新型コロナウイルス感染症のパンデミックにおける長崎大学留学生のメンタルヘルス及び学習への影響に関する研究

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The Impact of COVID-19 Pandemic on the Mental Health and Study of International Students of Nagasaki University in Japan

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1. Introduction

COVID-19 pandemic has caused tremendous changes in daily living, which may be related to mental health problems, including psychotic experiences.

The purpose of this study is to discover to what extent does the spread of COVID-19 infection affected the mental health and learning experiences of international students at Nagasaki University in Japan, and at the same time draw implications on how to provide beneficial support to international students in such emergency situation while Nagasaki University further promotes globalization.

As of May 2020, there were 473 international students from 49 countries enrolled at Nagasaki University (Nagasaki University 2020). Although each department conducts interviews or surveys with enrolled students at the end of each semester to investigate their living and academic status, there has been no separate research focusing on the impact on international students, and the results of individual interviews have not been made public. Failure to focus on international students specifically prevents the university from being able to fully grasp the situation at hand and its associated factors at depth. Therefore, this study aims to explore what kind of challenges the international students have been facing during the pandemic and how these challenges have had an impact on their mental health, well-being and study through an empirical case study.

This paper is divided into 6 main sections. Section 2 reviews COVID-19 infections and measures put in place in both Japan and Nagasaki as well as Nagasaki university to understand the situation during the survey time period. Section 3 summarizes the main findings of existing research, which supports the analytical theory of this study. Section 4 introduces the research framework and method and describes the outline of the survey. Section 5 summarizes the results of the study and the conclusion followed by discussions and suggestions in Section 6.

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2. COVID-19 infection and measurements in Nagasaki area

Nagasaki Prefecture, situated at the westernmost tip of Kyushu Island in Japan, encompasses more islands than any other prefecture in the country, as illustrated in **Figure 1**. As of July 1, 2023, the estimated population of this region stands at 1,269,079 (Nagasaki Prefecture's homepage). Nagasaki City, the largest city in this prefecture, is home to Nagasaki University, where a significant population of international students resides.

Figure 1 Nagasaki prefecture (depicted by authors)

This section elucidates the COVID-19 infection situation in the Nagasaki area, with a specific focus on the period up to February 2022 when the survey for this study was conducted. Additionally, it outlines the responses policies implemented by the local community and Nagasaki University in accordance with the central government's COVID-19 response policy during this period. This context aids in comprehending the circumstances under which the survey results were obtained. Since the first positive case of COVID-19 in the Nagasaki prefecture was confirmed in Iki City in March 2020, the cumulative number of confirmed cases has reached approximately 2.2 million as of February 2022 as shown in **Figure 2.** In Nagasaki city, the first infection was confirmed on April 15, 2020. However, during the following several months, the number of confirmed cases remained at zero. The most significant outbreak within Nagasaki city during the early stages occurred when 149 infected people found on board the cruise ship "Costa Atlantica" docked at the Kayaki Plant of Mitsubishi Heavy Industries Nagasaki Shipyard. Fortunately, the Nagasaki Prefectural Government successfully blocked the infection from spreading beyond the cruise ship. Overall, the level of COVID-19 infection in the Nagasaki area was comparatively lower than the rest of the prefectures in Kyushu Island and average of national wide (Cabinet Agency for Infectious Diseases Crisis Management's homepage). In response to the nationwide spread of the virus, the Ministry of Education, Culture, Sports, Science and Technology (MEXT) requested that in-person activities at university be suspended. In accordance with this request, the Nagasaki University implemented policy to suspend in-person lectures, exercises, experiments, graduation research, practical training, etc. for the first 2 weeks of the April 2020 semester (Educational Support Division, Student Support Department, Nagasaki University, 2021a). After two weeks, some face-to-face activities began to resume if the conditions for implementation were met (Educational

