ORIGINALES

Resilience associated to Mental Health and Sociodemographic factors in mexican nurses during COVID-19
Resiliencia asociada a factores de salud mental y sociodemográficos en enfermeros mexicanos durante COVID-19

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ABSTRACT:
Introduction: Nursing personnel are one of the groups which have been most affected by the current COVID-19 pandemic. Although mental health problems have been reported in this population, it is important to study resilience, in order to identify its strengths. The purpose was to study resilience in Mexican nurses and the mental health and sociodemographic factors associated with it. A cross-sectional study was used.
Method: A sociodemographic and COVID-19 related questionnaire, the Resilience Inventory and the General Health Questionnaire-28, was sent via online. 556 nurses were included, the majority were women (80%), single (60.8%), aged between 26-35 years (38.3%).
Results: Lower resilience was found among nurses who were younger ($p<0.001$, $\eta^2=0.05$), single ($p<0.001$, $\eta^2=0.02$) and with lower levels of education ($p=0.001$, $\eta^2=0.02$). Predictors of resilience included the search for mental health information ($\beta =-0.152$, $p <0.001$), higher education ($\beta = 0.142$, $p<0.001$), low levels of depression ($\beta=-0.307$, $p<0.001$) and low levels of social dysfunction ($\beta =-0.261$, $p<0.001$).
Conclusion: This findings allowed to identify the factors which are associated with resilience among nurses and how this plays an important role in their mental. Likewise, this data allows for the identification of high psychosocial risk groups, to better guide mental health strategies aimed at increasing resilience.

RESUMEN:
Introducción: El personal de enfermería es uno de los grupos más afectados por la actual pandemia por COVID-19. Se han reportado problemas de salud mental en esta población, sin embargo, también es importante estudiar la resiliencia, para identificar sus fortalezas. El objetivo de este estudio fue estudiar la resiliencia en enfermeros mexicanos y los factores sociodemográficos y de salud mental asociados a ella. Se llevó a cabo un estudio transversal.
Método: Se envió vía online un cuestionario sociodemográfico y relacionado a COVID-19, así como el Inventario de Resiliencia y el Cuestionario General de Salud-28. Se incluyeron 556 enfermeros, la mayoría fueron mujeres (80%), solteras (60.8%) y con edades entre 26-35 años (38.3%).
Resultados: Se encontraron niveles bajos de resiliencia en los enfermeros más jóvenes ($p<0.001$, $\eta^2=0.05$), solteros ($p<0.001$, $\eta^2=0.02$) y con menor nivel educativo ($p=0.001$, $\eta^2=0.02$). Los predictores de resiliencia fueron la búsqueda de información sobre salud mental ($\beta =-0.152$, $p <0.001$), nivel educativo más alto ($\beta = 0.142$, $p<0.001$), niveles bajos de depresión ($\beta=-0.307$, $p<0.001$) y bajos niveles de disfunción social ($\beta =-0.261$, $p<0.001$).
Conclusión: Estos hallazgos permiten identificar los factores asociados a la resiliencia en los enfermeros y cómo estos juegan un rol muy importante en su salud mental. Asimismo, estos datos permiten la identificación de grupos con mayor riesgo psicosocial, con la finalidad de guiar estrategias en salud mental orientadas a aumentar la resiliencia.

Palabras clave: COVID-19, Salud mental, Enfermeros, Enfermería, Resiliencia

INTRODUCTION

The Coronavirus disease (COVID-19) began in late 2019, and it rapidly spread to other regions of the country, and worldwide[1]. Healthcare professionals are one of the most vulnerable groups in terms of mental health problems in the face of this pandemic. Nurses have been identified as being among the most affected groups as those who have suffered the greatest psychological effects, such as anxiety, depression and stress[2]. Female nurses who are on the front line of care were found to have more severe symptoms of depression, anxiety, insomnia and distress, compared to doctors, in a study conducted by Lai et al.[3].

Some of the challenges face by front line nurses who care for infected patients include an increased risk of contagion due to exposure to the virus, not having the necessary personal protective equipment to prevent contagion, increased workload and even the neglect of basic activities while caring for infected patients[4]. A study conducted by Labrague and De los Santos[5] discovered that 90% of participant nurses reported not feeling fully prepared to care for patients with COVID-19. All these factors have caused alterations in their mental health, leading to increased levels of stress and anxiety, as well as a lack of appetite, fatigue, sleeping problems, excessive crying and even suicidal thoughts[6]. However, certain protective factors have been identified in nurses which may have helped them face the current pandemic. Some of these factors include a high commitment to work, to moral and social responsibility, a positive attitude and high levels of resilience[7]. A study by Shechter et al.[2] unveiled some of the strategies used by healthcare personnel to cope with the COVID-19 situation, including physical activity, religion, yoga and meditation. Moderate levels of resilience have also been reported among nurses who are in the front line of the COVID-19 pandemic, which are associated with lower levels of anxiety[5].

