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Associations Among Nurses' Mental/Physical Health, Lifestyle Behaviors, Shift Length, and Workplace Wellness Support During COVID-19

Important Implications for Health Care Systems

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Work cultures supportive of wellness and shorter shift length have been associated with better mental/physical health outcomes in nurses, but how the coronavirus disease-19 (COVID-19) pandemic impacted such outcomes is not known. This study's aims were to (1) describe the mental/physical health, well-being, and healthy lifestyle behaviors of nurses during the pandemic; (2) explore the pandemic's impact on their health and healthy lifestyle behaviors; and (3) determine the associations of perceived workplace wellness support and shift length with nurses' health, well-being, and healthy lifestyle behaviors. A cross-sectional descriptive design was used with 264 nurses associated with Trusted Health. Nurses completed a survey containing valid and reliable scales measuring depression, anxiety, burnout and quality of life, perceived wellness culture, and healthy lifestyle behaviors. Results indicated that more than 50% of nurses had worsening mental/

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physical health relating to the pandemic. Compared with nurses whose workplaces provided little/no wellness support, nurses with workplaces that supported their wellness were 3 to 9 times as likely to have better mental/physical health, no/little stress, no burnout, and high quality of life. Nurses who worked longer shifts had poorer health outcomes. These findings indicate that workplace wellness support and shorter shifts positively impacted nurse mental/physical health and professional quality of life amidst the pandemic. **Key words:** *nurses, occupational health, pandemic, well-being*

BEFORE THE CORONAVIRUS DISEASE-2019 (COVID-19) pandemic, national studies indicated that nurses experience high rates of mental/physical health problems that negatively impact the quality and safety of health care.[1,2] Currently, research indicates that rates of burnout, stress, anxiety, and posttraumatic stress disorder are on the rise in health care professionals as has been found in past viral epidemics.[3-5] System failures such as inadequate staffing, lack of training when deployed to a new clinical area, and personal protective equipment shortages, as well as being the primary support person to dying patients, have contributed to clinician distress during the pandemic.[6] Frontline health care professionals also face 3 times the risk of a positive COVID-19 test when compared with the general community.[7] Consequently, nurses and other health care professionals are facing a mental health pandemic inside of the COVID-19 pandemic that requires urgent action.[5,8]

Nurses are skilled at promoting the well-being of the patients they serve; however, they struggle to prioritize their own well-being. A study of 1790 nurses found that less than 50% of participants were in suboptimal mental/physical health.[1] Burnout has become endemic in health care professionals, with the prevalence between 35% and 60%.[9,10] Nurses also report high rates of depression, anxiety, and stress,[1,2] placing them at a greater risk of suicidal action than the public.[11,12]

A proposed solution for solving the clinician mental health crisis is the promotion of a systems approach.[13,14] This requires understanding system drivers in poor clinician mental health, such as heavy workloads, poor staffing, long work hours, electronic health record problems, and workplace culture.[15] Preceding the COVID-19 pandemic, positive work environments/cultures where clinicians felt supported in their wellness were identified as a key component in mitigating clinician wellness concerns. However, it is not known how nurses' perception of workplace wellness culture has impacted their mental/physical health and lifestyle behaviors during the COVID-19 pandemic.

SPECIFIC AIMS

This study's aims were to (1) describe the mental/physical health, well-being, and healthy lifestyle behaviors of nurses during the pandemic; (2) explore the pandemic's impact on their health and healthy lifestyle behaviors; and (3) determine the associations of perceived workplace wellness support and shift length with nurses' health, well-being, and healthy lifestyle behaviors.

METHODS

A cross-sectional survey design was utilized. The study procedures were in accordance with the ethical standards of the responsible committee on human experimentation and with the Helsinki Declaration. The institutional review board at the first author's institution reviewed and determined the study as exempt, category 2a (protocol no. 2020E0874). Study data were collected from August 2020 through October 2020.

Population

The study population included registered nurses contracted, previously contracted, or

interested in being contracted with Trusted Health, a travel nurse technology and staffing company. Trusted Health maintains e-mail listservs for sending organizational newsletters to nurses who signed up for such correspondence. The newsletters e-mailed during August 2020 to October 2020 contained information about the study, the survey, and how to participate anonymously via a secured link. Qualtrics, an online survey software program, hosted the survey. Participants provided their consent digitally before starting the survey.

Measures

Survey questions included gender, ethnicity/race, age, and primary role in nursing for demographic data collection. The remaining survey questions aimed to assess nurse well-being (mental/physical).