Support Division, Student Support Department, Nagasaki University, 2021b). However, the government extended a nationwide state of emergency on April 21, causing the university to revert to online lectures. Online schooling continues until mid-May. In mid-May 2020, face-to-face lectures were re-adopted, but hybrid scheduling was still encouraged for the remainder of the semester (Educational Support Division, Student Support Department, Nagasaki University, 2020c). These changes in class structure and the introduction of new teaching methods created confusion for some students. Starting from March 8, 2020, entry into Japan from abroad was prohibited as a result of the government's border lockdown policy. This action also impacted international students' ability to enter. In addition, people were asked to refrain from traveling to areas where infections were spreading domestically, and people traveling from outside the prefecture were also required to self-quarantine for two weeks. Under this circumstance, concerns were raised about the worsening economic circumstances for both parents and students. In the case of students, there was a decrease in part-time job opportunities, which especially impacted international students. Addressing these issues became an urgent task for the MEXT, student support organizations, local governments, universities, etc. Nagasaki University extended comprehensive support to all its students, including international students, utilizing resources from the MEXT as well as its internal funds. Notifications regarding the support were disseminated to students via email or published on the university's official website. In most instances, these notifications were originally in Japanese and were subsequently translated into English by the Study Abroad Support Division, following requests from the Student Support Division. Consequently, they became widely accessible to international students through email notifications. While it is worth noting that the majority of international undergraduate students at Nagasaki University possess a reasonable proficiency in Japanese, the reality remains that within the graduate school, a notable portion of students may have limited or no proficiency in the Japanese language.

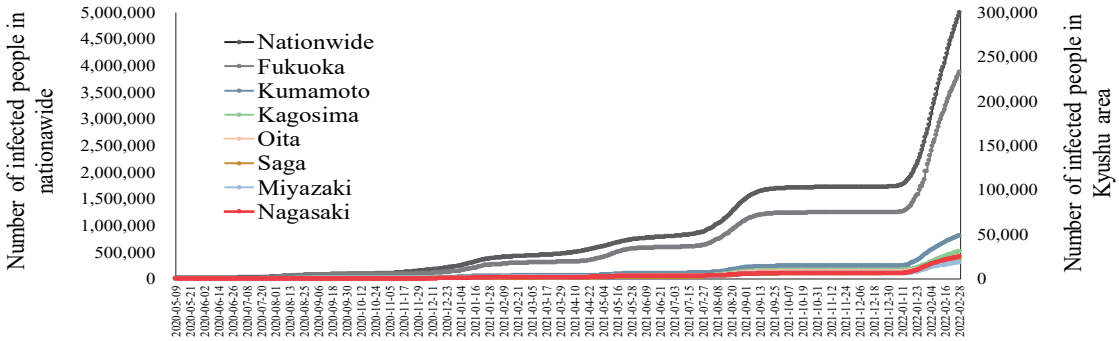

Figure 2 Number of infected people in Kyushu area and nationwide
(depicted by authors based on the open source by the Cabinet Agency for Infectious Diseases Crisis Management)