These protective factors facilitate a greater adaptation to stressful situations, and they can also be used as indicators of adequate mental health[8].

Resilience in nurses

The concept of resilience, has undergone various changes in recent years. Recent studies have found that, although some personal characteristics are associated with resilience, this is a dynamic process, which can be modifiable, and which is determined by multiple factors[9].

According to the American Psychological Association (APA), resilience is defined as: "the process of adapting well in the face of adversity, trauma, tragedy, threats or significant sources of stress"[10]. In this sense, the APA considers that behaviors, thoughts and conducts can be learned, therefore, given that resilience is considered a skill rather than a personality trait, it can be learned[10]. Furthermore, resilience has been found to be a predicting factor for good mental, physical and social health[11].

Some of the attributes of resilience, which have been identified in the literature, include self-efficacy, optimism, a sense of humor[8], spirituality, a positive attitude, perseverance and having a goal-oriented attitude[12].

Resilience in nurses has been a widely studied topic, especially considering the stressors to which they are subjected in their daily activities. Some of the factors that cause high levels of stress among nurses include organizational aspects, patient care, the demanding schedule and colleague related difficulties[13]. A review conducted by Badu et al.[11], found a diversity of individual attributes which nurses use to promote resilience in their workplaces including mindfulness and self-efficacy strategies. They argue that self-efficacy has to do with self-reliance, positive thinking, emotional intelligence, as well as passion and interest in their profession.

A further review by Cooper et al.[8], found that social support, self-efficacy, humor, optimism and a realistic outlook were also attributes of resilience found in nursing personnel.

On the other hand, sociodemographic characteristics have been observed to affect the level of resilience. Greater resilience has been found among older nurses, those with a higher educational level, and among those who were married[14]. In terms of sex, reports indicate that female nurses use coping strategies to reduce their stress to a greater degree than their male counterparts [7].

Regarding the relationship between resilience and the mental health of nurses, according to Foster et al.[15], studying the mental health of nurses in different cultures is vital to the understanding of cultural and environmental factors that influence resilience.

OBJECTIVE

The objective of this study was to evaluate resilience in Mexican nurses, in association with mental health and sociodemographic characteristics, during phase 2 and 3 of the COVID-19 pandemic in Mexico.

METHOD

Study design and participants

A cross-sectional study was carried out. Google forms was used to create a virtual questionnaire which was then sent by that same means to each of the participants. All of the participants were volunteers who gave their informed consent to answer the aforementioned questionnaire. The invitation was made through various nursing colleges and universities in Mexico, the survey was subsequently requested to be shared with other nurses for snowball sampling. The survey was available from April 14 to June 15, 2020. The inclusion criteria required the participants to be nurses or nursing students, who were of legal age, who lived in Mexico and who gave their informed consent to answer the questionnaire.

Measurements

A questionnaire was designed to collect data pertaining to the sociodemographic, employment and COVID-19 related characteristics of each participant. Sociodemographic data included: age, sex, marital status, education, and state of residence. The employment data included the type of work (hospital or non-hospital) and number of hours worked per week. On the other hand, COVID-19 related questions asked about contact with COVID-19 patients, about what type, if any, psychological care has been provided to the nurses from the beginning of the COVID-19 pandemic and if participants had independently searched for information relating to the care of their mental health during the course of the pandemic. Questions included: "Do you currently have contact with COVID-19 patients?" "Have you received any form of psychological care at any point since the beginning of the current COVID-19 situation?" "Have you searched the internet or other sources for any information or strategies to take care of your mental health since the beginning of the COVID19 pandemic?".

The resilience was assessed with The Resilience Inventory (IRES, for its acronym in Spanish), created and validated in the Mexican population, by Gaxiola Romero et al.[12]. This instrument consists of 16 items, with 5 response options ranging from "not at all" to "totally". It contemplates 7 attributes that characterize resilient people: positive attitude, sense of humor, perseverance, religiosity, self-efficacy, optimism and goal orientation. A reliability of the instrument of α=0.93 was obtained.