Healthy lifestyle behaviors

The Centers for Disease Control and Prevention (CDC) guidelines on preventing chronic disease were used for developing the healthy lifestyle behavior questions.[16] Questions inquired about hours of sleep obtained/night, minutes of physical activity obtained per week, number of fruits and vegetables eaten per day, and tobacco and alcohol use. Healthy lifestyle behaviors were measured because less than 7% of Americans engage in all the lifestyle behaviors recommended by public health authorities.[17] Healthy lifestyle behaviors are key in the prevention of chronic disease, including mental health conditions.

COVID-19 impact on healthy behaviors

COVID-19 restrictions disrupted daily life for many people and resulted in unhealthy coping mechanisms (eg, unhealthy eating, increased alcohol use) or an inability to participate in regular health routines.[18] After each healthy lifestyle behavior question, participants were asked whether COVID-19 impacted their healthy lifestyle behaviors and in what way. Sleep and physical activity impact were assessed with 2 questions. For sleep, the first question asked, "Has your sleep been negatively impacted since the start of the COVID-19 pandemic?" If participants answered "Yes," they were asked, "If yes, how has your sleep been impacted?" The available responses were "I am sleeping more than usual" or "I am sleeping less than usual." The same format was used for exercise. Eating, tobacco use, and alcohol use during COVID-19 were assessed with 1 question per behavior. For eating, participants were asked, "Has the pandemic affected your nutrition patterns in a negative way?" Responses were, "No," "Yes, I am tending to eat less healthy," and "Yes, I am eating more healthy." The tobacco and alcohol questions were formatted differently than the eating question did as they inquired whether tobacco or alcohol use had increased since the start of the pandemic. Available responses were "No" and "Yes I am using/consuming alcohol/these products more often."

Patient Health Questionnaire-2

The Patient Health Questionnaire-2 (PHQ-2) measures depressive symptoms and was used in this study as this instrument has been used in similar mental health and perceived workplace wellness support research.[1,2] The PHQ-2 is valid, reliable, and widely utilized.[19] Two items inquired about how frequently participants experienced depressive symptoms over the previous 2 weeks: "How often have you been bothered by any of the following problems: little interest or pleasure in doing things; or feeling down, depressed, or hopeless." Participants responded to the items using a 4-point Like-type scale, 0 (not at all) to 3 (nearly every day). The Cronbach α for this sample was 0.83.

Generalized Anxiety Disorder-2

The Generalized Anxiety Disorder-2 (GAD-2) measures anxiety symptoms and was used in this study as it has been used in similar mental health and perceived

workplace wellness support research.[1,2] The GAD-2 is valid and reliable.[20] Two items on the scale inquire about how frequently participants experienced anxiety symptoms over the previous 2 weeks: "How often have you been bothered by any of the following: feeling nervous, anxious, or on edge; or not being able to stop or control worrying." Participants responded to the items using a 4-point Like-type scale, 0 (not at all) to 3 (nearly every day). The Cronbach α for this sample was 0.87.

Perceived Stress Scale-4

Nurses tend to have lower perceived stress when they perceive their workplace as supportive of their wellness.[2] Therefore, the valid and reliable Perceived Stress Scale-4 (PSS-4) was used in the current study to measure stress perception via a 4-item Likert scale.[21,22] The 4 item scores are produced by calculating the sum of the items, with reverse scoring on 2 of the items. Higher scores indicate higher perceived stress. Example items include the following: "In the last month, how often you felt that you were unable to control the important things in your life?" And "That you were unable to handle your personal problems?" Participants responded to the items using a 5-point Likert scale, 0 (never) to 4 (very often). The Cronbach α for this study was 0.87.

Professional quality of life

Nurses' professional quality of life (ProQOL) has been shown to increase with higher perceived workplace wellness support.[2] To assess ProQOL in the current sample, 4 questions from the ProQOL scale[23] were used: "I feel worn out because of my work"; "I feel trapped by my job"; "I am not as engaged with my patients today as I used to be"; and "I believe I can make a difference through my work." Responses used a Likert scale from 1 (never) to 5 (very often). A score of 12 to 16 indicated a high ProQOL. The Cronbach α for this sample was 0.79.

Burnout

Workplace wellness support is believed to reduce clinician burnout.[13,14] A single item from the proprietary Maslach Burnout Inventory Emotional Exhaustion (MBI:EE) subscale has been validated as a standalone burnout measure.[24] The current study used a nonproprietary 1-item measure that has been reported as a viable replacement for the single item MBI:EE to assess burnout.[24] When compared with the MBI:EE, the nonproprietary measure has a correlation of 0.79, sensitivity of 83.2%, specificity of 87.4%, and an area under the receiver operator curve of 0.93. The nonproprietary 1-item measure asks, "Overall, based on your definition of burnout, how would you rate your level of burnout?" A 5-category ordinal scale is used to score responses: 1 = *no symptoms;* 2 = *occasional stress, but don't feel burned out;* 3 = *definitely burning out and am experiencing physical or emotion exhaustion;* 4 = *symptoms of burnout won't go away; and* 5 = *I feel completely burned out and often wonder if I can go on*.[24] A positive score for burnout was 3 or more.

