($B = -8.7$, $p < 0.001$), and the Republic of Korea ($B = -3.2$, $p < 0.001$) reported diminished resilience compared with nurses in the United States.

We note that although the statistically significant regression coefficients reported in Table 4 are often considered to represent small to moderate effects, the between-country differences in resilience were in some cases fairly large, consistent with the pattern of simple mean differences reported in Table 3. Specifically, compared to the United States, the regression estimated resilience scores for nurses practicing in the Republic of Korea, the Republic of Turkey, and Japan were lower by approximately three points – or one-half standard deviation – to almost nine points – or in excess of one standard deviation, with the latter difference often regarded as quite large.

Neither age, gender, years of practice, specialty certification, work setting, educational level, position, COVID-19 patient care experience, having adequate PPE or COVID-19 training, being asked to work at higher acuity levels, or being offered accommodation contributed significantly to the variance accounted for by the regression model.

5 | DISCUSSION

Nurses' resilience is a vital component of their emotional work of coping with patients' illness and death. Without resilience, a nurse may burn out and even seek to quit nursing altogether (Brown, 2021). We found that nurses who tested positive for COVID-19 reported lower resilience (about two points lower, or 0.3 SD) than those who tested negative. This may be because testing positive in spite of safety precautions threatened their sense of resilience. Knowing that one can become ill through practicing one's profession can result in a feeling of vulnerability, which may be antithetical to feeling resilient. Indeed, we found that the stronger the intention to leave the profession, the lower the resilience.

TABLE 4 Resilience as a function of nurse characteristics

Predictor	B[a]	SE	β[b]
Fear of contracting COVID-19	**−0.5*****	0.1	−0.2
Fear of spreading COVID-19 to family	**0.3***	0.1	0.1
Intention to leave their job	**−0.2****	0.1	−0.1
Had organizational support to prevent spread of COVID-19	**0.3****	0.1	0.1
Cared for COVID-19 patients	0.6	0.4	0.1
Provided PPE or mask from workplace	0.7	0.5	0.1
Involved with developing policies/procedures to prepare for COVID-19	**1.4****	0.4	0.2
Had taken a training/course on caring for COVID-19 patients and protecting oneself	−0.2	0.4	<0.1
Was asked to work at higher acuity levels to care for patients beyond the usual practice	0.6	0.4	0.1
Offered accommodation from institution	−0.9	0.5	0.1
COVID-19 test			
Positive versus negative result	**−1.9***	0.9	−0.3
Was not tested versus negative result	−0.3	0.4	−0.0
Age	0.1	<0.1	0.1
Female vs male	0.2	0.7	<0.1
Years of practice	−0.0	<0.1	−0.0
Certified in a specialty	0.3	0.4	<0.1
Country of practice			
Turkey vs US	**−4.1*****	0.6	−0.6
Japan vs US	**−8.7*****	0.7	−1.2
Korea vs US	**−3.2*****	0.6	−0.5
Other countries vs US	−1.1	1.2	−0.2
Types of organization			
Out-patient or non-acute vs In-patient	−0.4	0.5	−0.1
Advanced nursing vs inpatient	1.4	0.7	0.2
Education			
BSN vs Diploma or Associate degree	−0.8	0.5	−0.1
Graduate degree vs Diploma or Associate degree	−1.0	0.7	−0.1
Position			
APRN vs bedside staff	−0.2	0.7	−0.0
Other positions vs bedside staff	−0.3	0.5	−0.0

Note: N = 904.
*$p < 0.05$.
**$p < 0.01$.
***$p < 0.001$.
[a]B is an unstandardized regression coefficient.
[b]β is a standardized regression coefficient. For the dummy-coded predictors, $\beta = B/sdy$. For the numeric predictors, $\beta = (B*sdx)/sdy$.

The experience of a pandemic is inherently and inevitably local, varying among and within countries and across communities and institutions. Although the mean resilience scores for all countries were at the intermediate level (Davidson, 2018), nurses in the U.S had much higher resilience scores particularly compared to respondents from Japan (about nine points, or 1.2 SD greater) and also those from the Republic of Turkey (four points, or 0.6 SD greater) and the Republic of Korea (3.2 points, or 0.5 SD greater).

At the time of this study, U.S. nurses were facing high numbers of COVID-19 patients and the world's highest death rate (Beaubien, 2020; Lopez, 2021), but they received a great deal of public support and appreciation, which could bolster resilience as well as compassion satisfaction. As their professional ethic and duty to care mentioned earlier were recognized, and their skills were lauded as irreplaceable; they became "heroes" in the public eye (Mohammed et al., 2021).

The SEM offers a frame for considering variables potentially relevant to nurses' resilience in the context of COVID-19. Findings herein emphasize the importance of organizational-level variables, especially organizational support to prevent viral spread and involving nurses in the organization's response to the pandemic (Duncan, 2020). Finding that the opportunity to contribute to policies was a significant predictor of resilience in the regression mirrors other authors' findings that suggest the importance of nurses' having trust in their institutions' pandemic management. Moreover, the significant predictors at the interpersonal/family-level (fear of bringing COVID home to family) and at the individual-level (fear of contracting COVID-19 at work and intention to quit nursing) directly reflect employment in health care and specifically relate to organizations' systems for managing infection control.