Mental health was assessed using the General Health Questionnaire-28 ítems (GHQ-28). This questionnaire was developed by Goldberg and Hillier[16] and is based on the original 60-item version. It was validated in the Mexican population by Galindo Vázquez et al.[17]. The GHQ-28 includes 4 subscales, with 7 items each: somatic symptoms, anxiety and insomnia, social dysfunction and depression. Cronbach's α of each subscale have demonstrated adequate levels in the Mexican population: somatic symptoms α = 0.86, anxiety and headache α = 0.86, social functioning α = 0.76 and depression and suicidal ideation α= 0.80.

Data analysis

Descriptive statistics were performed for all study variables. Quantitative variables are expressed with means (M) and standard deviations (SD). Categorical variables are expressed in frequencies and percentages. The Kolmogorov-Smirnov test, performed to assess the normality of the variables, revealed a distribution other than the normal one, therefore, non-parametric statistics were conducted.

Mann-Whitney's U test and Kruskal Wallis H test were used for the comparisons of resilience with the categorical values, depending on the number of categories of each variable.

In addition, the effect size was calculated to estimate the magnitude of the differences. In particular, the Rosenthal r (*r*) was used in the comparisons of two groups and the eta squared (η^2) in the contrast of three or more groups.

For the quantitative variables, a bivariate Spearman Rho correlation was performed. Subsequently, a multiple linear regression was performed to predict the resilience variable and its subscales. 8 linear regression models were carried out: 1) the total IRES score, 2) positive attitude, 3) sense of humor, 4) perseverance, 5) religiosity, 6) self-efficacy, 7) optimism and 8) goal orientation. The models only included variables which were determined to be statistically significant in the comparison tests and the correlation. A "stepwise" method was used, to include only significant models. A confidence level of 95% was considered and collinearity tests were carried out, as well as the verification of independence, normality and homoscedasticity in the residuals.

Ethical aspects

The project was approved by the **** ethical committee (R-2020-1001-078). Informed consent was obtained from all individual participants included in the study, establishing confidential management of their data, as well as their acceptance for publication of the results.

RESULTS

Participant characteristics

The sample was comprised of 556 nurses who answered the virtual questionnaire. The sociodemographic data, related to COVID-19 and mental health, can be observed in table 1. 38.3% (n = 213) were between 26-36 years of age, 80% (n = 445) were women, 60.8 % (n = 338) were single, and 37.6% (n = 209) were nursing graduates. In terms of workload, 36.9% (n = 205) worked 40 hours or more per week and 39.2% (n = 226) had contact with COVID-19 patients. The most common mental health condition was the presence of "anxiety-insomnia" in 21% (n = 117) of the participants, however, 96.6% (n = 537) had not received psychological care, despite that, 53.8% (n = 299) had sought information on taking care of their mental health (Table 1).

Table 1
Descriptive results of the study variables.

	N(%) N=556
Age group	
= <25 years	211 (37.9)
26-35 years	213 (38.3)
= >36 years	132 (23.7)
Sex	
Female	445 (80)
Male	111 (20)
Marital Status	
Married/Living with partner	181 (32.6)
Divorced/Separated	34 (6.1)
Single	338 (60.8)
Widow	3 (0.3)
Level of Education	
Student	101 (18.2)
Technical career/auxiliary	114 (20.5)
Bachelor's in nursing	209 (37.6)
Specialized	65 (11.7)
Postgraduate degree	67 (12.1)
State of Residence	
North West	19 (3.4)
North East	14 (2.5)
Western México	363 (65.3)
Eastern México	28 (5)
North Central	36 (6.5)
South Central	58 (10.4)
South West	20 (3.6)
South East	18 (3.2)
Type of Work	
Hospital /clinical	226 (40.6)
Other	282 (50.7)
Hours Worked	
= < 24 hours	120 (21.6)
25-39 hours	117 (21)
= > 40 hours	205 (36.9)
Contact with COVID-19 patients	
Yes	218 (39.2)
No	338 (60.8)
Psychological care received from the onset of the COVID-19 pandemic	
Yes	19 (3.4)
No	537 (96.6)
Searched for mental health related information from the onset of this pandemic	
Yes	299 (53.8)
No	257 (46.2)
GHQ-28	
Somatic	
Case	47 (8.5)
Non-case	509 (91.5)
Anxiety-insomnia	

Case	117 (21)
Non-case	439 (79)
Social dysfunction	
Case	27 (4.9)
Non-case	529 (95.1)
Depression	
Case	14 (2.5)
Non-case	542 (97.5)

Comparison of Resilience with the study variables

Table 2 shows the comparisons between resilience and its subscales with the study variables.