Self-reported mental/physical health and COVID-19

Nurse self-reported mental/physical health ratings increase with higher perceived workplace wellness support.[1,2] In the present study, self-reported mental health was obtained by asking, "On a scale of 0-10, how would you rate your current mental health? [0 being very unhealthy to 10 being extremely healthy]" Self-reported physical health was obtained in a similar matter with the same scale. Following the scaled mental/physical health questions, participants were asked, "Has your physical health been impacted by COVID-19?" And "Has your mental health been impacted by COVID-19?" Available responses for physical health were "No," "Yes, I am physically healthier as a result of COVID-19," and "Yes, I am not as physically healthy as a result of COVID-19." The responses for

mental health were similar to the physical health responses, except instead using physicality verbiage in the "Yes" responses, "better mental health" and "not as mentally healthy" were used.

Shift length

The mental health of nurses can be impacted by the number of hours worked.[15] Therefore, shift length was assessed by asking, "How long is your typical workday or shift?" Selections options were less than 8 hours, 8 to 10 hours, 11 to 12 hours, and 12+ hours.

Workplace wellness support

Higher perceived workplace wellness support has been associated with improved mental and physical health in nurses.[1,2] Workplace wellness support was assessed by asking, "How supportive is your work environment of personal wellness?" Participants answered this question using a 5-point Likert scale, 0 (not at all) to 4 (very much).

Statistical analysis

Descriptive statistics were used to summarize sample characteristics, healthy lifestyle behaviors, mental/physical health, and the changes during the COVID-19 pandemic. Multiple logistic regression modeling was used to examine the effects of perceived workplace wellness support and shift length on each healthy lifestyle behavior and health measure, adjusting for other sample characteristics. Healthy lifestyle behaviors and health measures were analyzed separately in the multiple logistic regression model and dichotomized as better or worse categories. Better categories included sufficient sleep (7+ hours per night), adequate physical activities (150+ minutes of moderate physical activities per week), healthy eating (5+ servings of fruits/vegetables per day), not current smoker, no/light alcohol use ($\leq$3 times per week), better physical health (self-rated physical health score of 6-10), better mental health (self-rated mental health score of 6-10), no symptoms of depression (PHQ-2 score of 0), no symptoms of anxiety (GAD-2 score of 0), no/little stress (PSS-4 score of $\leq$4), and high ProQOL (ProQOL-4 score of $\geq$12).

Similarly, multiple logistic regression modeling was used to examine the effects of perceived workplace wellness support and shift length on the odds of having a negative impact from COVID-19 on healthy lifestyle behaviors and health measure, adjusting for other sample characteristics. Each negative impact indicator was analyzed separately in the multiple logistic regression model and was dichotomized as having a negative impact (yes vs no). The "yes" category included (1) negative impact on sleep by either slept more or less, (2) less physical activities, (3) eating less healthy, (4) more smoking, (5) more alcohol drinking, (7) worsen physical health, and (8) worsen mental health. Sample characteristics (age, sex, race/ethnicity, marital/relationship status, degree of education, and Trusted Health contract status) were adjusted as covariates in all the logistic regression models.

The perceived workplace wellness support (the primary independent variable for the logistic regression models) was distributed as n = 121, 122, 19 for "not at all," "somewhat," and "very much" categories, respectively. Our sample size (n = 264) was not powered to detect an odds ratio (OR) of less than 2.2 for the somewhat versus not at all comparisons and an OR of less than 5.1 for the very much versus not at all comparisons. Similarly, the sample size was not powered to detect an OR of less than 2.1 for the shift length comparisons (<12 vs 12+ hours per day). The power analyses were conducted using logistic regression modeling with a 2-sided significance level of .05, assuming an outcome (eg, sleeping 7+ hours per week) had a prevalence of 10% to 50%. Therefore, result interpretations were guided by both effect sizes (ie, ORs for logistic regression analysis) and inferential statistics. Cutoffs of OR for small, medium, and large effect sizes were 1.68 (or 0.60 if OR

<1), 3.47 (or 0.29 if OR <1), and 6.71 (or 0.15 if OR <1). SAS 9.4 (SAS Institute, Cary, North Carolina) was used for all the analyses.