3. Literature review

There has been extensive research on the mental health outcomes during and after the peak of the coronavirus pandemic. They found that COVID-19 circumstances significantly increase levels of psychological distress. Many of these studies have paid particular attention to vulnerable people, specific population groups, and places who lack access to quality care. One of these vulnerable groups is international students, who are living abroad apart from their families. Those studies which examined the mental health impact of COVID-19 on students at the university level reported that student experience moderate to high levels of stress or anxiety. The correlated factors found in these studies are financial distress (Van de Velde et al., 2021), fear of infection (Oh et al., 2021a), racial/ethnic discrimination (Oh et al., 2021b), age (Zapata-Ospina et al. 2021), physical health condition and knowledge of vaccine (Fan et al., 2021). A conducive learning environment (i.e. family size, residential area, access to high-speed internet) was also found to be associated with lower levels of anxiety during COVID-19 (Hoque et al., 2021). Several studies confirmed potential gender inequalities in mental health between males and females during COVID-19 (Bilodeau et al. 2021, Zapata-Ospina et al. 2021) due to their differential exposure or vulnerability to work, family and study conditions or IT familiarity. Meanwhile, COVID-19 impacted differently by student's field of study and major. For students working in frontline industries dealing with the direct impact of COVID-19, there is an increase in COVID-19-related stress due to the nature of their jobs. In particular, some studies focused on nursing students and revealed their anxiety symptoms and its associated factors (Hasanpour et al., 2021), their stress and burnout experienced (Sveinsdóttir et al., 2021) in related COVID-19. Miani et al., (2021) investigated undergraduate tertiary aviation students' perceptions of the aviation industry following the COVID-19 and found pressures for skills required to succeed within the pandemic. In contrast, there are studies showing that students recognize the new reality, face challenges, and present a positive vision of pandemic-related opportunities (Lopes and Gomes, 2023). The students also experienced extreme fear of academic delay (FAD) and psychological distress worldwide due to the devastating actions of COVID-19 (Hossain et al., 2021). On the other hand, Kamaludin et al. (2020) discussed the method for university students to cope with the psychological impact of the COVID-19 pandemic and restrictions on movement. It concluded that seeking social support and acceptance coping strategies were significantly associated with the lower level of anxiety, emphasizing the importance of the social element for student in addressing their mental health issues. Similarly, Tindle et al., (2022) shown that social support from friends, family, colleagues, and others facilitates higher levels of psychological flexibility which indirectly reduces psychological distress.

4. Materials and methods

4.1 Analytical framework

This study aims to fully understand the impact COVID-19 had on international students and related. For these factors, in addition to exogenous variables such as gender and etc., independent variables were set based on theoretical background through literature research and empirical evidence confirmed in interviews, and were classified into three categories: internal factors, social influence, and external pressure. The analytical framework of this study and summary of variables are presented in **Figure 3** and **Table 1**.

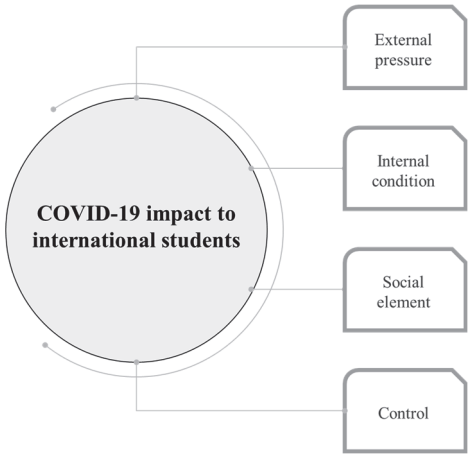

Figure 3 Analytical framework (depicted by authors)

(1) External pressure

The ongoing health threat posed by COVID-19 to our generation in a completely unprecedented manner has, by and large, affected many individuals' physical and mental health (Sugawara et al., 2022). While the governments' infection prevention and control measures were designed to minimize the spread of infectious, potentially COVID-19-related diseases, many of people encountered significant challenges in adapting to this new, albeit temporary, way of life. The government's guidelines and policies included lockdowns, border closures, and restrictions to social gatherings and outside activities. The strongest predictor of psychological distress during the COVID-19 pandemic appears to be the impact of quarantining and social isolation (Breaux et al., 2023). Meanwhile, one of the policies commonly implemented by governments around the world is border blockade. Despite this, to our knowledge there is little literature on the mental health impacts of this extreme policy. This is because it does not affect most people living in their home country. However, it is closely relevant for people living away from their home country. Accordingly, in this study, ***fear of infection, government infection control measures such as border closure, social distancing, and restrictions*** on external activities were set as external pressures that are likely to affect mental health. In Japan, there was no government-mandated 'lockdowns', so it was not included in this category. Meanwhile, the ***university's COVID-19 support*** for international students is expected to alleviate the impact of the pandemic and was included as one of the external factors.

(2) Societal element

Mounting papers and reports suggest that the COVID-19 pandemic has intensified prejudice and discrimination against racial/ethnic minorities (Lu et al., 2021).