Statistically significant differences were found among the different age groups. Those aged ≤25 years were less resilient compared to those aged 26-35 years (Z = -3.501, p <0.001, r = 0.17) and those aged 36 or over (Z = -5.457, p <0.001 , r = 0.29). On the other hand, the group of 36 years or more was more resilient than that of 26-35 years (Z = -2.584, p = 0.010, r = 0.14). Regarding the subscales, the group aged ≤25 years was less resilient compared to the group aged 26-35, on the positive attitude subscale (Z = -3.466, p = 0.001, r = 0.17), sense of humor (Z = -2.458, p = 0.014, r = 0.12), perseverance (Z = -2.931, p = 0.003, r = 0.14), religiosity (Z = -2.650, p = 0.008, r = 0.13) and self-efficacy (Z = -3.998, p <0.001, r = 0.19). The group aged ≤25 years was also less resilient compared to the group aged ≥36 years, on the positive attitude (Z = -4.376, p <0.001, r = 0.24), sense of humor (Z = -2.927, p = 0.031, r = 0.16), perseverance (Z = -4.393, p <0.001, r = 0.24), religiosity (Z = -4.934, p <0.001, r = 0.27), self-efficacy (Z = -5.409, p < 0.001, r = 0.29) and goal orientation (Z = -2.060, p = 0.039, r = 0.11) subscales. Furthermore, the group from 26-35 years old was less resilient compared to the ≥36-year-old group, on the subscale of perseverance (Z = -1.984, p = 0.047, r = 0.11), religiosity (Z = - 2.707, p = 0.007, r = 0.15) and self-efficacy (Z = -2.007, p <0.045, r = 0.11).

In terms of marital status, single participants were less resilient compared to those who were married or living with their partner (Z=-2.516, p=0.012, r=0.11) and compared to those who were separated or divorced (Z=-2.168, p=0.030, r=0.11). In relation to the subscales, single participants were observed to be less resilient compared to those who were married or living with their partner in terms of the positive attitude (Z=-2.244, p=0.025, r=0.10), perseverance (Z=-2.119, p=0.034, r=0.09), religiosity (Z=-2.995, p=0.003, r=0.13) and self-efficacy (Z=-2.521, p=0.012, r=0.11) subscales. Single participants were also less resilient compared to divorced or separated participants in terms of the religiosity (Z=-2.266, p=0.023, r=0.12), self-efficacy (Z=-2.674, p=0.008, r=0.14) and optimism (Z=-2.118, p=0.034, r=0.11) subscales.

In terms of level of education, nursing students were less resilient compared to nursing graduates (Z=-2.511, p=0.012, r=0.14), those with specializations (Z=-3.727, p<0.000, r=0.29) and those with post-graduate degrees (Z=-3.136, p=0.002, r=0.24). In terms of the subscales, nursing students were less resilient compared to technical career graduates, only on the self-efficacy subscale (Z=-2.138, p=0.033, r=0.15). Students were also less resilient compared to nursing graduates, on the subscales of positive

attitude (*Z*=-2.853, p=0.004, *r*=0.16), sense of humor (*Z*=-3.147, p=0.002, *r*=0.18), religiosity (*Z*=-1.979, p=0.048, *r*=0.11) and self-efficacy (*Z*=-2.510, p=0.012, *r*=0.14). Students were also less resilient than those with specializations in terms of the positive attitude (*Z*=-3.513, p<0.000, *r*=0.27), perseverance (*Z*=-2.990, p=0.003, *r*=0.23), religiosity (*Z*=-3.296, p=0.001, *r*=0.26), self-efficacy (*Z*=-3.816, p<0.000, *r*=0.09) and goal orientation (*Z*=-2.225, p<0.026, *r*=0.17) subscales. Lastly, students were also less resilient compared to those who had postgraduate degrees, in the positive attitude (*Z*=-2.614, p=0.009, *r*=0.20), sense of humor (*Z*=-2.260, p=0.024, *r*=0.17), perseverance (*Z*=-2.287, p=0.022, *r*=0.18), religiosity (*Z*=-2.639, p=0.008, *r*=0.20) and self-efficacy (*Z*=-3.775, p<0.000, *r*=0.29) subscales.

In relation to working hours, a difference was only found in the sense of humor subscale (p= 0.010, η^2= 0.01) (table 2). Those who worked ≥ 40 hours a week had less sense of humor compared to those who worked ≤ 24 hours a week (*Z*=-2.994, p=0.003, *r*=0.17).

Table 2 Comparison between resilience and its subscales with the study variables.