RESULTS

Sample characteristics

Of the 264 nurses who completed the survey, most were female (n = 235; 89.0%), non-Hispanic White (n = 187; 70.8%), and married or in a relationship (n = 153; 58.0%). The average age was 39.9 years (SD = 12.8). More than half of the nurses were between 25 and 44 years of age (n = 175; 66.2%) and worked in a point-of-care/bedside setting (n = 138; 52.3%). Fifty (18.9%) of the nurses had an associate degree or diploma, 160 (60.6%) had a Bachelor of Science degree, 42 (15.9%) had a master's or doctorate degree. A majority (n = 174; 65.9%) of the nurses worked 12 hours or longer per day. Only 25 (9.5%) of nurses were currently contracted with Trusted Health, and the remaining were previously or interested in being contracted nurses (see Supplemental Digital Content Table 1, available at: http://links.lww.com/NAQ/A9).

Healthy lifestyle behaviors and related changes during the COVID-19 pandemic

A small proportion of nurses met the CDC-recommended guidelines for sleep, physical activity, and fruit/vegetable consumption. About a third (n = 93; 34.8%) of the nurses slept 7 or more hours per night. Fifty-nine (22.3%) reported 150 minutes or more of moderate physical activities per week. Only twenty-one (8.0%) nurses consumed 5 or more servings of fruits/vegetables per day. Most nurses were not current smokers (n = 233; 88.3%). Thirty-nine nurses (14.8%) never drank alcohol, 195 (73.9%) were light drinkers, and 30 (11.4%) reported moderate/heavy drinking (Table 1).

Table 1. Healthy Lifestyle Behaviors and Change Since the COVID-19 Pandemic

	n (%)
Healthy behaviors	
Hours of sleep per night	
<7	172 (65.2)
7+	92 (34.8)
Minutes of moderate physical activity per week	
<150	205 (77.7)
150+	59 (22.3)
Servings of fruits/vegetables per day	
<5	243 (92.0)
5+	21 (8.0)
Current smoker	
Yes	28 (11.7)
No	233 (88.3)
Alcohol use	
Never	39 (14.8)
Light drinker (≤3 times/wk)	195 (73.9)
Moderate/heavy drinker (4+ times/wk)	30 (11.4)
COVID-19 impact on healthy behaviors	
Sleep	
No change	92 (34.8)
Negatively impacted	171 (64.8)
More sleep	30 (11.4)
Less sleep	141 (53.4)
Physical activity	
No change	72 (27.3)
Less	174 (65.9)
More	16 (6.1)
Eating	
No change	79 (29.9)
Less healthy	152 (57.6)
More healthy	33 (12.5)
Increased smoking since COVID-19	
No	244 (92.4)
Yes	15 (5.7)
Increased alcohol use during COVID-19	
No	161 (61.0)
Yes	102 (38.6)

Results listed in Table 1 demonstrate the impact of the COVID-19 pandemic on healthy lifestyle behaviors. Most of the nurses (n = 171; 64.8%) reported that the pandemic negatively affected their sleep, with 141 (53.4) sleeping less and 30 (11.4%) sleeping more. More than half reported that they had less physical activity (n = 174; 65.9%) and ate

less healthy (n = 152; 57.6%) due to the pandemic. The pandemic had less impact on smoking, with 15 (5.7%) reporting increased smoking, while more than a third (n = 102; 38.6%) reported increased alcohol intake due to the pandemic.

Mental/Physical health and the related changes during the COVID-19 pandemic

The nurses reported suboptimal health, with 197 (74.6%) reporting a physical health score of 5 or less and 213 (80.7%) reporting a mental health score of 5 or less. A substantial proportion of nurses reported some degree of depressive symptoms (n = 78; 29.5%), anxiety symptoms (n = 99; 37.5%), stress (n = 200; 78.5%), and burnout (n = 173; 65.5%). Only a small proportion of the nurses (n = 39; 14.8%) reported high ProQOL. More than half of the nurses reported worse physical health (n = 142; 53.8%) and worse mental health (n = 209; 79.2%) due to the pandemic (Table 2).

Table 2. Nurses' Self-reported Mental/Physical Health and COVID-19 Impact on Mental/Physical Health

	n (%) of Nurses
Mental health	
0-5	213 (80.7)
6-10 (good)	51 (19.3)
Physical health	
0-5	197 (74.6)
6-10 (good)	67 (25.4)
PHQ-2	
<3 (no depression)	184 (69.7)
≥3	78 (29.5)
GAD-2	
<3 (no anxiety)	163 (61.7)
≥3	99 (37.5)
PSS-4	
0-4 (no/little stress)	61 (23.1)
5-12	200 (75.8)
ProQOL-4	
0-11	223 (84.5)
12-16 (high professional QOL)	39 (14.8)
Burnout	
≥3 "Yes"	173 (65.5)
<3 "No"	91 (34.5)
COVID-19 impact on mental health	
No change	42 (15.9)
Better	13 (4.9)
Worse	209 (79.2)
COVID-19 impact on physical health	
No change	100 (37.9)
Better	22 (8.3)
Worse	142 (53.8)

Abbreviations: GAD-2, Generalized Anxiety Disorder-2; PHQ-2, Patient Health Questionnaire-2; ProQOL-4, Professional Quality of Life scale; PSS-4, Perceived Stress Scale-4; QOL, quality of life.

