

Stress, Anxiety, and Growth in Nurses During the COVID-19 Pandemic

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Article

Abstract

The global pandemic of the novel coronavirus (COVID-19) declared in March 2020 has created unprecedented challenges for healthcare professionals and organizations. A significant impact has been physical and psychological stress on nurses working in acute care environments. Stress-related growth may occur concurrently with the experience of negative psychological responses as another facet of coping and adjustment to the stressful event. The primary aim of this study was to describe the degree to which nurses reported stress, anxiety, and stress-related growth during the COVID-19 pandemic. This article discusses the study methods, which included a cross-sectional design with an online survey sent to nurses in a hospital system. Results demonstrated that, of the 1,009 participants in the final analysis, almost 70% reported anxiety symptoms, with 38% having scores at the moderate or severe level. Growth scores were low. Our discussion considers cultural implications of the findings and implications for practice that underscore the need for proactive interventions to mitigate the psychological burden of the pandemic on nurses and the need to implement routine screening of nurses for anxiety.

Key Words: Nursing, COVID-19 pandemic, posttraumatic growth, stress-related growth, stress, anxiety, Perceived Stress Scale, Generalized Anxiety Disorder 7-item scale, Posttraumatic Growth Inventory – Expanded

The global pandemic of the novel coronavirus (COVID-19), which the World Health Organization (WHO) declared in March 2020 ([WHO, 2020](#)), has created unprecedented challenges for healthcare professionals and organizations. A significant impact has been the physical and psychological stress on nurses working in acute care environments. A recent meta-analysis of 65 studies representing more than 97,000 healthcare workers in 21 countries (45% nurses) reported the pooled prevalence of moderate levels of depression, anxiety, and symptoms of posttraumatic stress disorder (PTSD) as 21.7%, 22.1%, and 21.5%, respectively ([Li et al., 2021](#)). A systematic review and meta-analysis, focused specifically on studies involving nurses from different regions of the world, reported high pooled prevalence rates for depression (32%) and anxiety (32%) ([Varghese et al., 2021](#)). The investigators also reported the overall prevalence of stress and PTSD in nurses as 40.6% and 18.6%, respectively. Although most studies have focused on the negative effects on mental health of nurses, it is also necessary to examine whether the pandemic offers potential for personal stress-related growth. A broader view, moving beyond the deficit-oriented perspective, may have implications for assisting nurses to adapt and grow after a stressful event.

Stress-Related Growth

Stress-related growth refers to positive adaptive changes that an individual experiences after a stressful event ([Dolbier et al., 2010](#)). It is closely related to the construct of posttraumatic growth, which infers a more severe stressful event leading to a personal transformation beyond what existed previously ([Tedeschi &](#)

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[Calhoun, 2004](#)). Originally “posttraumatic growth” was used to refer to the response to specific severe traumatic events (e.g., assaults, rape, violence). More recently, the recognition of the potential for personal growth to occur following more general or prolonged stressful conditions has led to the adoption of the broader, more inclusive term, “stress-related growth.”

Stress-related growth may occur concurrently with the experience of negative psychological responses...

Stress-related growth may occur concurrently with the experience of negative psychological responses, as another facet of coping and adjustment to the stressful event ([Ai & Park, 2005](#); [Tedeschi & Calhoun, 2004](#)). Posttraumatic growth occurs through cognitive processing and restructuring as an individual persists in developing new schemas, goals, and meanings related to their new reality ([Tedeschi & Calhoun, 2004](#)). We will use “stress-related growth” in discussing this study and its results but will retain “post-traumatic growth” in referring to earlier articles that used this term.

According to [Tedeschi and Calhoun \(2004\)](#), types of growth are in the domains of appreciation of life, relationships with others, new possibilities, personal strength, and spiritual/existential change. Closely related to the concept of resilience, posttraumatic growth has been described as “bouncing forward” as opposed to “bouncing back” ([Kalaitzaki et al., 2020](#)). [Bonanno \(2012\)](#) described resilience as a pattern or trajectory of healthy adjustment after a stressful event ([Bonanno, 2012](#)).