Schaller and park (2011) discussed that the behavioral immune systems may induce people to avoid and discriminate against outgroups, especially cultural and national outgroups. Existing research has further shown that infectious disease outbreaks including COVID-19 activated this behavioral immune system resulting from subsequently increased prejudice against minority groups and immigrants (Lu et al., 2021). However, culturally learned disease prevention strategies (e.g., washing hands, wearing masks) may mitigate immune system behaviors such as xenophobia. (Wormly and Varnum, 2023). In our study, we included ***prejudice and discrimination, cultural differences, and stigma against infection*** as social factors and explored their impact and relationship with international students' mental health and study.

(3) Internal conditions

On the other hand, the degree of impact external shocks or stimuli leave on individuals will vary depending on their environment and manner of internalization. This study centers its focus on four specific conditions that may influence how individuals internalize these significant changes to their way of life: ***financial hardship, skill acquisition and proactive information gathering, concern on career in the further, and communication difficulty***. Due to the spread of COVID-19, decreased income predicted increased illness, but was not due to fear of COVID-19 in general (Sugarawa el al., 2022). Some students are facing difficulties continuing their studies due to heavily reduced household incomes of home country as well as less income from part-time jobs. In Pre-Interview, the incidence and uncertainty of income accounted for the biggest portion of the students' concerns. Thus, financial situations were evaluated separately for the student own income and their parents' income at home country on a scale ranging from '1' = not very worried to '5' = very worried. The sum of the responses determined the overall value for this variable. In the education sector, the impact of COVID-19 has had a far-reaching effect on higher education institutions, posing significant challenges in terms of teaching, learning, research collaborations and institutional governance. Adapting to a fully remote set of classes during the pandemic was related to students' satisfaction with their achievements. Thus, given online adaptation and their overall response, it was deemed necessary to add skill acquisition and information gathering. COVID-19 has exposed vulnerabilities in many industries and restricted cross-border movement. Due to the direct impact of COVID-19, not only graduate school employment but also short-term employment such as internships were affected and reduced. COVID-19 may affect the career confidence of international students considering working abroad. Communication does not simply mean leveled language skills. Even if the ability of local language is in a proficiency level, whether cultural sensitivity is understood is a separate issue. Especially

under the pandemic, being able to express oneself well and be understood through verbal communication regarding mental health is an important factor in treatment.

(4) Control variables

Gender, period of stay abroad, nationality, and grade were considered as control variables, but among them, ***gender and grade***, which were statistically significant variables for the dependent variable through independent t-test and analysis of variance (ANOVA), were applied to the model.

Table 1 Description of variables and evaluation scale

Variables			Explanation	Evaluation scale
Dependent variables	Overall pandemic impact		how their mental health was impacted by the pandemic	'1' = not very affected to '5' = very affected
	Negative affect to study		how COVID-19 has negatively affected your academic motivation and performance	'1' = not very concerned to '5'= very concerned
Independent variables	External pressure	Border blockade	how these external situations have impacted on your mental health	'1' = not very affected to '5'= very affected
		Fear of infection		
		Social distance		
		University support		
	Internal condition	Financial concern	to what extent has the COVID-19 affected your financial situation? (Including financial support from family, scholarships, and part-time job income)	'1' = not very affected to '10'= very affected
		IT mindfulness	how active are you in acquiring new technologies (software and hardware) and information?	'1' = not at all willing to '5'= very willing
		Communication difficulty	how much of a language barrier do you feel when communicating in the local language?	'1' = not very difficult to '5'= very difficult
		Carrier impact	how negatively do you think the COVID-19 will affect your career path?	'1' = not very affected to '5'= very affected
	Social element	Stigma against infection	how anxious did you feel about the following items?	'1' = not very concerned to '5'= very concerned
		Discrimination		
		Cultural differences		