Associations of workplace wellness support with healthy lifestyle behaviors and the related changes during the COVID-19 pandemic

The proportion of nurses who had 7 or more hours of sleep per night increased with higher perceived workplace wellness support (28.9%, 38.5%, and 52.6% for "not at all/a little," "somewhat," and "very much support," respectively; Table 3). Similar trends for other healthy lifestyle behaviors were observed, including fruit/vegetable consumption, smoking, and alcohol use. The significant relationships between greater perceived support of wellness and better healthy lifestyle behaviors held after adjusting for nurses' age, gender, race/ethnicity, marital status, education, hours of workday/shift, and Trusted Health contract status in the multiple logistic regression models. Compared with nurses whose workplaces provided little or no support, those whose workplaces supported higher wellness were 5 times as likely to have 7 hours of sleep per night (OR = 4.89; 95% CI, 1.34-17.84) and 16 times as likely to have 5 or more servings of fruits/vegetables per day (OR = 16.24; 95% CI, 2.86-92.06; Table 3).

Information listed in Table 3 reveals that compared with nurses whose workplaces provided little/no support, those whose workplaces supported higher wellness were less likely to report a negative impact of the COVID-19 pandemic on their healthy lifestyle

Table 3. The Relationship of Perceived Support of Worksite Wellness With Nurses' Healthy Lifestyle Behaviors, Mental/Physical Health, and the Changes During the COVID-19 Pandemic

	Perceived Support of Wellness at the Place of Employment					
	Not At All/A Little (n = 121), %	Somewhat (n = 122), %	Very Much (n = 19), %	Somewhat vs Not At All/A Little, Adjusted OR (95% CI)[a]	Very Much vs Not At All/A Little, Adjusted OR (95% CI)[a]	*P*
Good healthy lifestyle behavior						
7+ h of sleep per night	28.9	38.5	52.6	1.52 (0.78-2.98)	4.89 (1.34-17.84)[b]	.048
150+ min of moderate physical activity per week	19.8	27.0	10.5	1.99 (0.96-4.13)[c]	0.75 (0.14-4.12)	.135
5+ servings of fruits/vegetables per day[d]	5.8	7.4	26.3	1.33 (0.41-4.32)	16.24 (2.86-92.06)[e]	.006
No smoking[d]	86.8	88.5	94.7	0.59 (0.19-1.89)[c]	0.98 (0.06-15.38)	.530
No/light alcohol drinking	87.6	88.5	94.7	0.99 (0.40-2.45)	2.08 (0.17-25.63)[c]	.839
Negative impact of COVID-19 on healthy lifestyle behavior						
Less/more sleep	70.2	62.3	47.4	0.75 (0.38-1.46)	0.21 (0.01-0.75)[b]	.053
Less physical activities	69.4	61.5	68.4	2.53 (0.51-12.46)[c]	0.23 (0.02-3.33)[b]	.215
Less healthy eating	63.6	54.9	36.8	0.65 (0.30-1.21)[c]	0.31 (0.19-1.07)[c]	.122
Increased smoking[d]	7.4	4.9	0.0	1.41 (0.46-4.29)	0.53 (0.05-6.07)[c]	.688
Increased alcohol use	45.5	35.2	21.1	0.49 (0.26-0.93)[c]	0.53 (0.14-2.04)[c]	.086
Good health						
Good physical health	19.0	30.3	36.8	2.48 (1.20-5.11)[c]	2.99 (0.84-10.59)[c]	.029
Good mental health	15.7	20.5	36.8	1.93 (0.85-4.40)[c]	4.96 (1.12-21.89)[b]	.066
No depression	67.8	71.3	73.7	1.61 (0.64-2.32)	2.23 (0.57-8.73)[c]	.486
No anxiety	57.9	67.2	52.6	1.42 (0.77-2.62)	0.54 (0.17-1.70)[c]	.200
No/little stress	16.5	28.7	31.6	1.90 (0.91-3.95)[c]	4.96 (1.25-19.64)[b]	.043
High professional QOL	7.4	20.5	26.3	4.65 (1.70-12.69)[b]	9.19 (1.88-44.96)[e]	.003
No burnout	23.1	43.4	52.6	2.89 (1.46-5.71)[c]	6.34 (1.84-21.88)[b]	.001
Negative impact of COVID-19 on health						
Worsen mental health	84.3	73.8	78.9	0.35 (0.16-0.79)[c]	0.38 (0.09-1.68)[c]	.034
Worsen physical health	61.2	47.5	42.1	0.45 (0.25-0.83)[c]	0.32 (0.10-1.05)[c]	.018

Abbreviations: CI, confidence interval; OR, odds ratio; QOL, quality of life.