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In addition to stress-related growth and posttraumatic growth, many terms have been used interchangeably (e.g., perceived benefits, positive psychological changes, flourishing) in the literature to describe personal growth ([Tedeschi & Calhoun, 2004](#)). We acknowledge the conceptual overlap, as well as the likelihood that nurses differ in their experiences of stress severity related to the pandemic. Thus, the term “growth” is used in this article to reflect positive changes associated with the experiences of the stressors or trauma of the pandemic.

The phenomenon of personal growth has been identified in many different populations following a variety of types of stressful events. A recent systematic review and meta-analysis of growth in 26 studies that represented 10,181 individuals who experienced a wide range of traumatic events reported that the prevalence of moderate to high growth was 52.58% ([Wu et al., 2019](#)). There is variability in the occurrence of growth; not all individuals experience growth after a stressful situation ([Dolbier et al., 2010](#)). Nurses may experience growth directly through personal stressful experiences related to their work or vicariously, as a result of knowing or caring for a patient who has been traumatized and has experienced growth ([Bybee, 2018](#)). Nursing research has described posttraumatic growth in specific populations such as neonatal intensive care unit nurses ([Beck & Casavant, 2020](#)), nurse midwives ([Beck et al., 2017](#)), end-of-life clinicians ([Bybee, 2018](#)), pediatric nurses ([Taubman-Ben-Ari & Weintraub, 2008](#)) and oncology nurses ([Yilmaz et al., 2018](#)).

...not all individuals experience growth after a stressful situation

Few studies to date have examined stress-related or posttraumatic growth in nurses in the United States during the COVID-19 pandemic. In international studies, moderate to high levels of posttraumatic growth were noted in two studies of frontline nurses in China during the COVID-19 pandemic ([Cui et al., 2021](#); [Peng et al., 2021](#)). In a larger study of more than 12,596 nurses in Taiwan, 50% of whom worked in hospital settings, posttraumatic growth was experienced by 30.3% of the nurses ([Chen et al., 2021](#)). In the study by [Chen and colleagues \(2021\)](#), working in a critical care unit; employment at a COVID-19 designated hospital; and caring for a patient with COVID-19 were factors associated with higher levels of growth.

The co-occurrence of stressful or traumatic events and growth has been examined in the literature. A meta-analysis of 42 studies found both a linear and curvilinear relationship between symptoms of PTSD and posttraumatic growth; however, this relationship was influenced by the person’s age and the nature of the stressful event ([Shakespeare-Finch & Lurie-Beck, 2014](#)). In the same analysis, this relationship was weak in healthcare professionals who cared for survivors of trauma. In another study, specific to nurses exposed to trauma experiences in war, the significant linear relationship between trauma and growth existed but only in those situations related to personal experiences, not those that were work-related ([Shamia et al., 2015](#)).

However, in disasters such as this pandemic, the nature of the stressful event is one that impacts not only the individual nurse, but also the work group experiencing the trauma together ([Brooks et al., 2019](#)). Thus, the relationship between stress and potential for personal growth may arise from both personal and occupational sources. In summary, research is needed to describe the prevalence of growth in nurses during the COVID-19 pandemic, as well as to elucidate factors associated with growth, so that targets for effective interventions can be developed.

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Study Methods

Study Aims

The aims of this study were to:

1. Describe the degree to which nurses working in the clinical setting during the COVID-19 pandemic reported stress, anxiety, and stress-related growth.
2. Describe factors associated with stress, anxiety, and stress-related growth.

Study Design, Sample and Setting

A cross-sectional, descriptive correlational design was used to describe degrees of stress, anxiety, and stress-related growth reported by nurses working in the clinical setting during the pandemic. From November 2020 to January 2021, a convenience sample of nurses was obtained from an academic medical center located in the Midwest region of the United States, including the urban academic medical center and 11 community hospitals. Inclusion criteria were licensure as a registered nurse (RN) or advanced practice nurse (APN) and working in any specialty within acute care hospitals and their ambulatory facilities. All nurses, regardless of role and whether they worked part-time or full-time, were included. Nurses with PRN status, contracted nurses, and homecare nurses were excluded.

A distribution list of eligible nurses was obtained from the hospital department of human resources. Each RN received a study participation invitation through email and a link to a secure survey site. An initial email was sent in batches of 500 from November 5, 2020, to November 25, 2020 to 6,628 nurses. An email reminder about the study was sent at 1 and 3 weeks after the initial email. Data collection occurred from November 5, 2020, to January 15, 2021. Of the 6,628 nurses, 1,498 responded; 1,340 were eligible; 1,223 consented; and 1,188 completed the self-administered, online survey. A total of 1,009 nurses were included in the final analysis, excluding 179 cases who missed more than half of the survey.

