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Factors Associated with the Resilience of St. Luke's International University Nursing Students During the COVID-19 Pandemic

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COVID-19パンデミック禍における聖路加国際大学看護学生のレジリエンスに関連する要因

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[Abstracts]

Background

This study aimed to identify factors associated with the resilience of nursing students during the COVID-19 pandemic and to provide relevant information that can support nursing students during in-hospital training.

Methods

This research was a secondary data analysis from a cross-sectional study. Study participants included 269 nursing students, of whom 165 were undergraduates and 104 were graduate students at St. Luke's International University. Variable measurements included basic information about the participants, the Bidimensional Resilience Scale, health behavior during the COVID-19 pandemic, the impact of the COVID-19 pandemic, knowledge of COVID-19, and vaccination. Multiple linear regression analysis was conducted with the Bidimensional Resilience Scale scores as the dependent variable. Data were collected from July to October 2022. This study was approved by the St. Luke's International University Research Ethics Review Committee.

Results

Factors associated with the resilience of nursing students during the COVID-19 pandemic were history of COVID-19 infection ($\beta=0.148, p=0.01$), confidence to overcome the impact of the COVID-19 pandemic ($\beta=0.128, p=0.031$), infection prevention behaviors such as avoiding hand-to-face contact ($\beta=0.149, p=0.013$) and gargling ($\beta=0.170, p=0.006$), and stress associated with social distance ($\beta=0.190, p=0.005$). Vaccine side effects ($\beta=-0.195, p<.001$) and feeling alienated from society ($\beta=-0.145, p=0.033$) were negatively associated with resilience.

Conclusion

Support will continue to be needed to help nursing students appropriately carry out infection-prevention behaviors and protect them from the stress of being isolated.

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[Keywords] Resilience, Nursing student, COVID-19, Cross-sectional study

[要旨]

背景

本研究はCOVID-19パンデミック禍の看護学生のレジリエンスに関連する要因を明らかにすることが目的である。

方法

横断研究の二次解析として聖路加国際大学の学生269名を対象とした。二次元レジリエンス尺度、パンデミック禍の健康行動やパンデミックの影響、COVID-19の知識、ワクチン接種についてデータを収集し、二次元レジリエンス尺度得点を従属変数として重回帰分析を行った。データは2022年7月から10月に収集した。本研究は聖路加国際大学研究倫理審査委員会の承認を得た。

結果と考察

COVID-19パンデミック禍の看護学生のレジリエンスと関連する要因は、COVID-19感染歴 ($\beta=0.148$)、パンデミックの影響を克服する自信 ($\beta=0.128$)、感染予防行動 ($\beta=0.149$)、ソーシャルディスタンスに伴うストレス ($\beta=0.190$) であり、ワクチンの副作用 ($\beta=-0.195$) と社会からの疎外感 ($\beta=-0.145$) はレジリエンスと負の関連があった。今後も看護学生が感染予防行動を適切に行い、孤独から守るための支援が求められる。

[キーワード] レジリエンス, 看護学生, COVID-19, 横断研究

I. BACKGROUND

The World Health Organization declared the COVID-19 pandemic in March 2020. COVID-19 infection spread worldwide, and in Japan, a state of emergency was declared in all prefectures in April 2020.

During that time, the environment surrounding university students changed dramatically as classes shifted from face-to-face to online. Mental health problems among university students during the COVID-19 pandemic, such as anxiety, stress, and resulting poor sleep quality and depression, have been reported worldwide.¹⁾ In particular, for nursing students, opportunities for hospital training were restricted. Even after hospital training had resumed, nursing students were required to take strict infection control measures as they were still at risk of being exposed to COVID-19. In a previous study of Japanese nursing students in 2021, more than 60% of the participants reported that their life satisfaction worsened after the pandemic.²⁾ Life satisfaction, fear of COVID-19, and worse economic status were factors associated with an increased risk of anxiety and depression among nursing students.²⁾

Resilience is the ability to overcome the negative

effects of stress, adapt positively, and maintain mental health.^{3,4)} It has been conceptualized as an individual characteristic or process by which students adapt and endure difficulties.³⁾ Previous research has shown that resilience is important in the academic lives of nursing students.^{3,4)}