[a]OR and 95% CI were derived from logistic regression models. Dependent variable—each behavior/health measure; primary independent variable of interest—perceived support of wellness at the place of employment; covariates—age, gender, race/ethnicity, marital status, degree, hours of work day/shift, and Trusted Health contract status.

[b]Medium effect size.

[c]Small effect size.

[d]Exact logistic regression was used because of sparse data.

[e]Large effect size. Cutoffs of OR for small, medium, and large effect sizes: 1.68 (or 0.60 if OR <1), 3.47 (or 0.29 if OR <1), and 6.71 (or 0.15 if OR <1).

behaviors. Although the differences were not statistically significant due to a small number (n = 9) of nurses who reported very much wellness support in workplace, the ORs (0.21-0.53) were of small to medium effect sizes.

Associations of workplace wellness support with health and the related changes during the COVID-19 pandemic

The proportion of nurses with good physical health increased with higher perceived workplace wellness support (19.0%, 30.3%, and 36.8% for "not at all/a little," "somewhat," and "very much support," respectively; Table 3). The same trend was observed for other health indicators, including mental health, depression, stress, ProQOL, and burnout. The significant relationship between greater perceived support of wellness and better health held after adjusting for nurses' age, gender, race/ethnicity, marital status, education, hours of workday/shift, and Trusted Health contract status in the multiple logistic regression models. Compared with nurses whose workplaces provided little or no support, those whose workplaces supported wellness very much were 3 to 9 times as likely to have good physical health (OR = 2.99; 95% CI, 0.84-10.59), good mental health (OR = 4.96; 95% CI, 1.12-21.89), no/little stress (OR = 4.96; 95% CI, 1.25-19.64), no burnout (OR = 6.34; 95% CI, 1.84-21.88), and higher ProQOL (OR = 9.19; 95% CI, 1.88-44.96; Table 3).

Table 3 also shows that compared with nurses whose workplaces provided little or no support, those whose workplaces supported higher wellness were significantly less likely to report worsening physical and mental health due to the pandemic, with ORs ranging from 0.32 to 0.45.

Associations of shift length with healthy lifestyle behaviors and the related changes during the COVID-19 pandemic

The proportion of nurses who had 7 or more hours of sleep per night decreased with longer workday/shift (40.0% vs 32.2% for <12 vs 12+ hours per day; Table 4). Similar trends for other good healthy lifestyle behaviors were observed, including 150+ minutes of moderate physical activity per week, 5+ servings of fruit/vegetable consumption per day, and no smoking. The significant relationships between longer shift length and a higher likelihood of smoking held after adjusting for nurses' age, gender, race/ethnicity, marital status, education, perceived workplace wellness support, and Trusted Health contract status in the multiple logistic regression models. Compared with nurses with workday/shift of less than 12 hours per day, those who worked 12+ hours per day were much less likely to be nonsmoker (OR = 0.09; 95% CI, 0.02-0.51; Table 4).

Table 4 also shows that a higher percentage of nurses who worked 12+ hours per day reported a negative impact of the COVID-19 pandemic on their healthy lifestyle behaviors than nurses who worked less than 12 hours per day. The significant relationships between longer shift length and a higher likelihood of negative impact of the COVID-19 pandemic on sleep (OR = 4.55; 95% CI, 2.21-9.36) and smoking (OR = 12.50; 95% CI, 1.57-99.16) held after adjusting for nurses' age, gender, race/ethnicity, marital status, education, perceived workplace wellness support, and Trusted Health contract status in the multiple logistic regression models.