Measures

Stress. Stress was measured using the Perceived Stress Scale (PSS) ([Cohen et al., 1983](#)). This self-report questionnaire measures general stress and has 10 items that ask about feelings and thoughts during the last month, using a 5-point Likert scale (0 = never to 4 = very often). After reverse scoring positively-worded items, scores are summed. Total scores range from 0 to 40, with higher scores reflecting greater perceived stress. The 10-item version of the PSS has shown good internal consistency in studies using predominantly community samples ([Lee, 2012](#)). Cronbach's alpha for this study was .88.

Anxiety. Anxiety was measured by the Generalized Anxiety Disorder 7-item (GAD-7) Scale ([Spitzer et al., 2006](#)). This self-report measure assesses the frequency of seven symptoms over the last two weeks on a 4-point Likert scale (0 = not at all sure to 3 = nearly every day). The scores are summed, with the total score ranging from 0 to 21. Higher scores represent a greater anxiety level. Scores of 5, 10, and 15 have been determined as cut points for mild, moderate, and severe anxiety symptoms, respectively ([Spitzer et al., 2006](#)). Internal consistency and construct validity were supported in a large sample from the general population (n = 5,030) ([Löwe et al., 2008](#)). The Cronbach's alpha was .94 in the current study.

Stress-Related Growth. Stress-related growth was assessed using the Posttraumatic Growth Inventory – Expanded (PTGI-X) ([Tedeschi et al., 2017](#)). PTGI-X measures the degree of benefits resulting from a traumatic event. The self-report measure has 25 items on a 6-point Likert scale ranging from 0 (I did not experience this change as a result of my crisis) to 5 (I experienced this change to a very great degree as a result of my crisis). The scale consists of five subscales: relating to others (7 items), new possibilities (5 items), personal strength (4 items), spiritual and existential change (6 items), and appreciation of life (3 items). Total scores ranged from 0 to 125 with higher scores indicating greater growth.

Each subscale score was reported using an average score ranging from 0 to 5 because each domain contains a different number of items ([Tedeschi et al., 2017](#)). The PTGI-X is an expansion of the original Posttraumatic Growth Inventory (PTGI) ([Tedeschi & Calhoun, 1996](#)) with four additional items to better measure self-reported spiritual and existential growth across varied cultural contexts ([Tedeschi et al., 2017](#)). The reliability and concurrent validity of the PTGI-X have been supported ([Tedeschi et al., 2017](#)). In the current study, Cronbach's alpha for the total scale was .97 with the subscales' alpha ranging from .85 to .91.

Demographic Data. Demographic information included age, gender, race, education level, affiliated hospital (academic medical center or community hospital), years of experience as an RN, nursing position, work setting, and shift. Questions related to the pandemic, and exposure to or diagnosis of COVID-19 in oneself, family, or coworker were also explored.

Data Analysis

Descriptive statistics were used to describe the demographic characteristics of RNs and study variables. Correlations among continuous variables (age, years of experience as an RN, stress, anxiety, and stress-related growth) were examined using Pearson's correlation. Independent *t*-tests were used to compare the means of each study variable based on the participant's

characteristics: type of patient care (direct or indirect), affiliated hospital (academic medical center or community hospital), exposure to COVID-19 (oneself, family members, or coworkers), and a diagnosis of COVID-19 (oneself, family members, or coworkers).

Mean imputation was used to handle missing data for the measures. The threshold for significance was adjusted for multiple comparisons using Bonferroni's correction. The alpha level was set at 0.004 for *t*-tests and 0.005 for the correlational analyses. Assumptions of Levene's test for equality of variances were not met in certain *t*-tests; therefore, degrees of freedom were adjusted for the test results.

Protection of Human Subjects

The study was approved by the hospital institutional review board and an online consent form was completed by study participants. Due to the sensitivity of the questions, resources for psychological support were included in two areas of the online survey.

Results

Most participants were working during the initial period of the pandemic...

