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## Factors associated with nurses emotional distress during the COVID-19 pandemic

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### ABSTRACT

**Background:** Nurses are among the frontline healthcare workers directly impacted by the burden of the coronavirus disease of 2019 (COVID-19) pandemic. This study aimed to examine the prevalence of emotional distress and the associated factors among nurses practicing in South Dakota during the COVID-19 pandemic.

**Methods:** An online survey was conducted among practicing, licensed nurses in South Dakota during the pandemic (July 2020 – August 2020). Emotional distress was measured using the Depression, Anxiety, and Stress Scale (DASS-21). Logistic regression models were performed to examine the association of emotional distress and the three DASS-21 subscales with: sociodemographic and work environment factors (e.g., work setting, job satisfaction, number of COVID-19 cases seen at the facility, preparedness, concerns with worsening pre-existing mental health conditions due to the pandemic, and contracting the illness).

**Results:** Among 1505 participants, overall emotional distress was reported by 22.2%, while anxiety, depression and stress were 15.8%, 14.5% and 11.9%, respectively. Factors associated with moderate to severe emotional distress, depression, anxiety, and stress were as follows: concerns for worsening of pre-existing mental health conditions, job dissatisfaction, encountering higher number of COVID-19 cases at one's work facility, feeling unprepared for the pandemic, and concern for contracting the illness (all  $p < 0.05$ ).

**Conclusions:** Our study suggests a high prevalence of emotional distress among nurses and highlights the factors associated with emotional distress during the COVID-19 pandemic. Promoting appropriate support is imperative to reduce nurses' emotional distress and promote psychological well-being during the COVID-19 world health crisis and in future pandemics.

On March 11, 2020, the World Health Organization (WHO) declared the novel coronavirus disease 2019 (COVID-19) a public health emergency and a pandemic. Worldwide, this highly contagious respiratory infection caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) has caused not only an economic crisis, but an increase in mortality and morbidity, and emotional distress (Brooks et al., 2020; Gallagher et al., 2020; Liu et al., 2020; Salari et al., 2020). In the United States (U.S.), data provided by the Centers for Disease Control and Prevention (CDC) report over thirty-three million cases and 605,140 deaths (CDC, as of July 13, 2021) since the pandemic started.

Although most clinical manifestations of the disease are mild, about

15% of the cases become severely ill and 5% critically ill, requiring intensive care treatment (Casella et al., 2020). During the first months of the pandemic, nurses, among other healthcare workers faced long working hours, fatigue, and shortage of personal protective equipment (PPE). Additional studies have shown that the shortage in PPE and lack of training to handle infected patients contributed to an increased risk of COVID-19 transmission (Nguyen et al., 2020; Sampaio et al., 2020).

Even though nurses endure physical and mental distress from daily work (Wijdenes et al., 2019), the conditions experienced when working in a pandemic can extrapolate the level of distress. Insight into the mental health implications of providing healthcare during a worldwide

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infectious disease outbreak may be garnered by reflecting on the severe acute respiratory syndrome coronavirus (SARS-CoV-1) infection. This global outbreak, first documented in Asia in 2003, quickly spread to more than two dozen countries, including those in North America, South America, and Europe (World Health Organization, 2003). Significant psychological impact was noted not only on nurses working in SARS units but also on nurses deployed to care for SARS patients (Chan et al., 2005; Koh et al., 2012; Maunder et al., 2006; Sin & Huak, 2004). Post-traumatic stress (PTS) symptoms were documented in healthcare workers up to three years after caring for SARS patients (Maunder et al., 2006; Wu et al., 2009). Rapidly changing policies and infectious control guidelines, heavy workloads, and many uncertainties compounded the stress experienced by nurses during the SARS pandemic (Chan et al., 2005; Koh et al., 2012).

Emerging literature has begun to examine the prevalence of mental health concerns among healthcare workers during the COVID-19 pandemic and to identify its common risk and protective factors (Muller et al., 2020; Pappa et al., 2020; Shechter et al., 2020). Pooled estimates suggest that at least one in five healthcare professionals experienced anxiety or depression (Pappa et al., 2020). For example, among healthcare workers in New York City, 33% of individuals reported symptoms of anxiety, 48% depression, and 57% acute stress (Shechter et al., 2020). Specific mental health risk factors include contact with COVID-19 patients and personal concern for contracting the illness or infecting others (Muller et al., 2020). Social support (Muller et al., 2020) and supportive practices at work (Greenberg et al., 2020), however, can serve as a buffer for some of the adversity healthcare professionals experience and promote positive mental health outcomes during the COVID-19 pandemic. Further, having a perceived sense of control and a reduced perceived risk were also identified as important in the well-being and mental health of nurses (Sin & Huak, 2004). Given the current trajectory of COVID-19, it is imperative to understand the main factors associated with mental distress among nurses during this unprecedented time to help prepare health care workers at the frontline during a pandemic. This may shed light on the factors impacting nurses' mental wellbeing, so strategies to support nurses caring for COVID patients can be developed, and long-term psychological impact and burnout prevented.