Factors reported to be associated with the resilience of nursing students include support from family, friends, faculty members, academic years as a nursing student, loneliness, and empowerment.⁵⁾ In a survey of nursing students during the COVID-19 pandemic in Australia, resilience scores was higher for those who engaged in work and nursing-related jobs.⁶⁾ However, no studies have reported factors associated with the resilience of nursing students during the COVID-19 pandemic in Japan. Identifying factors associated with the resilience of nursing students during the COVID-19 pandemic will provide knowledge useful to those who will continue to be required to take infection control measures for hospital training and who may be involved in the care of COVID-19 patients. Therefore, this study aimed to identify such factors among St. Luke's International University students.

II. METHODS

1. Study design

This research was a secondary data analysis from a cross-sectional study using a web-based questionnaire survey.

2. Secondary analysis of a cross-sectional study

The original study, 'A comparison of the relationship between nursing students' sense of control and health behaviours in Japan and the USA,' was funded by the Grants-in-Aid for Scientific Research from the Japan Society for the Promotion of Research (19K10794).⁷⁾ To make international comparisons about a sense of control, subjective health management skills, and health promotion lifestyle, and to determine the associations between these factors, the original study collected data from nursing students at five universities in Japan and the USA, including St. Luke's International University. One of the study results was reported as "Factors related to intention to be vaccinated against COVID-19 among healthcare university students."⁸⁾ This study used data from students at five medical universities in Japan and conducted a multivariate analysis with intention to be vaccinated as outcome. Resilience was included in the analysis as a predictor. Although the original study did not analyze resilience as an outcome, it is useful to identify factors associated with the resilience of nursing students, as the COVID-19 pandemic impacted daily life and mental health. In this study, only data collected from St. Luke's International University from the original study were used and analyzed to explore factors associated with the resilience of nursing students.

3. Study participants and data collection

The study participants were undergraduate and graduate nursing students at St. Luke's International University. Data were collected via a web-based questionnaire using Google Forms. The invitation to participate in the study was sent via the campus email. Students participated in the survey by accessing the Google form provided in the email after reading an explanation of the study purpose, method, voluntary participation, and privacy compliance, and clicking the "I agree to participate in the study" button. Data were collected from July to October 2022.

4. Variable measurement

The questionnaire included basic information about the participants, the Bidimensional Resilience Scale, health behavior during the COVID-19 pandemic, the impact of the COVID-19 pandemic, knowledge of COVID-19, and vaccination, all of which were used as variables. These variables were included with reference to the psychosocial effects of the COVID-19 pandemic in Japan as reported in the previous study.⁹⁾

1) Basic information about the participants

Basic information about the participants was collected, including enrollment program, presence of a housemate, part-time job, sleeping hours, presence of chronic diseases, history of COVID-19 infection, and history of dealing with COVID-19 patients.

2) The Bidimensional Resilience Scale

The Bidimensional Resilience Scale is a 21-item scale developed by Hirano¹⁰⁾ and confirmed to be reliable and valid. The Bidimensional Resilience Scale consists of the qualities resilience subscale which includes factors such as optimism, control, action, and sociability, and the acquisition resilience subscale which comprises problem-solving thinking, self-understanding, and understanding others.¹⁰⁾ The scale has been confirmed reliable (Cronbach's coefficient of 0.90) and validated by significantly higher correlations with existing similar scale.¹⁰⁾ Participants were asked to respond to each item using a 5-point scale ranging from "strongly agree" to "strongly disagree". The total of each item was used as the overall scale scores which ranged from 21 to 105.

3) Health behavior under the COVID-19 pandemic

The health behavior under the COVID-19 pandemic questionnaire was developed by the authors (AK and RA) and included 21 questions about health behaviors during the COVID-19 pandemic (e.g., wearing a mask in public, paying attention to respiratory symptoms, taking body temperature regularly, etc.). The frequency of these health behaviors was measured using a 4-point Likert scale ranging from "always" to "never". To ensure validity, the questionnaire items were revised through a pilot study and multiple discussions by the authors (AK and RA).