Associations of shift length with health and the related changes during the COVID-19 pandemic

The proportion of nurses with good mental health decreased with longer workday/shift (23.3% vs 17.2% for <12 vs 12+ hours per day; Table 4). The same trend was observed for other health indicators, including depression, stress, ProQOL, and burnout. The significant relationship between longer shift length and worse health held after adjusting for nurses' age, gender, race/ethnicity, marital status, education, perceived workplace wellness support, and Trusted Health contract

Table 4. Hours of Workday/Shift and Its Associations With Healthy Lifestyle Behaviors, Health, and Impact of the COVID-19 Pandemic on Lifestyle Behaviors and Health

	Hours of Work Day/Shift			
Outcome	**<12 h (n = 90), %**	**12+ h (n = 174), %**	**<12 h vs 12+ h, Adjusted OR (95% CI)[a]**	***P***
Good healthy lifestyle behaviors				
7+ h of sleep per night	40.0	32.2	0.69 (0.34-1.41)	.307
150+ min of moderate PA per week	25.6	20.7	1.20 (0.54-2.67)	.664
5+ servings of fruits/ vegetables per day[b]	11.1	6.3	0.94 (0.20-4.34)	.938
No smoking[b]	92.2	86.2	0.09 (0.02-0.51)[c]	.006
No/light alcohol drinking	87.8	89.1	1.55 (0.60-3.97)	.366
Negative impact of the COVID-19 pandemic on healthy lifestyle behaviors				
Less/more sleep	51.1	72.4	4.55 (2.21-9.36)[d]	<.001
Less physical activities	53.3	72.4	0.79 (0.11-5.70)	.813
Less healthy eating	55.6	58.6	1.58 (0.80-3.09)	.185
Increased smoking[b]	2.2	7.5	12.5 (1.57-99.16)[c]	.017
Increased alcohol use	33.3	41.4	1.10 (0.55-2.20)	.781
Good health				
Good physical health	27.8	24.1	0.83 (0.40-1.74)	.623
Good mental health	23.3	17.2	0.53 (0.23-1.21)[e]	.130
No depression	73.3	67.8	0.98 (0.49-1.96)	.945
No anxiety	67.8	58.6	0.67 (0.34-1.32)	.247
No/low stress	24.4	22.4	0.67 (0.31-1.43)	.299
High ProQOL	23.3	10.3	0.21 (0.09-0.50)[d]	<.001
No burnout	48.9	27.0	0.32 (0.16-0.66)[e]	.002
Negative impact of the COVID-19 pandemic on health				
Worsen physical health	44.4	58.6	2.29 (1.18-4.46)[e]	.014
Worsen mental health	74.4	81.6	1.68 (0.76-3.71)[e]	.196

Abbreviations: CI, confidence interval; OR, odds ratio; PA, physical activity; ProQOL, professional quality of life.
[a]OR and 95% CI were derived from logistic regression models. Dependent variable—each behavior/health measure; primary independent variable of interest—hours of work day/shift; covariates—age, gender, race/ethnicity, marital status, degree, perceived support of wellness at the place of employment, and Trusted Health contract status.
[b]Exact logistic regression was used because of sparse data.
[c]Large effect size. Cutoffs of OR for small, medium, and large effect sizes: 1.68 (or 0.60 if OR <1), 3.47 (or 0.29 if OR <1), and 6.71 (or 0.15 if OR <1).
[d]Medium effect size.
[e]Small effect size.

status in the multiple logistic regression models. Compared with nurses who worked less than 12 hours per day, those who worked 12+ hours per day were much less likely to have good mental health (OR = 0.53; 95% CI, 0.21-1.21), higher ProQOL (OR = 0.21; 95% CI, 0.09-0.50), and no burnout (OR = 0.32; 95% CI, 0.16-0.66; Table 4).

Table 4 also shows that compared with nurses who worked less than 12 hours per day, those who worked 12+ hours per day were more likely to report worsening physical (OR = 2.29; 95% CI, 1.18-4.46) and mental health (OR = 1.68; 95% CI, 0.76-3.71) due to the pandemic.

DISCUSSION

This study's results indicate that the aspects of health and well-being that nurses

struggled with before the pandemic were amplified during the pandemic. More than half of the nurses reported worsening physical/mental health in relation to the pandemic. A large proportion of the sample reported depressive symptoms, anxiety, stress, and burnout. Furthermore, the majority did not meet evidence-based recommendations for healthy lifestyle behaviors that can prevent chronic disease, such as physical activity, healthy eating, and adequate sleep.

The extent to which COVID-19 has impacted nurse wellness became more evident when comparing this study's results with similar research published before the pandemic. A 2018 study of health and well-being in nurses reported that 46% were in good physical health, 39% had a high level of perceived stress, and 46% had a high ProQOL.[1] A 2019 cross-sectional study estimated a burnout prevalence of 35.3% in nurses.[15] In comparison, only 25% of nurses in the current study were in good physical health, 75.8% had a high level of perceived stress, 14.8% reported a high ProQOL, and 65.5% experienced burnout. Thus, this study's findings highlight the substantial negative impact of the COVID-19 pandemic on nurses' health and well-being.