Thus, the aim of this study was to examine the prevalence of emotional distress, anxiety, depression, stress, and investigate its association with sociodemographic and work environment factors among nurses practicing in South Dakota (SD) during the COVID-19 pandemic.

## 1. Methods

### 1.1. Study design, participants and data collection

This cross-sectional study was conducted among a convenience sample of licensed nurses self-identifying as currently practicing as a licensed practical nurse (LPN), registered nurse (RN), or advanced practice nurse (APRN) and working during the COVID-19 pandemic. Recruitment was carried out via email invitation and by promoting the study on existing networks, social media. Email invitations to participate were sent to each nurse on the RN and LPN ( $N = 19, 249$ ) email list obtained from the state Board of Nursing. One reminder email was sent to participants who had not yet replied after one week following the survey dissemination. Data were collected through an online survey software (QuestionPro). Due to the variability of COVID-19 cases by region in the U.S., the analytical methods include only SD nurses. The study protocol was approved by the University Human Research Ethics Committee (IRB-2006012-EXM), and online informed consent was provided by all participants.

### 1.2. Measurements

#### 1.2.1. Dependent variable: Emotional distress

The Depression Anxiety Stress Scales-21 (DASS-21) (Lovibond and Lovibond, 1995) is a four-point Likert scale (0 = Did not apply, 1 = Applied to me to some degree, or some of the time 2 = Applied to me to a considerable degree, or a good part of the time, 3 = Applied to me very much, or most of the time) and consists of three seven-item subscales: Depression, Anxiety and Stress Scales. The Depression subscale includes items related to hopelessness, lack of or low levels of interest and positive affect, and devaluation of life; the Anxiety subscale refers to feelings related to fear and measures situational anxiety and autonomic arousal; and the Stress subscale assesses difficulty in relaxing, tension, irritability, and impatience, among others (Lovibond & Lovibond, 1996). The DASS-21 scale has been used in clinical and non-clinical settings with high reliability, with Cronbach's alphas for the sub-scales ranging from 0.87 to 0.94 (Antony et al., 1998).

For each subscale, the summed items were multiplied by two to represent the longer version of the questionnaire, DASS-42. Scores on the DASS-21 range from 0 to 63, with higher scores indicating a higher level of emotional distress. Per the DASS-21 manual (Lovibond and Lovibond, 1995), cut-offs were set at normal to mild (Anxiety-  $\leq 9$ , Depression  $\leq 13$ , Stress,  $< +18$ ) and moderate to extremely severe (Anxiety-  $\geq 10$ , Depression  $\geq 14$ , Stress,  $\geq 19$ ). Overall distress was computed as having at least one of the sub-scales being coded as moderate to extremely severe.

#### 1.2.2. Independent variables

1.2.2.1. *Sociodemographic.* Sociodemographic data included: gender, age, race/ethnicity, marital status, income, and highest degree obtained in nursing.

1.2.2.2. *Work environment factors.* Participants were asked their years of nursing practice (tenure), current practice capacity (e.g., LPNs, RNs, Advanced Practice Nurses) and work setting (e.g., acute or primary setting). Primary care included nurses working in family practice, federal clinics, community health clinics and private practice. Acute care included outpatient surgical center, hospital, and ambulatory care. Educators and administrators (nurses without contact with patients) were included as "other". Participants self-reported the number of confirmed/suspected cases of COVID-19 with direct clinical contact at the facility since March 1st, 2020 and job satisfaction was also assessed. Rural and urban status of the work facility was obtained using the facility zip code and then classified using the rural-urban commuting area codes (U.S. Department of Agricultural, 2010). Perception of preparedness to deal with the pandemic, concern for contracting the illness at work or infecting family members, and concern with worsening of pre-existing mental health conditions due to the pandemic were also examined.