	T	PA	SH	P	R	SE	O	GO
				Resilience Subscales				
				M±SD				
Age group								
≤ 25 years	66.2±9.8	16.8±2.7	8.2±1.6	8.5±1.5	6.2±2.7	8.2±1.5	8.9±1.4	9.2±1.2
26-35 years	69.3±9	17.7±2.4	8.5±1.5	8.9±1.2	6.9±2.7	8.8±1.5	8.9±1.4	9.3±1.1
≥ 36 years	71±8.6	18.1±2.4	8.7±1.3	9.2±1.1	7.7±2.4	9.1±1.2	9.1±1.2	9.4±1.1
p value	<0.001**	<0.001**	0.006*	<0.001**	<0.001**	<0.001**	0.222	0.116
η^2	0.05	0.03	0.01	0.03	0.04	0.05		
Sex								
Female	68.3±9.6	17.3±2.6	8.3±1.5	8.7±1.4	7±2.6	8.6±1.5	9±1.3	9.2±1.2
Male	70±8.9	18.2±2.3	8.8±1.4	9.1±1.2	6.4±2.9	9±1.3	9±1.5	9.4±1
p value	0.077	<0.001**	0.001*	0.039*	0.067	0.006*	0.453	0.106
r		0.15	0.13	0.09		0.12		
Marital status								
Married/ Living with partner	69.6±9.6	17.8±2.6	8.5±1.4	8.9±1.3	7.3±2.6	8.8±1.5	8.9±1.4	9.2±1.3
Divorced/ Separated	70.5±10.4	17.6±2.3	8.7±1.4	9±1.2	7.6±2.6	9±1.6	9.2±1.7	9.2±1.3
Single	67.9±9.2	17.3±2.6	8.4±1.5	8.7±1.4	6.5±2.7	8.6±1.4	9±1.3	9.3±1.1
Widow	80±0	20±0	10±0	10±0	10±0	10±0	10±0	10±0
p value	<0.001**	0.024*	0.136	0.040*	0.001*	0.002*	0.061	0.628
η^2	0.02	0.01		0.01	0.02	0.02		
Level of Education								
Student	65.7±10.7	16.8±2.8	8±1.5	8.4±1.6	6.1±2.8	8.2±1.6	8.8±1.6	9.1±1.4
Technical career/ auxiliary	68.1±9.8	17.1±2.8	8.4±1.6	8.7±1.4	6.8±2.7	8.6±1.4	9±1.3	9.2±1.1
Bachelor's in nursing	68.9±9.3	17.7±2.6	8.6±1.4	8.8±1.3	6.8±2.6	8.6±1.5	8.9±1.4	9.2±1.1
Specialized	71.5±7.8	18.2±2.4	8.3±1.9	9.2±0.2	7.6±2.5	9.1±1.2	9.3±1	9.6±0.8
Postgraduate	70.9±7.4	18±1.9	8.6±1.1	9.1±0.8	7.3±2.6	9±1.3	9.1±1.2	9.5±0.9
p value	0.001*	0.001*	0.036*	0.030*	0.008*	<0.001**	0.420	0.053