4) The impact of COVID-19 pandemic

The impact of COVID-19 (six items), developed by the authors (AK and RA), asked participants to respond to four options ranging from “strongly” to “not at all” regarding the extent to which the COVID-19 pandemic affected their lives (daily life, work, study, and financial situation). On a five-point scale from “strongly agree” to “strongly disagree,” participants were also asked whether infection prevention controls were adequate in their residential areas and at the university.

5) Knowledge of COVID-19

Participants were asked to respond on a 5-point scale from “very high” to “very low” regarding their knowledge of the COVID-19 disease and the vaccine.

6) Vaccination

Data were collected on the number of vaccinations, side effects, and whether they received further vaccines. Participants were asked to answer on a 4-point scale of “definitely want to receive more vaccines,” “want to receive more if necessary,” “not really want to receive,” and “not want to receive more”.

5. Statistical analysis

Descriptive statistics, means and standard deviations, and sample proportions (n, %) were calculated for the variables included in this study. After confirming the normality of the data for the dependent variable using histogram and Quantile-Quantile Plot, multiple linear regression analysis was conducted using the forced entry method with the Bidimensional Resilience Scale scores as the dependent variable. Multicollinearity was tested using variance inflation factor (VIF). Statistical significance was set at a two-sided p -value < 0.05 . IBM SPSS Statistics Version 29 was used for statistical analysis.

6. Ethical consideration

This study was approved by the St. Luke's International University Research Ethics Review Committee (Approval No: 22-A024) and Medical Research Ethics Committee at the Tokyo Medical and Dental University (M2021-231).

III. RESULTS

1. Characteristics of the participants

We asked 755 students to complete the survey and received responses from 269 (response rate 35.6%). The characteristics of the study participants are shown in **Table 1**. Descriptive statistics for “housemate,” “part-time job,” “history of dealing with COVID-19 patients,” and “side effects of vaccines” are presented for the sample excluding missing values.

Of the participants, 61.3% ($n=165$) were undergraduate students while 38.7% ($n=104$) were graduate students; 9.3% ($n=25$) had a history of COVID-19 infection and 21.9% ($n=59$) had a history of dealing with COVID-19 patients. Most participants (91.1%) had been vaccinated three or more times, and 82.2% ($n=221$) reported experiencing side effects. The mean score on the Bidimensional Resilience Scale was 80.2 ± 9.6 . For the scales developed by the authors, Cronbach's alpha coefficients were calculated, obtaining 0.81 for “Health behavior under COVID-19 pandemic” and 0.33 for “The impact of COVID-19 pandemic”.

2. Factors associated with the Bidimensional Resilience Scale score

The results of multiple linear regression analysis with the Bidimensional Resilience Scale score as the dependent variable are shown in **Table 2**. Analysis of variance for the multiple regression linear model was $F=4.97$, $p < 0.001$.

The VIF was less than 3 for all variables and no multicollinearity was observed.

Factors associated with Bidimensional Resilience were “history of COVID-19 infection” ($\beta=0.148$, $p=0.01$), “confidence to overcome the impact of the COVID-19 pandemic” ($\beta=0.128$, $p=0.031$), and “side effects of vaccines” ($\beta=-0.195$, $p=<.001$). In the health behavior during the COVID-19 pandemic, “avoid hand-to-face contact” ($\beta=0.149$, $p=0.013$), “gargle immediately after returning home” ($\beta=0.17$, $p=0.006$), “have stress and/or symptoms of depression due to following the social distancing orders” ($\beta=0.19$, $p=0.005$), and “feel alienated from society” ($\beta=-0.145$, $p=0.033$) were associated with the Bidimensional Resilience.