Of the 1,009 participants, ages ranged from 22 to 73 years, with a mean age of 41.19 years (SD = 12.20). Responders were predominantly White, female, had a BSN degree, and were employed full-time as a clinical nurse and/or a direct patient care provider working in an inpatient setting.

On average, participants had 14.69 years of experience (SD = 11.66), ranging from less than a year to 46 years of experience. Most participants were working during the initial period of the pandemic, between March 17, 2020, and May 1, 2020. More than half of the participants experienced exposure (74.2%) or diagnosis of COVID-19 (57.8%). (See Table 1).

Table 1. Demographic Characteristics of RNs

(N=1009)

Characteristics	total n	n (%)
Gender	988	
Female		910 (92.1%)
Male		77 (7.6%)
Other		1 (0.1%)
Race	1003	
White		911 (90.8%)
Black		32 (3.2%)
Other		60 (6%)
Education (Nursing degree)	1006	
Diploma		31 (3.1%)
Associate degree		175 (17.4%)
BSN		616 (61.2%)

MSN or MN		170 (16.9%)
DNP and/or PhD		14 (1.4%)
Hospital	1009	
Academic Medical Center		578 (57.3%)
Community Hospital		431 (42.7%)
Position	1000	
Clinical nurse / Direct care provider		708 (70.8%)
Nurse Practitioner		89 (8.9%)
Clinical Nurse Specialist		22 (2.2%)
Educator		25 (2.5%)
Manager / Administrator		81 (8.1%)
Other		75 (7.5%)
Work Setting	995	
Inpatient		563 (56.6%)
Hospital-based ambulatory		228 (22.9%)
Community-based ambulatory		73 (7.3%)
Multi-settings		96 (9.6%)
Other		35 (3.5%)
Type of Employment	990	
Full-time		847 (85.6%)
Part-time		143 (14.4%)
Work during the initial period of the Pandemic (March 17 th – May 1 st)	990	

Yes	911 (92.0%)
No	79 (8.0%)
Exposure to COVID 19: yes	749 (74.2%)
Self*	370 (49.5%)
Family member*	449 (60.0%)
Coworker*	462 (61.8%)
Other*	110 (14.7%)
Diagnosis of COVID 19: yes	583 (57.8%)
Self*	91 (15.6%)
Family member*	314 (54.0%)
Coworker*	361 (62.0%)
Other*	126 (21.6%)

Note. * Multiple response questions

A descriptive analysis of the study variables showed that RNs reported low to moderate levels of stress, anxiety, and stress-related growth (See Table 2). The average score for perceived stress was 15.24 with a median score of 16. Two-thirds of the sample reported a stress score greater than 13, which was cited by Cohen & Williamson (1988) as the mean score for perceived stress, measured by the PSS-10, in a probability sample (n = 2387) in the United States (Cohen & Williamson, 1988). Although the mean score of anxiety was low (M = 8.39, SD = 6.09, possible range: 0-21), 69.5% of participants reported anxiety symptoms. Mild anxiety symptoms (score of 5-9) were reported by 31.4% of RNs; moderate symptoms (score of 10-14) by 19.8%; and severe symptoms (score above 15) by 18.3%. The total mean score for the PTGI-X was in the low to moderate range. Among the five subscales, the appreciation of life subscale reflected the greatest area of growth.

Table 2. Descriptive Summary of Study Variables

(N=1009)

Variables	M (SD)	Possible Range	95% CI	Cronbach's alpha
Stress (PSS)	15.24 (6.02)	0 – 40	14.86 – 15.61	.88
Anxiety (GAD-7)	8.39 (6.09)	0 – 21	8.01 – 8.76	.94
Stress-related growth (PTGI-X)	44.44 (29.90)	0 – 125	42.59 – 46.29	.97
Relating to others*	1.82 (1.30)	0 – 5	1.74 – 1.90	.91

New possibilities*	1.62 (1.24)	0 – 5	1.55 – 1.70	.85
Personal strength*	2.01 (1.42)	0 – 5	1.92 – 2.10	.88
Spiritual and existential change*	1.24 (1.27)	0 – 5	1.16 – 1.32	.92
Appreciation of life*	2.70 (1.48)	0 – 5	2.61 – 2.79	.95

Note. *Stress-related growth subscale scores are averaged

Stress and anxiety were significantly and positively associated with stress-related growth...