## 2. Data analysis

Due to the positive skewness of the DASS-21 total scale score (Kurtosis = 3.08, and skewness = 1.69), logistic regression models were performed to estimate adjusted odds ratios (ORs) and 95% Confidence Intervals (CIs) to assess the association between nurses' emotional distress (overall DASS-21 score) and the three subscales (depression, anxiety, and stress) with the independent variables. The logistic regression was performed using the dichotomized DASS-21 score and subscales ("moderate-extremely severe" versus "normal-mild" distress). Except for the variable income (6%), missing values did not exceed 5% for the independent and dependent variables. Bivariate analyses were conducted to assess the associations between the independent variables and the outcome, emotional distress. Variables with  $p$ -value  $< 0.1$  in bivariate analysis were included in multiple logistic regression analysis.

Since most of the sample reported white as race (93.9%), race was not included in the logistic regression analysis. We also examined for multicollinearity and found that age and tenure variables were highly correlated (correlation coefficient = 0.8), thus the variable tenure was excluded from the final models. The level of statistical significance was set at  $p < 0.05$ . Data were exported from QuestionPro and the statistical analysis carried out in SPSS version 26.0 (IBM SPSS Statistics, New York, NY, 2020).

### 3. Results

Between July 13th to August 13th, 2020, when the 7-day moving average of positive cases ranged from 60 to 90 cases in SD, 2633 nurses participated in the survey. After excluding unlicensed nurses or not currently practicing, incomplete questionnaires and participants from other states ( $N = 989$ ), a total of 1644 eligible nurses were identified. Of those, data for the multiple logistic regression were available for 91.5% ( $N = 1505$ ) eligible participants. Table 1 shows the descriptive statistics

**Table 1**  
Descriptive characteristics of the participants ( $N = 1644$ ).

Variables	N <sup>a</sup>	%
Gender		
Male	134	8.2
Female	1502	91.8
Age		
20–29	272	16.5
30–39	478	29.1
40–49	368	22.4
50–59	299	18.2
60 +	227	13.8
Race/Ethnicity		
White	1565	93.9
American Indian	47	2.9
Hispanic/Latinos	21	1.3
Other	34	2.1
Income		
Less than \$20,000–\$34,999	40	2.6
\$35,000–\$44,999	157	10.2
\$50,000–\$74,999	397	25.7
\$75,000–\$99,999	363	23.5
Over \$100,000	589	38.1
Marital status		
Single	263	16.0
Married	1167	71.1
Divorced/Separated/Widowed	211	12.9
Highest degree		
Licensed Practical Nurse (LPN)	153	9.3
Associate Degree in Nursing (ADN)/Diploma	364	20.4
Bachelors (BS)	862	52.5
Higher (MS, PhD, DNP)	264	16.1
Practice		
Licensed Practical Nurse (LPN)	167	10.2
Registered Nurse (RN)	1297	78.9
Certified Nurse Practitioner (CNP)	111	6.8
Certified Nurse	48	2.9
CRNA/CNM/CNS/CNL		
Other (e.g., educators)	20	1.2
Tenure		
≤1 year	68	4.1
2–5 years	285	17.3
6–10 years	316	19.2
11–20 years	403	24.5
More than 20 years	572	34.8
Work setting		
Primary care/community practice	408	24.8
Acute care (outpatient surgical center, hospital, ambulatory)	849	51.7
Long term care/Assisting living/Home care	188	11.4
Veterans Affairs/Indian Health Service	72	4.4
Other (e.g., corrections)	126	7.7
Rural/Urban Facility		
Urban	987	60.1
Rural	656	39.9

<sup>a</sup> Ns vary because of missing data.

for characteristics of survey sample. The majority were white married female, and working as registered nurses. Half of the nurses had a bachelor's degree, reported working in an acute setting and in an urban facility. About half were age 39 or younger. Table 2 depicts number of COVID-19 cases with direct contact, nurses' concerns, job satisfaction and preparedness. Nearly one in five (19.2%) reported encountering 11 or more cases of COVID-19 at their work facility and more than half reported concerns for getting infected at work.

Among this sample, the internal consistency of the DASS-21 was  $\geq 0.90$  for the overall scale and the three subscales (Depression = 0.91; Anxiety = 0.86; and Stress = 0.92 and total scale = 0.96). The prevalence of overall emotional distress was 22.2%, whereas the prevalence of anxiety, depression, and stress (moderate to extremely severe) were 15.8%, 14.5%, and 11.9%, respectively (Table 3). In the bivariate analysis, emotional distress (overall and the three DASS-21 subscales) were not associated with rural-urban status of the work facility (data not shown).

