

Impact of COVID-19 Pandemic Self-restraint on College Students' Mental Health: A Longitudinal Survey of the Second and Third Waves

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How to cite this article: Takashi OHUE. Impact of COVID-19 Pandemic Self-restraint on College Students' Mental Health: A Longitudinal Survey of the Second and Third Waves. International Journal of Nursing Education / Vol. 16 No. 4, October-December 2024.

Abstract

Purpose: The purpose of this study was to investigate the effects of the COVID-19 pandemic on mental health in students at university.

Method: 1880 students from university were surveyed. Survey period: July-August 2020

Demographic factors were used department, grade, gender, age. Mental health factors (PHQ-9 Japanese version, GAD-7 Japanese version, IES-R) were used. Decreased motivation to learn, loneliness: Japanese version UCLA loneliness scale was used.

Results: As a result of the survey, in (July-August), 737 patients (123 males and 614 females) were recovered (recovery rate 40.9%). As a result, in terms of gender difference, males had a higher total of "loneliness" than females and had a higher total of PTSD and "invasive symptoms". Students whose parents corresponded to corona had high "anxiety" and "depression". Students who felt rumors had high scores for "PTSD," "depression," "anxiety," and "loneliness." Students "seeking support" also scored higher on PTSD, depression, anxiety, and loneliness. Those who were "not very careful" about infection control were more likely to be depressed than those who were "careful", and those who were "quite careful" were less motivated to learn. Family structure and parental profession have no effect. In addition, the relationship between each psychiatric symptom (PTSD, depression, anxiety disorder) and "loneliness" and "motivation to learn" was examined using covariance structure analysis. When the model was examined, the models of "loneliness" $\Rightarrow$ "decreased learning motivation" $\Rightarrow$ "PTSD" $\Rightarrow$ "depression" and "anxiety" were verified. In other words, it was shown that it is important to deal with "loneliness" to improve mental health and learning motivation during the COVID 19 pandemic.

Conclusion: At the time of the COVID-19 pandemic, college students may be high-risk persons with mental health problems.

Keywords: Japanese university student, COVID-19, Mental health, Longitudinal study, Self-restraint life

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Submission date: June 14, 2024

Revision date: Jul 15, 2024

Published date: Oct 22, 2024

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Introduction

In December 2019, the first case of pneumonia caused by a novel coronavirus was reported in Wuhan, China. Subsequently, the World Health Organization declared a “public health emergency of international concern” on January 30, 2020, owing to the spread of coronavirus disease 2019 (COVID-19) both domestically and internationally, and new pneumonia cases associated with COVID-19 were reported.¹ As of June 27, 2022, 9,253,386 cases of COVID-19 and 31,126 deaths were reported in Japan.²

In response, universities have been forced to implement social distancing measures and to shift to online classes. Furthermore, its impact on the mental health of university students has been reported. Internationally, students have been identified as a high-risk group for mental health issues.³ Cao et al.⁴ investigated the psychological impact of COVID-19 on university students in China and found that fear of infection and academic anxiety significantly affected mental health. Elmer et al.⁵ focused on university students’ social networks and mental health, analyzed changes during the pandemic and suggested that social restrictions impacted mental health. Wang et al.⁶ examined immediate psychological responses and associated factors among university students in China during the early stages of COVID-19. They found that uncertainty and stress had a direct impact on mental health. Son et al.⁷ investigated the impact of COVID-19 on the mental health of university students in the United States and observed that financial anxiety and interruption of in-person classes affected their mental well-being.

In Japan, Takahashi et al.⁸ examined the impact of the COVID-19 outbreak on the mental health of Japanese university students, suggesting that anxiety about the infection and restrictions on in-person classes affected their psychological health. Masuda et al.⁹ reported on the relationship between stress and psychological health among nursing students during the COVID-19 pandemic.

University students have faced various issues unique to the remote learning format during the COVID-19 pandemic, such as the need for adequate communication environments for online classes, confusion about the new online learning

format, and the burden of excessive assignments and information processing. These factors are presumed to affect mental health. In addition, the pandemic has led to restrictions on on-campus access, reducing opportunities for social interaction and communication with friends. Adolescent university students are particularly prone to feelings of loneliness. Ochiai¹⁰ stated that loneliness is an inevitable feeling associated with the discovery of the self and a fundamental emotional experience during adolescence. Therefore, social distancing and online classes during the COVID-19 pandemic may have exacerbated feelings of loneliness among university students. Ohue¹¹ conducted a cross-sectional study on the impact of the second wave of the COVID-19 pandemic on the mental health of university students and demonstrated that increased loneliness led to decreased motivation to learn and deteriorating mental health. However, Wang and Cheng¹² pointed out several issues with cross-sectional surveys, such as “temporal ambiguity,” “common method variance,” “sampling bias,” and “lack of follow-up.” Thus, Ohue’s¹¹ study has these limitations, indicating the need for longitudinal research.