Correlations among study variables are presented in Table 3. There was a statistically significant, positive relationship between stress and anxiety. Age and years of experience were negatively and significantly related to stress and anxiety levels. Higher levels of stress and anxiety were reported by those participants who were younger and had fewer years of RN experience. Stress and anxiety were significantly and positively associated with stress-related growth, indicating that RNs with higher stress and anxiety levels had greater positive growth.

Table 3. Correlations among Study Variables

	1	2	3	4	5
1. Age	1	.85**	-.19**	-.19**	-.02
2. Years of experience		1	-.17**	-.17**	-.04
3. Stress			1	.75**	.10*
4. Anxiety				1	.11**
5. Stress-related growth					1

Note. * $p < .005$, ** $p < .001$

The results of the independent t -test comparing stress, anxiety, and stress-related growth levels based on the RN characteristics are presented in Table 4. Levels of stress, anxiety, and stress-related growth did not differ statistically by type of patient care (direct or indirect care), by hospital type (academic medical center or community hospital), or whether the nurse reported a diagnosis of COVID-19 in themselves or someone close to them. Participants who reported exposure to COVID-19 in themselves, or someone close to them, reported higher stress [Mean difference = 1.25, $t(996) = -2.86$, $p = .004$] and anxiety [Mean difference = 1.55, $t(480.55) = -3.74$, $p < .001$] than those who did not report exposure. The Cohen's d effect sizes for these t -tests were small.

Participants who reported exposure to COVID-19 in themselves, or someone close to them, reported higher stress...

Table 4. Comparison of Stress, Anxiety, and Stress-related Growth by Nurse Characteristics

Variables	Type of patient care		t-test	p-value	Effect size	Hospital Type		t-test	p-value	Effect size
	Direct (n=797)	Indirect (n=203)				Medical Center (n=578)	Com-munity (n=431)			
	<i>M (SD)</i>	<i>M (SD)</i>	<i>t</i>	<i>p</i>	<i>d</i>	<i>M (SD)</i>	<i>M (SD)</i>	<i>t</i>	<i>p</i>	<i>d</i>
Stress	15.44 (6.15)	14.56 (5.45)	2.00	.046	.15	15.41 (5.93)	15.00 (6.14)	1.06	.288	.07
Anxiety	8.55 (6.14)	7.81 (5.87)	1.56	.119	.12	8.33 (6.06)	8.46 (6.13)	-.35	.728	-.02
Stress-related growth	43.86 (29.54)	47.23 (31.20)	-1.44	.152	-.11	43.06 (28.73)	46.29 (31.32)	-1.68	.094	-.11

Variables	Exposure to COVID 19		t-test	p-value	Effect size	Diagnosis of COVID 19		t-test	p-value	Effect size
	Yes (n=749)	No (n=249)				Yes (n=583)	No (n=414)			
	<i>M (SD)</i>	<i>M (SD)</i>	<i>t</i>	<i>p</i>	<i>d</i>	<i>M (SD)</i>	<i>M (SD)</i>	<i>t</i>	<i>p</i>	<i>d</i>
Stress	15.51 (6.05)	14.26 (5.82)	-2.86	.004	.21	15.48 (6.14)	14.81 (5.83)	-1.73	.084	.11
Anxiety	8.75 (6.24)	7.20 (5.46)	-3.74	<.001	.26	8.71 (6.21)	7.89 (5.90)	-2.10	.036	.14
Stress-related growth	45.37 (29.86)	42.13 (29.98)	-1.48	.138	.11	46.25 (29.97)	42.17 (29.73)	-2.13	.034	.14

Note. The dependent variables are stress, anxiety, and stress-related growth. The independent variables are the nurse characteristics.

Discussion

The primary aim of this cross-sectional survey study was to describe the prevalence of stress, anxiety, and growth in nurses working during the COVID-19 pandemic. Data collection occurred nine months after the start of the pandemic and during a regional surge in COVID-19 cases. In this study, almost 70% of participants reported having anxiety symptoms, with scores from 38% of them at the cut levels for moderate or severe anxiety symptoms. These scores suggest probable cases of generalized anxiety disorder and a need for further evaluation ([Spitzer et al., 2006](#)).