4.2 Empirical model for the analysis

This study used hierarchical regression analysis to exam the extent to which each independent variable explains the dependent variable, while controlling for other independent variables. While inputting each category into the model step by step, the correlation between the categorized independent variables and the dependent variable was analyzed. Independent variables were introduced in the following order: exogenous variables and internal factors, social influence, and external pressure. In other words, we examined the impact of the external pressure of COVID-19 on mental health while controlling for other variables. The hierarchical regression model is constructed as three steps, capturing the relationship between dependent variables ('Mental health' and 'Academic motivation and productivity', for each equation) and the preset independent variables. Here ε represents the error term, and α_0 is the constant for each equation:

$$DEPENDENT\ VARIABLE = \alpha_0 + \alpha_1 CONTROL + \alpha_2 INTERNAL\ CONDITION + \varepsilon_1 \quad \text{(eq. 1)}$$

$$DEPENDENT\ VARIABLE = \alpha_0 + \alpha_1 CONTROL + \alpha_2 INTERNAL\ CONDITION + \alpha_3 SOCIAL\ ELEMENT + \varepsilon_2 \quad \text{(eq. 2)}$$

$$DEPENDENT\ VARIABLE = \alpha_0 + \alpha_1 CONTROL + \alpha_2 INTERNAL\ CONDITION + \alpha_3 SOCIAL\ ELEMENT + \alpha_4 EXETERNAL\ PRESSURE + \varepsilon_3 \quad \text{(eq. 3)}$$

In a model where the dependent variable is 'Academic motivation and productivity', the degree of influence on 'Mental health' is included as one of the independent variables (Internal condition). SPSS version 28 was used as an analysis tool.

4.3 Methodologies

To achieve the purpose of this study, a questionnaire method was adopted. For the design of the questionnaire, a pre-interview survey was conducted with 5 students, and after some revisions and corrections, a final draft was made.

An online survey was conducted during December 2021-January 2022, a period when the COVID-19 had spread widely across Japan and was still on the rise. The survey consisted in 6 parts with a total of 60 questions, including Part 1 basic information, Part 2 individual characteristic, Part 3 impact on mental health, Part 4 impact on study and research, Part 5 career concerns, and in the Part 6, evaluation of Nagasaki University's international student support policy.

The questionnaire is written in 3 languages, including Chinese, English, and Japanese. The online link was sent by email to all international students, including undergraduate students, graduate students, research students, short-term exchange students, and language training, with help of the Office of international student.

Subsequently, to gain a deeper understanding of the results, a post-questionnaire interview was conducted in the form of a one-on-one interview with 30 students.

At the conclusion of the study, a workshop led by international students was held. International students and university officials participated in this workshop to discuss the results of this study and future directions.

5. Results

5.1 Summary of valid samples

As a result of the survey, a total of 184 samples were collected, representing 40% of all international students. The samples were selected based on the inclusion criteria that the student was enrolled in school in 2020 and was counted only if the survey was completed in full. There was a total of 162 valid samples.

(1) Academic year: 80% of respondents are graduate students, including research students. First-year master's students accounted for 19%, and other graduate students in each year ranged from 7 to 11%. The other 20% were undergraduate students. Among undergraduate students, fourth-year students accounted for the largest proportion at 7.5%.

(2) Nationality: There were 30 nationalities, with the largest number of students coming from China (48%), followed by Korea (6%), Myanmar (6%), and Vietnam (5%).

(3) Gender: The sample was nearly even as the responses consisted of 53% males, 46% females, with 1% choosing to not to respond.

(4) Residence city and living arrangement: The majority of the international students in our sample reported that they were living in Nagasaki city (87.5%), while the remaining 12.5% reported that they were living in a neighboring city. 80% of students reported that this is their first experience living independently abroad while 20% of students reported that they have lived abroad before. We found that 76% of the students reported to live alone, while 10% of the students remarked that they lived with their spouse and

children, and another 14% reported to live with some form of roommates in a dorm or a shared house.

(5) Average monthly living cost: The average monthly cost of living of respondents was about 80,000 yen in which includes living cost, housing, etc. but excludes tuition fee.

(6) Language proficiency: Nearly 70% of the students rated their Japanese-speaking competency as beginner or intermediate, while 33% ranked it as advanced, and only 1% rated it as native level.

5.2 Experience of depression due to COVID-19

In the survey, we asked students if they experienced a period of depression during the pandemic. The results showed that a surprising number of students reported experiencing depression during the pandemic, 76%, while the remaining students responded that it was not severe. In addition, students indicated how they felt during the pandemic by choosing between 20 words listed. This result is shown in the word cloud in **Figure 4**.