Purpose

The relationship between the passage of time and mental health among university students during the COVID-19 pandemic has not yet been clarified. Therefore, this study conducted a longitudinal survey during the second and third waves of COVID-19 to examine the impact of the pandemic on university students’ mental health.

Methods

Survey Participants

The survey targeted 1,880 students from various university departments and graduate schools, including the Department of Modern Business, Department of Nutrition Management, Department of Health Systems, Department of Nursing, Department of Social Welfare, Department of Child Welfare, Department of Early Childhood Education, Graduate School of Nursing, Graduate School of Modern Business, and Graduate School of Economic Information.

Survey Period

Second wave: July to August 2020

Third wave: December 2020 to January 2021

Research Design

The longitudinal study approach was used.

Survey Content

- **Demographic Factors:** Questions included department, academic year, sex, age, family structure, whether parents or relatives were treating COVID-19 patients, support needs, and infection prevention measures.
- **Depression Assessment:** The Patient Health Questionnaire-9 (PHQ-9, Japanese version), developed by Kroenke et al.¹³ and translated by Muramatsu¹⁴, revised by Muramatsu et al.¹⁵, was used to diagnose and assess the severity of depression. It comprises nine items rated on a four-point scale from "0" (not at all) to "3" (nearly every day) over the past two weeks, with higher scores indicating more severe depression.
- **Anxiety Assessment:** The Generalized Anxiety Disorder-7 (GAD-7, Japanese version), developed by Spitzer et al.¹⁶, translated by Muramatsu et al.¹⁷, and revised by Muramatsu¹⁴, was used to evaluate generalized anxiety symptoms. It uses a four-point scale from "0" (not at all) to "3" (nearly every day), with higher scores indicating higher anxiety.
- **Trauma Experience Assessment:** The Impact of Event Scale-Revised (IES-R, Japanese version) by Asukai et al.¹⁸ was used to measure post-traumatic stress disorder (PTSD) symptoms. The 22-item self-report questionnaire assesses symptoms like intrusion (seven items), avoidance (eight items), and hyperarousal (seven items) over the past week on a five-point scale, with higher scores indicating more severe symptoms.
- **Academic Motivation and Class Motivation**

Decline: Subscales from the Motivation Decline Scale developed by Shimoyama¹⁹ comprised 10 items rated on a five-point scale. Higher scores indicate greater declines in motivation.

- **Loneliness:** The UCLA Loneliness Scale, developed by Russell et al.²⁰ and translated into Japanese by Kudo and Nishikawa,²¹ consists of 20 items rated on a four-point scale from "1. always" to "4. never," with higher scores indicating greater loneliness.

Permission was obtained using the PHQ-9 and GAD-7 scales. The IES-R can be used without permission for research purposes.²²

Survey Method

The survey was conducted online using the university's website and email system to ensure the security of the educational information system.

Analysis Method

We calculated the number and percentage of basic attributes of the participants.

We used t-tests to identify significant differences in mental health symptoms (PTSD, depression, and anxiety), "loneliness," and "academic motivation" between the second and third waves.

We conducted a covariance structure analysis to examine whether "loneliness" and "decline in academic motivation" during the second wave (Time 1: July to August 2020) affected mental health during the third wave (Time 2: December 2020 to January 2021). Model fit was assessed using χ^2 , GFI, AGFI, and RMSEA, using a model similar to Ohue's¹¹ cross-sectional survey. The hypothesis model considered the impact of "loneliness" leading to a "decline in academic motivation" (Time 1) and subsequent "PTSD," "depression," and "anxiety" (Time 2; Figure 1). The analysis used the cross-lagged effect model to examine interactions between variables over time, evaluated with GFI and RMSEA, considering $GFI \geq .80$ and $RMSEA \leq .10$. All analyses were conducted using SPSS Windows software version 19.0 and AMOS version 19.0.