There are variable reports of the prevalence of anxiety among nurses during the COVID-19 pandemic and comparisons are difficult due to the heterogeneity in samples and measures. Our finding of 70% prevalence is higher than the pooled prevalence for anxiety, including all severity levels, reported in a meta-analysis of 21 studies of nurses worldwide (32%; 95% confidence interval (CI) = 21% to 44%) ([Varghese et al., 2021](#)). However, our results regarding severity of anxiety symptoms are similar to a cross-sectional survey study, which used the two-item GAD to screen for anxiety in New York City healthcare workers during the peak of the hospital admissions ([Shechter et al., 2020](#)). The investigators reported that, of the nurses in the study (n = 375), 40% screened positive for anxiety, indicating a possible need for further diagnostic evaluation.

Nurses in this study appraised situations in their lives as stressful. A range of stress levels in healthcare professionals as measured by various versions of the PSS has been reported in the literature and may reflect differences in samples and timing of measurement. The median score of 16 found in this study is slightly lower than the PSS-10 median scores reported in research studies of British nurses (*Mdn* = 19.5) and healthcare professionals in the Sudan (*Mdn* = 19) ([Debski et al., 2021](#); [Mahgoub et al., 2021](#)).

Nurses in this study appraised situations in their lives as stressful.

As expected, stress and anxiety were strongly correlated in this study. The finding that fewer years of work experience and young age were associated with higher levels of stress and anxiety is consistent with the literature ([Murat et al., 2021](#); [Sanghera et al., 2020](#)). The correlation, however, was weak, indicating that assumptions cannot be made about levels of stress and anxiety based on these demographic characteristics. Additionally, relationships between stress and growth, and anxiety and growth, were weak with small effect sizes. Therefore, one must be cautious in claiming clinical significance.

The finding of low levels of growth in this study differs from the moderate levels reported in two studies using a 20-item Chinese version of the PTGI ([Cui et al., 2021](#); [Peng et al., 2021](#)) and one study using the 10-item PTGI short form ([Chen et al., 2021](#)). The Chinese version is a cultural adaptation of the 21-item version of the PTGI ([Tedeschi & Calhoun, 1996](#)) with removal of item 18 (I have a stronger religious faith) and retention of five factors consistent with the original PTGI. Frontline nurses in China were reported to have mean growth scores of 65.65 and 70.53 in two studies conducted early in the pandemic ([Cui et al., 2021](#); [Peng et al., 2021](#)). In contrast to our findings, age and years of work experience were positively correlated with growth in the 2021 study by Cui et al.

In an April 2020 survey of 12,596 nurses in Taiwan and China, Chen and colleagues ([2021](#)) found that 39.3% of the participants experienced posttraumatic growth. In the current study, the appreciation of life subscale had the highest mean of the five dimensions of growth. This is consistent with findings reported by Cui et al. ([2021](#)) and Tedeschi and Calhoun ([2004](#)) that described greater appreciation of life as a common area of growth that is often due to a change in priorities after a traumatic event in one's life.

There are several possible explanations for the low growth scores in our study and differences from studies conducted in China and Taiwan. First, culture influences how an individual appraises, interprets, and copes with an event that is potentially stressful or traumatic, and thus also affects the underlying process leading to growth ([Kashyap & Hussain, 2018](#)). Growth after a traumatic event may be conceptualized differently among diverse cultures and requires measures that are culturally sensitive ([Kashyap & Hussain, 2018](#); [Splevins et al., 2010](#)). It is possible that the construct of growth differs between Eastern and Western cultures, leading to variations in how individuals respond to survey questions and making comparisons between studies difficult.

Growth after a traumatic event may be conceptualized differently among diverse cultures and requires measures that are culturally sensitive

The low growth scores observed in this sample may be related to the measure that we used to assess growth, which Tedeschi and Calhoun ([2004](#)) conceptualized as a positive psychological change as one attempts to adapt to a major stressor, crisis, or significant threat ([Tedeschi & Calhoun, 2004](#)). Perhaps, for many nurses in this sample, coping mechanisms were working adequately to keep pandemic-related stress from escalating to the level of a major stressor or crisis.

It is also possible that even in instances where nurses experienced a major stressor, growth did not occur. There is variability in positive and negative responses to a stressful situation. Not all individuals experience growth during extreme stressors ([Dolbier et al., 2010](#)).