Previous research echoes our findings that resilience is closely related to organizational factors, even if expressed individually. A 2014 integrative review on resilience in nurses found occupational stressors and individual psychological characteristics, such as self-efficacy or a sense of hope, influenced the resilience level of nurses (Hart et al., 2014). Workplaces with constantly changing demands and organizational goals that are not congruent with nurses' values cause nurses to experience psychological distress.

The only variable at the interpersonal level predicting resilience was likewise indirectly associated with employment in a healthcare environment: fear of bringing infection home to family. Paradoxically, higher levels of fear predicted higher resilience. This somewhat confusing finding may indicate that a nurse fearful of bringing home the virus would be extra vigilant and thus feel more resilient despite the risk of disease spread. A potential factor that may contribute to having higher resilience despite fear of bringing home infection is that nurses with families may have more support and hence, have higher resilience. However, both these interpretations and the finding should be further investigated to determine its persistence with other infectious diseases to which nurses are exposed.

Demographics were not significant. Rather, the regression results suggest that work environment and organizational resources are more salient than intrapersonal/individual factors. Previous resilience research, however, found that intrapersonal factors were significantly predictive of resilience. Nurses with more education experienced less negative emotional labor (Xu et al., 2020). In U.S. intensive care unit nurses (n = 114), resilience was significantly associated with low burnout (expressed by depersonalization, and emotional exhaustion). Higher levels of resilience were associated with hope and reduced stress and a high sense of personal accomplishment (Rushton et al., 2015). Xu et al. (2020) reported that higher education and professional rank increased resilience. Our findings could be the result of analyzing cross-sectional data, rather than exploring the strength of within-country predictors of resilience.

5.1 | Limitations

Given that this study is a cross-sectional study with recruitment by convenience across multiple settings, we cannot generalize or infer causality

from these variables' association with resilience. Nor can we make inferences about the impact of the pandemic on nurses' resilience. Nurses who were "burned out" may have declined to participate and thus we may have found more individual factors relating to resilience if they had participated. Although we invited nurses to share the invitation to participate with colleagues, we do not know the extent of snowballing that took place in recruiting respondents, which could have potentially biased the sample toward participants with similar experience or perspective. This could have had an impact on cross-country findings.

As noted above, within-country analysis of underlying variables is warranted. The pandemic experience may have had a negative impact, but so too might the challenges have strengthened nurses' resilience. A longitudinal study to examine resilience along the course of the pandemic could be useful. Qualitative work is recommended to delve deeper into resilience shown by nurses during a pandemic. The SEM offers a useful organizing heuristic for studying this phenomenon and ensures a wide lens. But it does not provide a theoretical guide for selection of variables or for hypothesizing how relationships among the selected variables might underlie resilience. Further analysis of interrelationships, within and across socio-ecological levels, is warranted as well as consideration of other variables within each level that could be more revelatory.

5.2 | Relevance for clinical practice

It is essential that nurses receive the support needed to provide high quality nursing care to COVID-19 patients. Health care leaders, health institutions, and government agencies concerned with health need to realize that nurses require not only tangible support like PPE, but also social/emotional support from friends, family, employers, and the community to maintain their levels of caregiving. Nursing associations, institution administrators and governments can assure the availability of both short and long-term mental health counseling and sharing programs, such as the Republic of Turkey's RUHSAD-Mental Health Support System (Ministry of Health Directorate, 2020) and further increase the effectiveness of these programs (Rieckert et al., 2021). Although strengthening an individual's psychological ability to handle emotionally challenging events is essential, organizational and community level factors must also be prioritized (Rieckert et al., 2021; Shih et al., 2009; Tan et al., 2020; Wei et al., 2019; Yıldırım et al., 2021). When nurses are respected and their health is protected, resilience can be built through increased trust in their colleagues and their leaders (Gensimore et al., 2020).

6 | CONCLUSIONS

This study provides a snapshot of nurses' resilience during the pandemic in four countries. More targeted research should look at whether and how types of education, practice locations, and years of experience are associated with nurses' resilience and if these factors mitigate responses to pandemic nursing in different settings.

Our findings support the literature that indicates that organization and unit-level leadership is critically important to nurse resilience, which in turn is important for maintaining nurses' health and wellness as well as the quality of care they deliver. We recommend qualitative research to delve deeper into the lived experience of providing nursing care during a pandemic and the role that resilience plays in nurses' response to caring for their patients.

CONFLICT OF INTEREST
No conflict of interest has been declared by the authors.

AUTHORSHIP STATEMENT
All authors listed meet the authorship criteria according to the latest guidelines of the International Committee of Medical Journal Editors. All authors are in agreement with the manuscript.

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DATA AVAILABILITY STATEMENT
The data that support the findings of this study are available from the corresponding author upon reasonable request

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