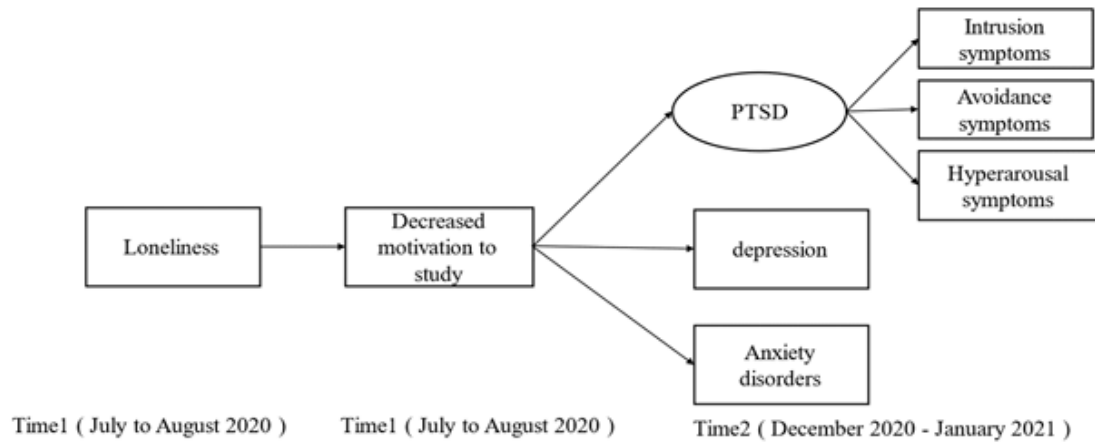


Figure 1: Hypothetical model

Ethical Considerations

This study was approved by the Ethics Committee of the Hyogo University (No. 20003). Written requests were made to the administrators of the research facilities for consent. Participants were informed that participation was voluntary, that they could withdraw at any time without disadvantage, and that their data would only be used in this study. Data confidentiality and privacy were ensured through statistical processing, using code numbers to prevent personal identification.

Results

Demographic Factors (Table 1)

The survey was conducted from July to August (first wave) and received responses from 737 students (123 male and 614 female participants) for a response rate of 40.9%. The second survey, conducted from December to January (third wave), received 235 responses (30 male and 205 female participants), with a response rate of 13.05%. The analysis focused on 189 students (21 male and 168 female participants) who responded to both surveys. The participants comprised 106 first-year, 33 second-year, 39 third-year, and nine fourth-year students.

Table 1: Demographic Factors

	N	%
Gender		
Male	21	11.1
Female	168	88.9
Department		
Modern Business Department	14	7.4
Nutrition Management Department	28	14.8
Health Systems Department	7	3.7
Nursing Department	62	32.8
Social Welfare Department	14	7.4
Child Welfare Department	17	9
Early Childhood Education Department	44	23.3
Year		
Freshman	106	56.1
Sophomore	33	17.5
Junior	39	20.6
Senior	9	4.8

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Age		
18 years old	43	22.8
19 years old	73	38.6
20 years old	40	21.2
21 years old	13	6.9
22 years old	5	2.6
23 years old	1	0.5
24-57 years old	7	3.6

Examination of Differences in Longitudinal Survey Scores (Table 2)

A t-test was conducted to compare the scores of each subscale between the second and third waves. Significant increases were observed in PTSD ($t = 1.84$,

$p < 0.05$), overall academic motivation ($t = 3.68$, $p < 0.01$), and class motivation ($t = 3.03$, $p < 0.01$). While no significant differences were found for the other items, average scores were decreased.

Table 2: Longitudinal survey results for each scale

		2nd Wave		3rd Wave		t	P
		M	SD	M	SD		
IES-R	PTSD Total	25.45	18.19	22.04	18.08	1.84	0.05
	Intrusion symptoms	8.87	7.07	8.02	6.56	1.2	0.23
	Avoidance Symptoms	10.31	7.48	9.14	7.5	1.5	0.13
	Hyperarousal symptoms	6.27	5.34	5.66	5.21	1.11	0.27
GAD-7	anxiety	4.83	4.5	4.25	4.34	1.29	0.20
PHQ-9	Depression	5.25	4.93	5.05	5.28	0.37	0.71
UCLA loneliness scale	Loneliness	39.85	9.73	39.91	9.89	0.06	0.96
Motivation to learn	Decreased motivation to learn	13.77	2.06	13.62	2.37	0.63	0.53
	Decreased motivation to teach	8.28	2.99	7.4	2.61	3.03	0.00
	Total decline in motivation to learn	22.05	3.73	20.44	4.73	3.68	0.00