#### 3.1. Overall emotional distress

Table 4 shows the associations between sociodemographic, practice, work setting, job satisfaction, preparedness, concerns at work and overall emotional distress (DASS-21) found in the logistic regression analysis. The predictor variables explained 30% of the variance of emotional distress. No significant associations were found between gender, age, income, tenure, and work setting with overall emotional distress. Concerns with worsening of pre-existing mental health conditions due to the COVID-19 pandemic, job dissatisfaction, higher number of COVID-19 cases encountered at one's work facility, concerned of becoming infected at work, and feeling unprepared for the pandemic were strongly associated with moderate to severe emotional distress. For instance, nurses who reported high concern for the worsening of pre-existing mental conditions due to the pandemic and who were unsatisfied with their jobs were close to six (adjusted Odds Ratios [aOR]: 5.80; 95% CI 4.10–8.21) and four (aOR: 3.68; 95% CI 2.43–5.56) times more likely, respectively to report moderate to extremely severe levels of overall emotional distress. Finally, emotional distress was also associated with nurses' degree and practice. LPNs had almost threefold the likelihood of moderate to severe emotional distress (aOR: 3.11; 95% CI 1.48–6.55) when compared to nurses with higher degrees (MS, DNP or PhD). Similar results were also found when comparing RNs (aOR: 2.47; 95% CI 1.19–5.12) with all other practices.

**Table 2**  
Concerns of nurses, job satisfaction, COVID-19 cases and Preparedness.

Variables	N <sup>a</sup>	%
Concerns in worsening pre-existing mental health conditions		
No	675	42.0
Yes	345	21.5
No mental health condition	588	36.6
Job satisfaction		
Unsatisfied/very unsatisfied	166	10.1
Satisfied/very satisfied	1476	89.9
Number of COVID-19 cases with direct contact at the facility		
Zero	557	33.9
1–5	572	34.8
6–10	200	12.2
11 or more	315	19.2
Preparedness		
Completely/somewhat unprepared	387	23.5
Completely/somewhat prepared	1257	76.5
Fear of getting infected at work		
Not worried /not worried at all	668	40.6
Worried/ Extremely worried	976	59.4
Fear of infecting family members		
Not worried /not worried at all	455	27.7
Worried/ Extremely worried	1189	72.3

<sup>a</sup> Ns vary because of missing data.

**Table 3**  
Frequency distribution of emotional distress (DASS-21) and subscales (Anxiety, Depression, and Stress).

	N	%
DASS-21 Anxiety Subscale		
Normal-Mild	1385	84.2
Moderate- extremely severe	259	15.8
DASS-21 Depression Subscale		
Normal-Mild	1405	85.5
Moderate- extremely severe	239	14.5
DASS-21 Stress Subscale		
Normal-Mild	1448	88.1
Moderate- extremely severe	196	11.9
DASS-21 Total		
Normal-Mild	1279	77.8
Moderate- extremely severe	365	22.2

DASS-21: Depression, Anxiety and Stress scale.

**Table 4**  
Effects of sociodemographic variables, practice, work environment, job satisfaction, preparedness and concerns on overall emotional distress (DASS-21) during the COVID-19 pandemic (N = 1505).

Variables	Overall Emotional Distress (DASS-21)			
	N	aOR	95% C.I.	P-value
Gender				
Female	1376	1.28	0.73–2.23	0.389
Age in years				
20–29 years	259	1.73	0.94–3.18	0.080
30–39 years	453	1.40	0.83–2.36	0.210
40–49 years	335	1.57	0.92–2.66	0.099
50–59 years	259	1.16	0.66–2.04	0.607
60+ years	199	Ref.		
Marital Status				
Single	245	1.09	0.70–1.70	0.690
Divorced/Separated/Widowed	196	1.45	0.92–2.27	0.108
Married	1064	Ref.		
Highest Degree				
Licensed Practical Nurse (LPN)	137	<b>3.11</b>	<b>1.48–6.55</b>	<b>0.003</b>
Associate Degree in Nursing (ADN)/ Diploma	389	1.42	0.75–2.70	0.281
Bachelors (BS)	755	1.28	0.69–2.35	0.431
Higher (MS, PhD, DNP)	224	Ref.		
Practice				
RN (ADN, Diploma, BSN)	1184	<b>2.47</b>	<b>1.19–5.12</b>	<b>0.015</b>
Other (LPN & Advanced Practice)	321	Ref.		
Concerns in worsening pre-existing mental health conditions due to the pandemic				
No	630	1.11	0.78–1.58	0.567
Yes	331	<b>5.80</b>	<b>4.10–8.21</b>	<b>0.000</b>
No mental health condition	544	Ref.		
Job satisfaction				
Unsatisfied/very unsatisfied	149	<b>3.68</b>	<b>2.43–5.56</b>	<b>0.000</b>
Satisfied/very satisfied	1356	Ref.		
Number of COVID-19 cases with direct contact at the facility				
Zero	496	Ref.		
1–5	523	1.30	0.90–1.88	0.161
6–10	189	<b>1.76</b>	<b>1.09–2.84</b>	<b>0.020</b>
11 or more	297	<b>2.20</b>	<b>1.43–3.40</b>	<b>0.000</b>
Preparedness				
Completely/somewhat unprepared	348	<b>1.53</b>	<b>1.11–2.11</b>	<b>0.010</b>
Completely/somewhat prepared	1157	Ref.		
Fear of being infected at work				
Worried/extremely worried	629	<b>2.02</b>	<b>1.38–2.94</b>	<b>0.000</b>
Not worried/not worried at all	876	Ref.		
Fear of infecting family members				
Worried/extremely worried	1085	1.06	0.69–1.62	0.804
Not worried/not worried at all	420	Ref.		