The finding that nurses who perceived their workplaces as supportive of their wellness had better physical/mental health and engaged more in healthy lifestyle behaviors than those who did not have the same level of support was critical. When compared with nurses whose workplaces provided little or no support, nurses who reported having workplaces that very much supported wellness were 3 to 9 times as likely to have good physical health, good mental health, no/little stress, no burnout, and high ProQOL. Nurses whose workplaces supported higher wellness were 5 times as likely to have 7 or more hours of sleep/night and 16 times as likely to have 5+ servings of fruits/vegetables per day when compared with nurses whose workplaces provided little/no support. Previous research has found a significant relationship between workplaces that are supportive of wellness and better health,[1,2] thus strengthening the importance of building and sustaining workplace wellness cultures to support clinicians' health and well-being.

There are several evidence-based programs and tactics that enhance nurses' and other clinicians' health and well-being that should be adopted by health care systems. A recent systematic review by Melnyk and colleagues[25] indicated that effective interventions to improve mental/physical health, well-being, and healthy lifestyle behaviors in physicians and nurses include mindfulness, health coaching, deep abdominal breathing, gratitude, cognitive-behavioral therapy/skills building, and visual triggers. Specifically, evidence-based programs, titled Mindfulness in Motion[26] and MINDBODYSTRONG for clinicians,[27,28] which is manualized and based on cognitive-behavioral therapy, are efficacious in decreasing depression, anxiety, stress, and burnout and improving job satisfaction and are being scaled throughout the nation to improve the health and well-being of clinicians. In addition, anonymous mental health screening programs should be implemented by health systems, such as the Healer Education and Referral (HEAR) program, which provides referral and access to mental health treatment of clinicians suffering from depression.[29,30]

Beyond evidence-based programming and wellness cultures and tactics, intense effort must be placed in fixing system drivers such as long working hours that lead to burnout and unhealthy behaviors. Nurses tend to prefer 12-hour shift lengths as they perceive that it improves work-life balance.[31,32] However, the current study found that the proportion of nurses who met good healthy lifestyle behaviors (sleep, exercise, and fruit and vegetable consumption) was higher in the nurses who worked shifts of less than 12 hours than nurses who worked shifts of 12 hours or more. Furthermore, when compared with nurses who worked shifts of less than 12 hours, those who worked 12+ hours were more likely to report worsening

physical/mental health due to the pandemic. Previous research supports these findings as nurses who work 12-hour shifts reported more sick absences,[33] work-induced fatigue,[34] and burnout[35] Nurses with 12+-hour shifts tend to work in acute and critical care, which can be a more stressful and complex work environment than an 8-hour ambulatory care work environment.[2] Discussing changes to shift length can be challenging as shift length preference is not homogeneous among nurses and can vary depending on their individual experiences.[35] Acute and intensive care unit nurses may be especially concerned with reductions in shift length due to complexity compression (ie, when nurses must conduct their daily tasks in addition to unplanned responsibilities within a condensed time frame).[36] However, a recent qualitative study demonstrated that nurses actually had a greater physical and mental workload during a 12-hour shift than an 8-hour shift.[37] Grassroots efforts are needed to inform nurses about the potential negative impact that longer shifts can have on their physical and mental well-being. Obtaining nurse buy-in will assist in overcoming C-suite concerns about eliminating 12-hour shifts and having experienced, valued nurses leave for another health system that continue to have the option.

While the correlation between workplace wellness support, shift length, and improved nurse wellness outcomes is critical, the relationships were correlative and not causative. Sampling for this study was not random, so findings cannot be generalized. Despite these limitations, the increase in poor mental/physical health, stress, and burnout in addition to the decrease in ProQOL is concerning. Wellness culture is one important driver in clinician health and well-being. Health care systems must invest in building and sustaining wellness cultures. Evidence-based programs and resources to support clinician mental/physical health and healthy lifestyle behaviors should be provided as a first line of defense for improving clinician well-being and for improving other health care quality indicators. Findings from prior studies indicate that the health and well-being of clinicians negatively impact health care quality, safety, and costs.[1,2,38,39]

CONCLUSION

Nurses continue to report poor mental/physical health and well-being, which the COVID-19 pandemic has exacerbated. Health care systems need to invest in creating supportive wellness cultures through evidence-based programs and access to mental health counseling and resources. Fixing system problems, such as long work hours and poor staffing, that contribute to poor clinician well-being should also be a priority as poor clinician well-being adversely impacts health care quality, safety, and costs. Nurses can be resilient and healthy but still suffer when appropriate staffing levels are not met and realistic shift lengths are not provided. Workplace wellness support is of immense value as it can lead to nurses with better mental/physical health and ProQOL.

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