Longitudinal Model of University Students' Mental Health During the COVID-19 Pandemic

A cross-lagged effect model in covariance structure analysis was employed to examine whether "loneliness" and "decline in academic motivation" during the second wave affected mental health during the third wave. The second wave (July to August 2020) was designated as Time 1, and the

third wave (December 2020 to January 2021) as Time 2. The hypothesis model was verified ($X^2[26] = 80.690$, $GFI = 0.91$, $AGFI = 0.84$, $RMSEA = 0.10$) (Figure 2). The hypothesized model of "loneliness" leading to a "decline in academic motivation" (Time 1) and subsequently affecting "PTSD," "depression," and "anxiety" (Time 2) was validated. All the path coefficients were significant.

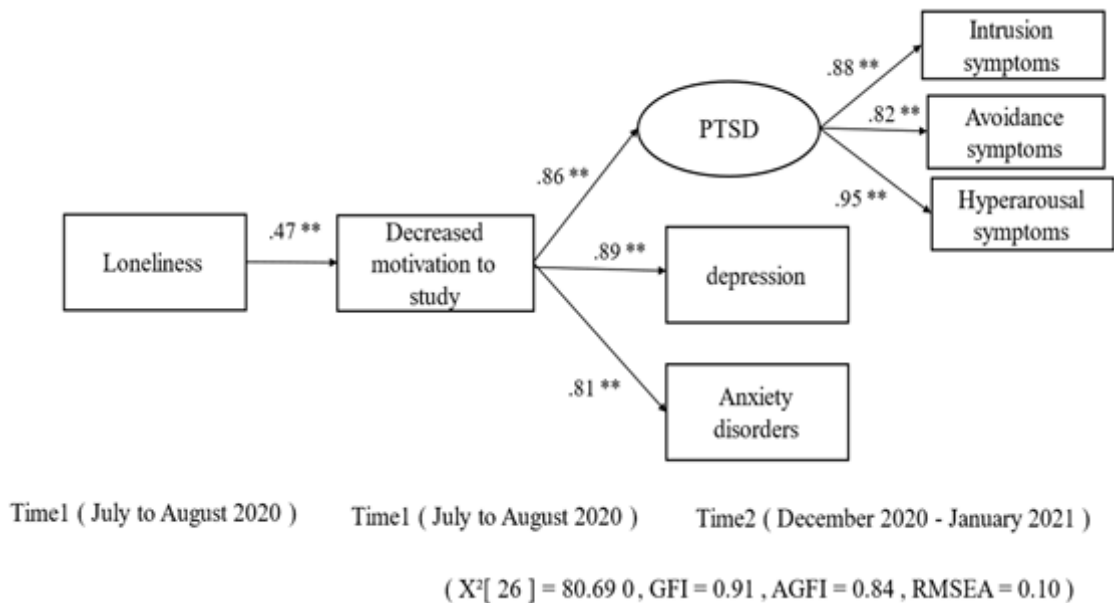


Figure 2: Longitudinal model of mental health among university students during the pandemic

Discussion

This study investigated the impact of the COVID-19 pandemic on the mental health of students at University A by conducting longitudinal surveys during the second and third waves of COVID-19 infections. The longitudinal survey results revealed significant decreases in PTSD, overall academic motivation, and class motivation. This indicates that PTSD and decline in academic motivation were higher during the second wave than during the third wave. Ohue¹¹ conducted a cross-sectional study during the second wave, examining the impact of lockdown measures during the COVID-19 pandemic on the mental health of university students. This suggests that the pandemic-induced lockdown affected university students' mental health. Our study confirmed significant increases in PTSD and an overall decline in academic motivation and class motivation. In Hyogo Prefecture, where the university is located, states of emergency were declared twice: first from April 7 to May 31, 2020, and second from January 8 to March 18, 2021. During the second wave, there was no state of emergency, as in April-May, meaning that the second wave was when anxiety and fear of the pandemic could easily be heightened due to the end of the emergency declaration. This may explain the higher PTSD scores observed in the second wave. Moreover, the shift to online classes

has brought about various challenges, such as the need to establish an adequate Internet environment, initial confusion with online learning, the burden of numerous assignments, and information processing. These issues are likely to have contributed to the decline in academic motivation. Ohue's¹¹ cross-sectional study concluded that "loneliness" impacted mental health adversely. Our study validated a model where "loneliness" and "decline in academic motivation" during the second wave affected mental health during the third wave. This suggests that the lockdown during the pandemic decreased both loneliness and academic motivation, subsequently affecting mental health. Therefore, appropriate early interventions for "loneliness" during the COVID-19 pandemic are crucial for improving mental health. Addressing loneliness is essential, as it could decrease motivation and interest, potentially lowering academic performance and engagement.