	T	PA	SH	P	R	SE	O	GO
η²	0.02	0.02	0.01	0.01	0.01	0.03		
Type of work								
Clinical	69.2±9	17.6±2.5	8.5±1.5	8.8±1.3	7±2.6	8.7±1.4	9±1.3	9.3±1.1
Non-clinical	68.8±9.7	17.5±2.6	8.5±1.5	8.8±1.4	6.9±2.7	8.6±1.5	9±1.4	9.3±1.2
p value	0.872	0.918	0.789	0.598	0.680	0.477	0.868	0.569
Hours worked								
≤ 24 hours	69.9±9.1	17.6±2.7	8.8±1.4	8.8±1.3	7.1±2.6	8.8±1.3	9±1.2	9.3±1.1
25-39 hours	69.7±8.9	17.7±2.4	8.5±1.4	8.9±1.3	7.1±2.7	8.8±1.3	9.1±1.3	9.3±1.1
≥ 40 hours	69.2±9.2	17.7±2.4	8.4±1.5	9±1.2	7±2.7	8.7±1.5	8.9±1.4	9.3±1.1
p value	0.763	0.906	0.010*	0.480	0.979	0.986	0.819	0.586
η²			0.01					
Contact with COVID-19 patients								
Yes	69.1±9.9	17.6±2.7	8.5±1.6	8.9±1.4	7±2.8	8.8±1.4	9±1.4	9.2±1.2
No	68.4±9.2	17.4±2.5	8.4±1.4	8.8±1.3	6.8±2.6	8.6±1.5	9±1.3	9.3±1.1
p value	0.118	0.088	0.230	0.267	0.221	0.056	0.599	0.192
Searched for mental health related information								
Yes	69.7±8.6	17.8±2.3	8.5±1.4	9±1.2	7±2.6	8.8±1.4	9±1.3	9.4±1
No	67.4±10.2	17.1±2.8	8.3±1.6	8.6±1.5	6.7±2.8	8.5±1.6	8.9±1.5	9.2±1.3
p value	0.011*	0.009*	0.084	0.010*	0.126	0.146	0.186	0.084
r	0.11	0.11		0.11				
GHQ-Somatic								
Case	63.9±11.1	16.1±2.7	7.8±1.6	8±1.6	6.9±2.7	7.8±1.9	8.3±1.8	8.6±1.6
Non-case	69.1±9.2	17.6±2.6	8.5±1.5	8.9±1.3	6.8±2.7	8.7±1.4	9±1.3	9.3±1.1
p value	0.001*	<0.001**	0.003*	<0.001**	0.794	0.002*	0.002*	<0.001**
r	0.14	0.16	0.13	0.17		0.13	0.13	0.15
Anxiety-insomnia								
Case	63.5±11	16±2.8	7.8±1.6	8.1±1.6	6.5±3	7.8±1.7	8.4±1.8	8.6±1.6
Non-case	70.1±8.5	17.9±2.4	8.6±1.4	9±1.2	6.9±2.6	8.9±1.3	9.1±1.2	9.4±0.9
p value	<0.001**	<0.001**	<0.001**	<0.001**	0.195	<0.001**	<0.001**	<0.001**
r	0.26	0.29	0.21	0.24		0.26	0.17	0.25
Social dysfunction								
Case	57±12.7	14.9±3.1	7.2±1.8	7.1±1.8	5.6±2.7	6.6±1.9	7.5±2.2	7.9±1.8
Non-case	69.3±8.9	17.6±2.5	8.5±1.5	8.9±1.3	6.9±2.7	8.7±1.4	9±1.3	9.3±1.1
p value	<0.001**	<0.001**	<0.001**	<0.001**	0.013*	<0.001**	<0.001**	<0.001**
r	0.22	0.19	0.16	0.22	0.10	0.24	0.17	0.20
Depression								
Case	49.6±12.4	13.2±3.2	7.2±1.8	6.6±2.2	4.3±2.2	5.7±2	6±2.3	5.4±2.2
Non-case	69.2±	17.6±2.5	8.5±1.5	8.9±1.3	6.9±2.7	8.7±1.4	9±1.2	9.3±1
p value	<0.001**	<0.001**	0.008*	<0.001**	0.001*	<0.001**	<0.001**	<0.001**
r	0.21	0.19	0.11	0.17	0.14	0.21	0.20	0.23

Abbreviations: T=Total IRES, PA=Positive Attitude, SH= Sense of Humor, P= Perseverance, R= Religiosity, SE= Self-Efficacy, O= Optimism, and GO: Goal Oriented.
Note: Mann-Whitney U and Kruskal Wallis test was used. * p<0.05, **p<0.001

Factors associated with resilience

All the sociodemographic, mental health, and COVID-19-related variables, which were significant according to the Mann-Whitney U test, Kruskal-Wallis test and Spearman's Rho bivariate correlation, were included in the multiple linear regression. The variables to be predicted were the total resilience score, as well as each of its subscales. The final model of the total resilience score explains 28.4% of the variance (R^2= 0.284) and the significant variables were depression (β= -0.3 07, p<0.001), social dysfunction (β= -0.261, p<0.001), the search for information related to mental health care (β= -0.152, p<0.001) and level of education (β= 0.142, p<0.001) (table 3).

Depression and social dysfunction were the most frequent predictors in the resilience subscales. Both were predictors of low positive attitude (β=-0.246, p<0.001; β=-0.152, p=0.001), low perseverance (β=-0.276, p<0.001; β=-0.266, p<0.001), low self-efficacy (β=-0.289, p<0.001; β=-0.255, p<0.001), low optimism (β=-0.295, p<0.001; β=-0.209, p<0.001) and low goal orientation (β=-0.388, p<0.001; β=-0.164, p<0.001).

Table 3. Multiple linear regression of the variables associated with resilience.