aOR: adjusted Odds Ratios, CI: Confidence Interval. Ref. = reference category. Model adjusted for income and working setting.

### 3.2. Subscales

Consistent findings were found with anxiety, depression, and stress (Table 5). The factors consistently associated with moderate to severe anxiety, depression and stress were concerns for the worsening of previous mental health conditions, higher numbers of COVID-19 cases at one's work facility, job dissatisfaction, fear of getting infected at work, and feeling unprepared for the pandemic. For instance, nurses who reported concerns that the pandemic may exacerbate pre-existing mental health conditions were five-fold more likely to report moderate to severe anxiety (aOR: 5.35; 95% CI 3.62–7.91), depression (aOR: 5.45; 95% CI 3.65–8.14), and stress (aOR: 5.48; 95% CI:3.53–8.49) than nurses who reported not having a mental health condition. In addition, divorce/widowed nurses were more likely to report higher levels of depression than married nurses (aOR: 1.77; 95% CI:1.06–2.95). Similarly, LPNs were associated with higher levels of anxiety and stress compared to nurses with higher degrees. In addition, RNs (ADN, Diploma, BSN) were also more likely to report higher levels of anxiety, depression and stress compared to all other practices (LPNs & Advanced Practice Nurses). Age was a risk factor for higher stress. Younger nurses were significantly more likely to report higher rates of stress compared to nurses aged 60 and above. The strength of the correlations between the main socio-demographic and work environment factors with emotional distress and the DASS-21 subscales are shown in Table 6. Although the correlation coefficients between work environment factors and overall emotional distress and the DASS-21 subscales were not strongly correlated in the bivariate analysis, they were statistically significant and presented the same direction as in the regression models (Tables 4 and 5). For instance, as shown in Table 6, an inverse correlation was noted with preparedness and job dissatisfaction with emotional distress and the DASS-21 subscales. Similar findings were reported in Table 4, with significant associations to overall emotional distress and work environment variables.

### 4. Discussion

The aim of this study was to examine the prevalence of emotional distress, anxiety, depression, stress, and investigate its association with sociodemographic and work environment factors among nurses practicing in South Dakota (SD) during the COVID-19 pandemic. Using the DASS-21, which showed an excellent internal consistency to measure emotional distress, anxiety, depression and stress level among nurses, the percentage of nurses with moderate to extremely severe anxiety, depression, and stress was 15.8%, 14.5%, and 11.9%, respectively, and 22.2% for overall emotional distress. These findings were similar to the ones found by Du et al. (2020) in China, but lower than those reported by Shechter et al. (2020) in New York. However, potential differences could be explained by the high infection and mortality rate occurring in New York, while this study was carried out in the initial phase of the pandemic in SD when the infection rates were lower than other states (CDC, 2020). These similar findings were found in a longitudinal study conducted in Wuhan China which found nurses showed significantly higher risks of depression, anxiety, and posttraumatic stress disorder (PTSD) symptoms during the outbreak period compared to those in the stable period (Cai et al., 2020).

The second aim of this study was to identify the associated factors with emotional distress and the three subscales. Our findings show that concerns for worsening pre-existing mental health conditions, job dissatisfaction, higher number of COVID-19 cases with direct clinical contact at the facility, fear of getting infected at work, and feeling unprepared for the pandemic were independent predictors for higher emotional distress, anxiety, depression and stress. Liu et al. (2020) found similar results with healthcare providers voicing concerns about becoming infected and infecting family members or others. In addition, Sampaio et al. (2020) found a positive correlation between fear of getting infected (both self and family members) and depression, anxiety and stress. Furthermore, our findings are consistent with previous

**Table 5**

Effects of sociodemographic variables, practice, work environment, job satisfaction, preparedness and concerns on Anxiety, Depression, and Stress during the COVID-19 pandemic (N = 1505).