Table 1 . Characteristics of the participants

		n = 269	
		n	%
Enrolment program	Undergraduate	165	61.3
	Graduate	104	38.7
Housemate (n=267)	Live with somebody	197	73.2
	Alone	70	26.0
Part time job (n=266)	Not at all	52	19.5
	Less than 10 hours/week	81	30.5
	10-20 hours/week	66	24.8
	20-40 hours/week	35	13.2
	40 hours or more per week	32	12.0
Chronic diseases	Have	35	13.0
	None	234	87.0
History of COVID-19 infection	Have	25	9.3
	None	244	90.7
History of dealing with COVID-19 patients (n=267)	Have	59	21.9
	None	208	77.3
Number of vaccinations	Never	10	3.7
	Once	0	0
	Twice	14	5.2
	3 times or more	245	91.1
Side effects of vaccines (n=259)	Had	221	82.2
	None	38	14.1
Whether they received further vaccines	Definitely want to receive	74	27.5
	Want to receive more if necessary	141	52.4
	Not really want to receive	39	14.5
	Not want to receive more	15	5.6
		Mean(SD)	Range
The Bidimensional Resilience Scale score		80.2(9.6)	49-105
Innate factors	Optimism	11.6(2.2)	5-15
	Control	11.0(2.1)	5-15
	Sociability	10.3(2.7)	3-15
	Vitality	12.0(2.4)	4-15
Acquired factors	Problem-solving	11.7(1.9)	5-15
	Self-understanding	11.3(1.7)	6-15
	Understanding others	12.4(1.9)	5-15
Sleeping hours		6.44(1.1)	2-10
Knowledge of the COVID-19 disease		3.33(0.64)	2-5
Knowledge of the COVID-19 vaccine		3.27(0.64)	2-5

IV. DISCUSSION

The resilience of nursing students during the COVID-19 pandemic was associated with a history of COVID-19 infection, infection prevention behaviors such as avoiding hand-to-face contact and gargling, the stress associated with social distance, and confidence to overcome the impact of the COVID-19 pandemic. Vaccine side effects and feeling alienated from society were negatively associated with resilience. A previous study of nursing students at another university before

the COVID-19 pandemic reported subscale scores of 9–12 on the Bidimensional Resilience Scale¹¹⁾, which did not differ significantly from the scores of nursing students during the COVID-19 pandemic in the present study.

Fear of the virus is one of the challenges nursing students face during the COVID-19 pandemic.⁶⁾ Regarding the association between a history of COVID-19 infection and resilience in this study, it is possible that the experience of actually being infected and overcoming COVID-19 may have reduced fear of

Table 2. Factors associated with the Bidimensional Resilience Scale score

	β	p -value
$n=269$		
Basic information about the participants		
Housemate	-0.036	0.511
Part-time job	-0.032	0.561
Chronic diseases	0.075	0.168
Sleeping hours	0.025	0.641
History of COVID-19 infection	0.148	0.01*
History of COVID-19 infection in family, friends, or coworkers	0.022	0.686
History of dealing with COVID-19 patients	-0.058	0.328
History of direct care of COVID-19 patients	-0.065	0.273
Impact of the COVID-19 pandemic on daily life and work/study	-0.053	0.344
Economic impact of the COVID-19 pandemic	0.007	0.911
Concerns about study delays due to COVID-19 pandemic	-0.097	0.115
Confidence to overcome the impact of the COVID-19 pandemic	0.128	0.031*
COVID-19 infection prevention and control in residential areas	-0.010	0.856
COVID-19 infection prevention and control at the university	0.009	0.869
Knowledge of the COVID-19 disease	0.043	0.585
knowledge of the COVID-19 vaccine	0.081	0.293
Number of vaccinations	-0.061	0.260
Side effects	-0.195	<.001*
Whether participants received further vaccines	0.057	0.320