	Adjusted R^2	β	95% CI	p
Total IRES				
GHQ-Depression		-0.307	-2.657 to -1.531	<0.001**
GHQ- Social dysfunction		-0.261	-1.797to -0.932	<0.001**
Searching for information related to their mental health	0.284	-0.152	-4.238.033 to -1.537	<0.001**
Level of education		0.142	0.558 to 1.661	<0.001**
Positive attitude				
GHQ- Depression		-0.246	-0.631 to -0.303	<0.001**
GHQ- Social dysfunction		-0.152	-0.358 to -0.086	0.001*
Searching for information related to their mental health	0.243	-0.178	-1.337 to -0.553	<0.001**
Level of education		0.131	0.125 to 0.441	<0.001**
GHQ- anxiety and insomnia		-0.134	-0.230 to -0.046	0.003*
Sex		-0.100	-1.149 to -0.179	0.007*
Sense of humor				
GHQ- Social dysfunction		-0.218	-0.281 to -0.095	<0.001**
GHQ- anxiety and insomnia		-0.190	-0.174 to -0.047	0.001*
Searching for information related to their mental health	0.140	-0.133	-0.660 to -0.135	0.003*
Hours worked per week		-0.098	-0.016 to -0.001	0.028*
Perseverance				
GHQ- Depression	0.258	-0.276	-0.361 to -0.192	<0.001**
GHQ- Social		-0.266	-0.268 to -0.139	<0.001**

	IRES	β	95% CI	p
dysfunction				
Searching for information related to their mental health		-0.156	-0.637 to -0.233	<0.001**
Level of education		0.129	0.065 to 0.229	<0.001**
Religiosity				
Age	0.071	0.201	0.034 to 0.081	<0.001**
GHQ-Depression		-0.155	-0.468 to -0.146	<0.001**
Self-efficacy				
GHQ- Depression		-0.289	-0.407 to -0.223	<0.001**
GHQ- Social dysfunction		-0.255	-0.284 to -0.143	<0.001**
Level of education	0.255	0.137	0.081 to 0.261	<0.001**
Searching for information related to their mental health		-0.113	-0.563 to 0.122	0.002*
Optimism				
GHQ- Depression		-0.295	-0.388 to -0.210	<0.001**
GHQ- Social dysfunction		-0.209	-0.231 to -0.094	<0.001**
Marital status	0.190	0.094	0.027 to 0.257	0.016*
Searching for information related to their mental health		-0.086	-0.458 to -0.031	0.025*
Goal orientation				
GHQ- Depression		-0.388	-0.403 to -0.259	<0.001**
GHQ- Social dysfunction		-0.164	-0.163 to -0.052	<0.001**
Searching for information related to their mental health	0.246	-0.106	-0.425 to -0.078	0.005*

Abbreviations: IRES= Resilience Inventory, GHQ=General Health Questionnaire.
*p<0.05 *p<0.001

DISCUSSION

Nursing personnel are among the most affected groups in terms of mental health as a result of the COVID-19 pandemic due to the nature of their work[2], therefore, it is important to investigate and understand resilience among nurses during the current pandemic.

In the present study, the nurses who presented somatic symptoms, anxiety-insomnia, social dysfunction and depression, had the lowest levels of resilience. Evidence has shown how resilience helps maintain lower levels of anxiety and depression[15], and somatic symptoms such as headaches, neck pain, muscle tension, and fatigue[18]. Similarly, in the present study, depression and social dysfunction were the most common predictors of low scores for resilience and its attributes: positive attitude, sense of humor, perseverance, self-efficacy, optimism, and goal orientation. This finding further highlights the important role of resilience on nurses' mental health.

Regarding the different attributes of resilience, perseverance and self-efficacy among nurses were observed to be associated with depression, social dysfunction, level of

education and the search for mental health related information. Perseverance and self-efficacy have been described as positive personality traits, particularly for the achievement of goals, such as participation in sports[19]. However, in the context of nursing, self-efficacy is more commonly found among nurses who have a higher level of education[14]. On the other hand, optimism was associated with depression, social dysfunction, marital status and the search for mental health related information. Optimism, one of the attributes of resilience, has been described as a powerful indicator of better health. Kim et al.[20], found a strong association between optimism and a decrease in mortality risks, including cancer, heart disease, respiratory diseases and infections. However, they suggest that it is important to consider the role of optimism in healthy behaviors, and therefore, that the latter are linked to risk reduction. These findings suggest the importance of promoting optimism as a protective factor for health.

Regarding the sociodemographic characteristics, it has been found that young, single nurses with a lower level of education, presented significantly lower levels of resilience.

In relation to the difference by age, the low level of resilience observed among younger nurses is consistent with what is described in the literature[13,14]. Foster, et al.[13], found that younger nurses shown less resilience, due to their difficulty in understanding and controlling negative thoughts related to adverse situations. This difference may also be caused by the number of years of experience of the nurses, given that resilience is generally higher among those with greater work experience[21]. Regarding the attributes of resilience, the regression showed that age predicted higher levels of religiosity. In previous studies, religiosity was determined to be more commonly seen among older women, and it has generally been considered to be a protective factor for psychological conditions, such as depression, in this age group [22]. However, it is important to take into account the differences by region, given that religiosity is more prevalent in some regions of Latin America [22].