Variables	Anxiety			Depression			Stress		
	aOR	95% C.I.	p-value	aOR	95% C.I.	p-value	aOR	95% C.I.	p-value
Gender									
Female	1.30	0.69–2.44	0.413	0.84	0.46–1.54	0.566	1.18	0.59–2.37	0.641
Age in years									
20–29 years	<b>2.14</b>	<b>1.05–4.37</b>	<b>0.037</b>	1.44	0.71–2.91	0.313	<b>3.97</b>	<b>1.62–9.78</b>	<b>0.003</b>
30–39 years	1.62	0.86–3.05	0.139	1.22	0.67–2.23	0.513	<b>3.19</b>	<b>1.41–7.22</b>	<b>0.005</b>
40–49 years	1.81	0.95–3.44	0.072	1.34	0.73–2.46	0.350	<b>2.72</b>	<b>1.19–6.25</b>	<b>0.018</b>
50–59 years	1.36	0.69–2.69	0.378	0.77	0.40–1.50	0.444	1.11	0.45–2.77	0.822
60+ years	Ref.								
Marital Status									
Single	1.01	0.62–1.63	0.974	1.10	0.67–1.83	0.703	1.11	0.65–1.91	0.699
Divorced/Separated/Widowed	1.35	0.81–2.24	0.245	<b>1.77</b>	<b>1.06–2.95</b>	<b>0.028</b>	1.65	0.91–2.98	0.097
Married	Ref.								
Highest Degree									
Licensed Practical Nurse (LPN)	<b>3.95</b>	<b>1.70–9.19</b>	<b>0.001</b>	<b>2.47</b>	<b>1.03–5.94</b>	<b>0.043</b>	<b>4.32</b>	<b>1.58–11.79</b>	<b>0.004</b>
Associate Degree in Nursing (ADN)/Diploma	1.43	0.69–2.98	0.341	1.12	0.54–2.34	0.759	1.17	0.50–2.75	0.716
Bachelors (BSN)	1.12	0.55–2.26	0.760	1.18	0.59–2.38	0.643	1.44	0.65–3.22	0.371
Higher (MS, PhD, DNP)	Ref.								
Practice									
RN (ADN, Diploma, BSN)	<b>2.33</b>	<b>0.99–5.47</b>	<b>0.053</b>	<b>2.73</b>	<b>1.15–6.48</b>	<b>0.023</b>	<b>3.18</b>	<b>1.13–8.98</b>	<b>0.029</b>
Other (LPN & Advanced Practice)	Ref.								
Concerns in worsening pre-existing mental health conditions due to the pandemic									
No	1.22	0.80–1.85	0.351	1.07	0.69–1.66	0.748	1.10	0.67–1.81	0.699
Yes	<b>5.35</b>	<b>3.62–7.91</b>	<b>0.000</b>	<b>5.45</b>	<b>3.65–8.14</b>	<b>0.000</b>	<b>5.48</b>	<b>3.53–8.49</b>	<b>0.000</b>
No mental health condition	Ref.								
Job satisfaction									
Unsatisfied/very unsatisfied	<b>2.38</b>	<b>1.54–3.69</b>	<b>0.000</b>	<b>4.24</b>	<b>2.77–6.48</b>	<b>0.000</b>	<b>3.48</b>	<b>2.20–5.50</b>	<b>0.000</b>
Satisfied/very satisfied	Ref.								
Number of COVID-19 cases with direct contact at the facility									
Zero	Ref.								
1–5	<b>1.54</b>	<b>1.00–2.37</b>	<b>0.051</b>	1.46	0.95–2.25	0.084	1.47	0.91–2.38	0.116
6–10	<b>2.14</b>	<b>1.24–3.70</b>	<b>0.006</b>	<b>2.17</b>	<b>1.26–3.75</b>	<b>0.005</b>	<b>2.19</b>	<b>1.20–4.00</b>	<b>0.010</b>
11 or more	<b>3.27</b>	<b>2.01–5.33</b>	<b>0.000</b>	<b>1.92</b>	<b>1.16–3.18</b>	<b>0.012</b>	<b>2.22</b>	<b>1.28–3.84</b>	<b>0.004</b>
Preparedness									
Completely/somewhat unprepared	<b>1.69</b>	<b>1.19–2.42</b>	<b>0.004</b>	<b>1.72</b>	<b>1.20–2.46</b>	<b>0.003</b>	<b>1.82</b>	<b>1.24–2.69</b>	<b>0.002</b>
Completely/somewhat prepared	Ref.								
Fear of being infected at work									
Worried/extremely worried	<b>1.94</b>	<b>1.26–2.99</b>	<b>0.003</b>	<b>1.92</b>	<b>1.22–3.03</b>	<b>0.005</b>	<b>1.90</b>	<b>1.16–3.14</b>	<b>0.011</b>
Not worried/not worried at all	Ref.								
Fear of infecting family members									
Worried/extremely worried	1.01	0.62–1.67	0.956	0.84	0.51–1.40	0.505	0.90	0.51–1.60	0.723
Not worried/not worried at all	Ref.								