Dependent Variables: The Bidimensional Resilience Scale score

Adjusted R-squared: 0.39

*Significant at 0.05 level

Table 2 . Factors associated with the Bidimensional Resilience Scale score (continued)

	n = 269	
	β	
	p- value	
Health behavior under COVID-19	0.071	0.225
Pandemic	0.004	0.942
Wear a mask in public	0.026	0.635
Self-monitor for respiratory symptoms	0.149	0.013*
Follow respiratory hygiene recommendations	0.102	0.101
Avoid hand-to-face (especially, eyes, mouth, and nose) contact	0.015	0.820
Check body temperature regularly	0.017	0.797
Wash hands or use sanitizer after touching objects and surfaces in public	0.170	0.006*
Clean and disinfect shared objects and surfaces	0.068	0.325
Gargle immediately after returning home	-0.074	0.264
Limit international or domestic travel only to the essential	0.002	0.982
Limit usage of public transportation only to the essential	-0.030	0.711
Avoid crowded, closed, and close-contact settings	-0.009	0.885
Limit gatherings only to the essential	-0.021	0.716
Maintain social distance in public areas	0.044	0.479
Avoid contact with individuals at high risk for severe illnesses	-0.064	0.349
Keep up with the latest information and recommendations from health authorities	0.190	0.005*
Follow the government's physical/social-distancing orders/requests	-0.145	0.033*
Have stress and/or symptoms of depression due to following the social distancing (stayhome) orders	0.090	0.140
Feel alienated from society	0.092	0.121
Use specific measures to reduce stress	0.022	0.732
Maintain physical activities		
Seek support from others		

Dependent Variables: The Bidimensional Resilience Scale score

Adjusted R-squared: 0.39

*Significant at 0.05 level

the virus. However, young women are more likely to have stronger symptoms of COVID-19 infection, which can easily affect their social lives.¹²⁾ Since this study did not collect data on the intensity of symptoms and sequelae caused by COVID-19, the severity of these symptoms may have had a negative impact on resilience. Therefore, there are limitations in the generalizability of the results regarding the association between history of COVID-19 infection and resilience. The positive association between resilience scores and stress and/or symptoms of depression due to social distance was an interesting finding. A previous study reported that “decentering,” the skill of distancing oneself from stress by viewing it as temporary, was positively correlated with resilience.¹³⁾ As data on “decentering” was not collected in the present study, this may have been a parametric variable that showed a positive correlation between stress and resilience.

While taking infection prevention behaviors such as gargling and social distancing were associated with resilience, a previous study also reported that proper preparation and training in infection prevention measures could lead to empowerment and resilience building.¹⁴⁾ This finding suggests that the resilience of nursing students during the COVID-19 pandemic may differ by grade level. Although the sample in this study was limited and participants were not divided by grade level, future analysis of nursing students separately by grade level or enrollment program may show differences in factors related to resilience. Studies of university students have shown that infection prevention measures do not affect their mental health,¹⁵⁾ it is necessary to continue supporting nursing students in taking infection prevention measures against COVID-19.

On the other hand, vaccine side effects had a negative impact on resilience. Motivation to vaccinate against COVID-19 is related to protecting the lives and health of self and others.¹⁶⁾ Negative attitudes toward vaccination due to side effects may have hindered the infection prevention behaviors of nursing students and negatively affected their resilience. The side effects were considered as a physical and psychological burden, especially for nursing students who are recommended to be vaccinated in preparation for hospital training. In addition, the negative impact of social isolation on resilience is consistent with the findings of previous studies.⁶⁾ Although restrictions

such as stay-homes have now been lifted, mental support for nursing students will continue to be required, as the support of family, friends, and faculty members is an important factor in their resilience.⁵⁾

In this study, multiple linear regression analysis was conducted using forced entry methods for variables considered to be factors associated with resilience from the previous study. However, the adjusted R-square for the model was low at 0.39, and the standardized partial regression coefficient was generally small. This means that the degree of explanation of factors associated with resilience is not high. Given the cross-sectional nature of this study, it is important to note that we cannot establish a causal relationship between the variables.

V. CONCLUSION

Results of a survey of 269 nursing students during the COVID-19 pandemic showed that a history of COVID-19 infection, infection prevention behaviors such as gargling, the stress associated with social distance, and confidence to overcome the impacts of COVID-19 pandemic were associated with resilience. Vaccine side effects and social alienation had a negative impact on resilience. Support will still be needed to help nursing students appropriately carry out infection prevention practices and protect them from experiencing stress from isolation. Since this study did not analyze factors related to resilience separately for each grade level, future research should take these factors into account to consider support measures that are more specific to the attributes of the nursing students.

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