The data pertaining to sex, on the other hand, seems to be contradictory. In this study, men had greater resilience in terms of positive attitude, sense of humor, perseverance and self-efficacy; however, the effect size was relatively low: $r = 0.15$, $r = 0.13$, $r = 0.09$, and $r = 0.12$, respectively. Similarly, various studies have found lower levels of resilience in women compared to men[14,23]. However, other reports studying resilience among nurses state that there are no significant differences in resilience between the sexes[24]. This contradiction may stem from the fact that most of the participants in these studies, using nurses, are women, therefore the male sex may not be evenly represented.

On the other hand, participants in the present study who were single were determined to be less resilient compared to their counterparts who were married, living with their partner, were separated or have been divorced. Specifically, they were less resilient in the attributes of positive attitude, perseverance, religiosity, and self-efficacy. This results support those of previous studies, which report higher levels of resilience among married individuals[14, 25]. Being married or living with a partner can act as a protective factor, since it allows one to be connected with other people and to be provided with support in the face of stressful situations[14]. Reports from the Mexican population during the current pandemic indicate that being single is associated with greater psychological stress[26].

Furthermore, participants with lower levels of education were also found to have lower levels of resilience, in this case these included nursing students and nurses who had graduated from a technical career. Likewise, education was a predictor for self-efficacy, perseverance, and positive attitude. Reports from other sources also confirm that nurses with a higher level of education have higher levels of resilience[21]. In fact, nurses who have a postgraduate degree also tend to have higher levels of self-efficacy[14], which concurs with the findings within this study, where participants with a postgraduate degree or specialization were determined to have higher levels of self-efficacy.

Mental health programs aimed at promoting resilience among nurses have been shown to be effective[27]. However, one of the obstacles in implementing these programs is the refusal by the nurses to receive psychological support. More than half of the nurses (53.8%) in the present study had sought information about their mental health in the face of COVID-19, however only 3.4% conformed to have received psychological care due to the pandemic. Although, in some populations, nurses accept psychological more freely[11], others have reported that they do not need mental health support[7, 28]. A study by Cai, et al.[7], reported that up to 36% of nurses did not consider psychological support important. This presents a challenge for the implementation of such mental health programs among nurses. On suggestion, in addition to designing and implementing the programs, could include the use of strategies to generate interest for these types of interventions among the nursing population. Another alternative may be to consider the use of mobile phones for the implementation of digital applications, for example, aimed at teaching certain psychological strategies which could increase resilience[29].

Some strategies to improve mental health among nurses in the face of the current COVID-19 pandemic include: encouraging teamwork and harmony among co-workers, promoting emotional expression through dialogue, painting or singing, implementing relaxation strategies such as deep breathing or exercise, communicating with colleagues who have had similar experiences or similar feelings, improving education around preventive measures in the event of viral exposure in order to reduce contagion concerns, establishing a social support network and seeking professional support if they feel the psychological stress mounting and/or not improving[6].

One of the limitations of this study was the greater participation of women, so it is recommended to include a more heterogeneous sample in future studies. Furthermore, it is suggested for future studies to include nurses in different working conditions, as well as to investigate other protective variables of mental health such as coping and social support.

CONCLUSION

The current pandemic has been extremely challenging for nursing staff worldwide. In the present study has been shown that mental health problems, such as anxiety and insomnia, depression, social dysfunction and somatic symptoms, are associated with lower levels of resilience. This finding suggests that resilience functions as a protector against mental health problems. Likewise, older participants, those living with a partner and those with higher levels of education, presented significantly higher levels of resilience. This allows for the identification of certain risk groups in order to better

guide mental health strategies in nurses. This also highlights the importance for the creation of mental health departments for hospital workers at all levels, especially those who are in constant contact with patients at risk of death, or with a high incidence of mortality.

Moreover, the present study has various implications for psychosocial nursing care in the current pandemic. This study suggests that psychosocial care must be reinforced in those who have mental health problems such as anxiety, depression, social dysfunction and somatic symptoms, as well as in young, single nurses with a lower level of education. It is important that mental health programs be created specifically for nursing staff, and that these programs include strategies which promote resilience. Some of these strategies may include the acknowledgement of emotions, fostering spirituality and self-reflection, self-efficacy, optimism, humor, a positive attitude, perseverance and a goal oriented attitude.

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