aOR: adjusted Odds Ratios, CI: Confidence Interval. Ref. = reference category. Model adjusted for income, and working setting.

**Table 6**

Correlation coefficient between sociodemographic and work environment factors with DASS-21, Anxiety, Depression, and Stress during the COVID-19 pandemic.

Variables	DASS-21	Anxiety	Depression	Stress
Age	-0.096**	-0.111**	-0.071**	-0.141**
Highest Degree	-0.097**	-0.100**	-0.068**	-0.065*
Practice	0.060*	0.028	0.045	0.029
Concerns in worsening pre-existing mental health conditions due to the pandemic	0.029	0.017	0.022	0.024
Job dissatisfaction	-0.231**	-0.177**	-0.255**	-0.211**
Number of COVID-19 cases with direct contact at the facility	0.122**	0.152**	0.092**	0.105**
Preparedness	-0.141**	-0.130**	-0.147**	-0.145**
Fear of being infected at work	0.194**	0.164**	0.146**	0.141**

\* Correlation is significant at the 0.05 level (2-tailed).

\*\* Correlation is significant at the 0.01 level (2-tailed).

research showing a significant relationship between job stress and job satisfaction among nurses (Ella et al., 2016). For example, Said and El-Shafei (2020) conducted a study during COVID-19 pandemic in Egypt and found a highly stressful work environment resulted in job dissatisfaction and a tendency to leave their job. Kackin et al. (2020) interviewed 10 nurses in Turkey who cared for patients diagnosed with COVID-19 and determined that these nurses experienced both psychological and social distress as a result of the pandemic. Even in the early stages of the worldwide outbreak, these nurses experienced fear, anxiety and depression. Findings of this qualitative research also suggested that nurses caring for COVID-19 patients were at risk for burnout and secondary trauma (Kackin et al., 2020).

Although other studies have found female gender is associated with higher rates of anxiety and depression (Lai et al., 2020; Rajkumar, 2020), no significant association was found in this study between gender and emotional distress. However, this study found that age was a risk factor for stress with younger nurses reporting higher stress. Shahrouf and Dardas (2020) found similar results with younger Jordanian nurses reporting higher psychological distress. In addition, income, work setting, and rural-urban status of the work facility were not associated with emotional distress, anxiety, depression, or stress. However, this

study found that nurses who were divorced/separated/widowed were more likely to report moderate to severe depression when compared to married nurses. Previous studies have shown that widowhood and divorce are distressing life events that contribute to higher levels of depression (Elbay et al., 2020). Both events may also represent lack of social support, and this is critical as social support has been found to moderate the negative effects of stress on mental health outcomes (Muller et al., 2020). In addition, LPNs were more likely to report moderate to severe emotional distress when compared to nurses with higher degrees (MS, DNP or PhD). This finding may be supported by the fact that nurses with more years of education have greater professional autonomy and empowerment at work, giving them more choices about their practice (Labrague et al., 2018). Nurses with fewer years of education may have less knowledge of self-care strategies and may lack access to resources and networks that could help buffer and better cope with stress at work (Stansfeld et al., 1999).

## 5. Strengths and limitations

The research presents several strengths; however, findings of this study should be interpreted in light of its limitations. First, this is a cross-sectional study and thus no cause-and-effect relationship can be inferred. Second, response bias may be present due to the self-report nature of the survey. Third, the study was carried out during the initial phase of the pandemic in one Midwest state (the seven-day average of positive cases was between 60 and 80, compared to 821 to 1279 cases in November 2020) (South Dakota Department of Health, 2020) which may have an impact in the underestimation of the main outcomes. Nurses caring for COVID-19 patients have reported to be at risk for various mental health problems during the outbreak of the pandemic (Cai et al., 2020; World Health Organization, 2020). However, despite nurses reporting lower emotional distress, anxiety, depression and stress; strong associations were still found with concern of worsening pre-existing conditions due to the pandemic, perception of risk, and job dissatisfaction. Although nurses' perception of general preparedness for the pandemic was evaluated, the availability of personal protective equipment (PPE) was not specifically addressed, which could be considered another limitation of the study given the concern for PPE availability nationwide. Finally, the sampling of this study was voluntary, hence, selection bias may have occurred. Nonetheless, the prevalence of emotional distress, anxiety, depression, and stress was similar to Du et al. (2020). Despite these limitations, to our best knowledge, this study is among the very few to investigate the risk factors with emotional distress among nurses in the Midwest during the COVID-19 pandemic.