Regarding the longitudinal model of mental health of university students during the COVID-19 infection, a model was verified in which "loneliness" in the second wave $\Rightarrow$ "decreased motivation to learn" $\Rightarrow$ "PTSD," "depression," and "anxiety" in the third wave. In other words, it was shown that responding to "loneliness" in the early stages is essential for improving mental health during the COVID-19 pandemic. This suggests that the self-restraint lifestyle

due to the state of emergency declaration promotes “loneliness” and decreases motivation to learn. It has been suggested that the loneliness associated with online classes affects this finding. In addition, since “loneliness” also leads to a decrease in students’ motivation to learn, it is thought that intervention in loneliness will be the key during the COVID-19 pandemic. As loneliness increases, students find it challenging to be motivated or interested, which may decrease their motivation to learn. If this continues, it may negatively affect academic engagement and grades. It has also been suggested that loneliness may cause a decrease in motivation to learn, which may further lead to mental health problems, such as PTSD, depression, and anxiety. This result was consistent with the findings of previous studies. For example, Smith et al.²³ suggested that social constraints may cause college students to experience feelings of isolation, which may lead to academic impact and mental distress. Additionally, studies such as Jones et al.²⁴ have pointed out that increased loneliness among college students is associated with increased remote learning and social constraints. Addressing this may lead to improved motivation to learn and mental health. During the COVID-19 pandemic, increased social constraints and remote learning may have increased loneliness. It has been found that increased loneliness reduces individual psychological stability and stress tolerance, making people more susceptible to mental health problems. Self-restraint due to the COVID-19 pandemic increases loneliness and affects mental health and learning motivation. Interventions to prevent loneliness are essential during a pandemic.

Conclusion

The longitudinal model for university students’ mental health during the COVID-19 pandemic was validated, showing that “loneliness” during the second wave led to a “decline in academic motivation,” which in turn affected “PTSD,” “depression,” and “anxiety” during the third wave. This highlights the importance of addressing early “loneliness” to improve mental health during the COVID-19 pandemic. The state of emergency and the subsequent lockdowns during the pandemic heightened “loneliness” and decreased academic motivation. It was suggested that loneliness associated with online classes affected students. Furthermore, “loneliness” has been

linked to a decline in academic motivation, making interventions targeting loneliness crucial during the COVID-19 pandemic. Increased loneliness can lead to decreased motivation and interest among students, potentially lowering their academic engagement and performance. Continuing this trend could adversely affect academic efforts and grades. Additionally, a decline in academic motivation caused by loneliness can lead to PTSD, depression, and anxiety.

Limitations and Future Directions

This study was limited to students from a single university, which may not provide universal data. Future studies should include multiple universities to gather more comprehensive data. Collaboration with university health centers is necessary to provide mental health support. Online lectures have been conducted during the COVID-19 pandemic. Online lectures are insufficient in Japan, and face-to-face classes are the norm. As a result, university professors teaching at universities were confused about introducing online lectures amid the chaos of the COVID-19 pandemic, and many lectures were one-sided. It is believed that the lack of interaction among university students is a factor in their increased sense of loneliness during the COVID-19 pandemic. In the future, using “breakout rooms” and other methods to deepen active interaction between students, even in online lectures, will be necessary. Reducing “loneliness” during the COVID-19 pandemic is essential for improving students’ mental health and academic motivation. Intervention studies are needed to explore whether alleviating loneliness can enhance academic motivation and mental health during the pandemic.

Conflict of interest There are no conflicts of interest in this research.

Source of Funding This study was supported by Hyogo University Personal Grant. There are no conflicts of interest regarding the publication of this study.

Ethical clearance: This study was conducted after obtaining approval from the Ethics Review Committee of the author-affiliated university.

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