The timing of the measurements may have also contributed to the low growth scores. Although data collection occurred during a surge in cases, it was beyond the initial months of the pandemic; nurses may have already modified their perception of the pandemic and/or developed resilience in managing stress. Growth after a stressful event is conceptualized as a process, as well as an outcome, with different temporal patterns of growth among individuals ([Tedeschi & Calhoun, 2004](#)).

It is also possible that even in instances where nurses experienced a major stressor, growth did not occur.

Implications for Practice

Early recognition of psychological distress in nurses and proactive interventions are needed to mitigate the impact of the pandemic on all nurses.

Early recognition of psychological distress in nurses and proactive interventions are needed to mitigate the impact of the pandemic on all nurses. Young nurses and those with fewer years of work experience may be more vulnerable to poor mental health outcomes and warrant close monitoring by managers and resource staff. It is important for nurse leaders to not only acknowledge and normalize feelings of anxiety in a nurse expressing their feelings, but to also assess the degree of anxiety that is felt. Utilizing a brief screening tool, such as the GAD-7, may identify nurses at risk and in

need of further assessment and help. Although the mean level of anxiety was fairly low, a significant percentage of the sample in this study had high levels. Anxiety has been associated with other mental health issues, such as depression or insomnia, and perhaps with early intervention, downstream psychological problems can be avoided.

Limitations

There are several limitations to address. A cross-sectional approach was used in this study to provide a snapshot of the stress, anxiety, and growth of nurses during the COVID-19 pandemic. A longitudinal perspective is needed to better capture changes in these variables as the pandemic is a protracted, dynamic situation. The low response rate may introduce sampling error as groups of nurses may not have been represented. Although this study used a large sample representative of both community-based hospitals and an academic medical center, further clarification of whether the nurse worked in an acute setting (e.g., ICU, COVID-floor) would help to clarify associations of work environment with stress and anxiety.

The lack of an a priori power analysis is another limitation. The post hoc power analysis conducted using G*Power 3.1.9.7 (Faul et al., 2009) demonstrated that the study was underpowered once the Bonferroni adjustment was made. For the correlational analyses, the post hoc power analysis determined the power as 0.65 to detect a small effect when a more stringent alpha was used, given our sample size of 1009, alpha of 0.005, and effect size of 0.1. To achieve a power of 0.80, a sample size of 1,325 participants would have been needed. The post hoc power analysis indicated that all of the t-tests were underpowered to detect a small effect with alpha set more stringently at 0.004 (range of Cohen's d = 0.37 to 0.60). The total sample size needed to achieve a power of .80 was 1,388.

Conclusion

This study contributes to the small but growing body of literature that is examining positive outcomes, such as psychological growth, during the COVID-19 pandemic. Further research should explore personal and work-related factors associated with growth, as well as potential moderators of the relationship between stress and growth. Our findings underscore the need not only for proactive, evidence-based interventions to mitigate the psychological burden of the pandemic on nurses, but also to implement routine screening of nurses for anxiety.

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Patricia Hosang Beam is a Professional Development Specialist and a member of the University Hospitals System educator team with expertise in pediatric nursing. With more than 45 years of clinical experience, Dr. Beam has published and presented on topics related to guiding and developing the nurse at the bedside. Her research includes the influence of emotional intelligence and self-awareness on the bedside nurse's perception of clinical leadership, as well as evaluating RN education programs in a pediatric setting. As a member of the Society of Pediatric Nurses, she participated in the development of the core curriculum for pediatric nurse residencies.

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Janet A. Kloos, a critical care nurse for 40 years, provides patient care at the bedside and leads coordination of care with an interdisciplinary team as a clinical nurse specialist. Dr. Kloos has conducted research in stress and anxiety reduction in families of critically-ill patients, caregivers of LVAD patients and cardiac tamponade. Dr. Kloos has authored articles on families of critically-ill patients, post intensive care syndrome and cardiology topics in peer-reviewed journals.

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Sarah DeLozier has a PhD in cognitive psychology with an emphasis in statistics from Colorado State University. Involved in research for over 10 years, she founded the University Hospitals Clinical Research Center Biostatistical Support Services team in 2017, and leads a team of statisticians in assisting investigators of all disciplines in publishing their research. She serves as the biostatistician member of the institutional DSMB (Data Safety Monitoring Board) at UH, and additionally serves as a consultant for the institutional IRB.

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