## 6. Clinical applications

Multidisciplinary teams at national and local levels that protect and provide mental and moral support to health professionals are important to mitigate the burden of mental health problems during an outbreak. Kackin et al. (2020) found that nurses need psychological support and resource management during the pandemic. Individual resilience and coping skills are important; however, organizational and collective efforts are even more crucial during these unprecedented times (Greenberg et al., 2020). Healthcare managers have a crucial role to protect nurses' mental wellbeing (Maben & Bridges, 2020). Identifying nurses' needs and listening to their fears and concerns at work are critical to protect and promote nurses' psychological well-being during the COVID-19 pandemic. The World Health Organization (2020) offers helpful strategies to mitigate the stress on nurses, such as rotating workers from higher-stress to lower-stress functions, partner novice with more experienced colleagues, which helps provide support and monitor stress, and ensure staff are aware of where and how they can access mental health and psychological support. In addition, it will be important for leadership to continue to monitor nurse's psychological well-being even as

vaccines are available and the pandemic abates to monitor for long-term effects. During the SARS pandemic, PTS symptoms were documented in healthcare workers up to three years later (Maunder et al., 2006; Wu et al., 2009). These efforts may also have implications for mitigating the impact of future pandemics on the nursing workforce.

## 7. Research implications

Future research is needed as the pandemic continues to impose its long-term effects on the mental health of nurses. Broadening the understanding of the longitudinal impact of COVID-19 on nurses as well as the factors that predispose nurses to higher levels of emotional distress may support program planning designed to support nurses' mental health and resiliency and may offer some insight into surge capacity efforts with future pandemics. Exploring the lived experiences of nurses during the pandemic through the use of focus groups and administering a follow-up survey to study participants may provide valuable information, especially as COVID-19 numbers continue to threaten to overwhelm many healthcare facilities.

Further research into the impact of different administrative strategies, such as resiliency training, flexible scheduling options, and limiting the number of hours nurses are in contact with COVID-19 patients, may also prove to be beneficial. The Joint Commission (TJC) (2020) has supported the removal of any barriers that may inhibit healthcare staff from accessing mental health services, including the elimination of policies that support stigma and consequences for seeking mental health treatment. The American Nurses Credentialing Center (ANCC) (2020) has promoted clear communication, collaboration and fostering of resiliency in their efforts to support nurses caring for COVID-19 patients. Future inquiry comparing the emotional distress of nurses employed at hospitals with ANCC Magnet Recognition and/or TJC accreditation to those employed at facilities without may be valuable in attempts to gain knowledge about the effectiveness of strategies designed to support nurses' mental health during the pandemic.

## 8. Conclusion

In summary, our findings suggest a high prevalence of emotional distress among practicing nurses in SD during the COVID-19 pandemic. Concerns for worsening pre-existing mental health conditions, job dissatisfaction, higher number of COVID-19 cases with direct clinical contact at the facility, fear of getting infected at work, and feeling unprepared for the pandemic were independent predictors for higher emotional distress, anxiety, depression, and stress. These findings underline the need to promote appropriate support in the work environment to reduce nurses' emotional distress and promote psychological well-being during the COVID-19 world health crisis and in future pandemics.

## CRediT authorship contribution statement

**Patricia Da Rosa:** Conceptualization, Project administration, Methodology, Software, Data curation, Formal analysis, Writing – original draft, Writing – review & editing. **Robin Brown:** Conceptualization, Writing – original draft, Writing – review & editing. **Brandi Pravecek:** Conceptualization, Writing – original draft, Writing – review & editing. **Christin Carlotta:** Conceptualization, Writing – original draft, Writing – review & editing. **Aileen S. Garcia:** Conceptualization, Writing – original draft, Writing – review & editing. **Paula Carson:** Conceptualization, Writing – review & editing. **Dannica Callies:** Conceptualization, Writing – review & editing. **Matthew Vukovich:** Supervision, Conceptualization, Writing – review & editing.

## Declaration of competing interest

The authors declare that they have no known competing financial

interests or personal relationships that could have appeared to influence the work reported in this paper.

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