Half of these words presented positive feelings while the other half presented negative feelings. The results showed that students largely reported negative feelings with "***worried", "uncertainty", and "anxiety"*** being the most represented. Positive feelings such as "***relaxed", "enjoying_staying_home" and "happy,"*** appeared smaller on the word cloud, indicating that students did not experience these emotions.

Figure 4 Respondents' emotions during the pandemic (depicted by authors)

5.3 Descriptive statistics of variables

The results of the descriptive statistics of the variables are shown in **Table 2.** The normality of the variable data was tested through the statistics of skewness and kurtosis. The acceptable range of skewness and kurtosis for data to be considered approximately normally distributed is typically between -2 and 2 for each. Skewness and kurtosis for all independent and dependent variables fall within this range.

Table 2 Descriptive statistics of variables

Dependent variables		N	Avg.	SD.	Min	Max	skewness	kurtosis
Overall pandemic impact		161	3.63	1.02	1.00	5.00	-0.491	-0.060
Negative affect to study		162	3.76	1.23	1.00	5.00	-0.738	-0.407
Category	Independent variables	N	Avg.	SD.	Min	Max	skewness	kurtosis
External pressure	Border blockade	161	4.24	1.14	1.00	5.00	-1.534	1.559
	Fear of infection	162	3.48	1.28	1.00	5.00	-0.424	-0.834
	Social distance	161	3.17	1.19	1.00	5.00	-0.262	-0.766
	Nagasaki University support	154	2.88	1.50	0.00	5.00	-0.733	-0.380
Internal condition	Financial concern	163	6.81	2.55	0.00	10.00	-0.446	-0.689
	New technology	161	3.94	0.80	1.00	5.00	-0.545	0.401
	New information	161	3.71	0.86	1.00	5.00	-0.597	0.655
	Communication difficulty	162	3.18	1.33	1.00	5.00	-0.162	-1.087
	Carrier impact	155	3.05	1.45	1.00	6.00	0.974	-0.092
Social element	Stigma against infection	162	3.18	1.32	1.00	5.00	-0.157	-1.041
	Discrimination	162	3.07	1.39	1.00	5.00	-0.080	-1.161
	Cultural differences	162	3.05	1.31	1.00	5.00	-0.120	-0.965

(1) Dependent variables

When we asked international students to rate the impact of the pandemic on their mental health and their academic motivation and productivity on a 5-point scale, they reported both being moderately to very strongly affected. Specifically, the average score for the negative impact on academics was 3.76 points, which was greater than the average score for the impact on mental health (3.63).

(2) Independent variables

The highest score of impact on students' mental health was the implementation of ***border blockade*** that would have prevented their return to home country, with a high score of 4.24. Additional questions revealed that students visited their home countries only a few times per year. Despite that, through interviews, we learned that the emotions they feel in situations where they can always go and situations where they cannot go differ. Many feared the inability to visit family if an emergency occurred. The things that international students were highly worried about were their family in their home country. The top concern was the safety of their family members from infectious diseases while board was closed. This result is consistent with the results from the board blockade, showing that limitations on physical movement across boarder has a high impact on mental health.

Regarding other government measurement to take ***social distance with people*** as well as to ***avoid outside activities***, they were necessary to prohibit the spread of the infection but also caused mental health stress. This score was moderate-to-high of 3.17 and 3.12, respectively. However, ***fear of infection*** itself appeared to have a greater impact on mental health than these new social behavioral policies (average, 3.48). ***University support*** for international students was not highly evaluated for its utility, with an average of 2.88. Although lower than the fear of infection, the fear of ***being stigmatized*** if infected with COVID-19 reached a figure of 3.18.

International students' concerns about ***cultural differences (average 3.05) and prejudice/discrimination*** **against foreigners (average 3.07),** which were found to be at a moderate level. The second-highest concern among participants was a loss or reduction of earnings, the ***financial hardship***, due to pandemic of their parents and their own, with an average of 6.84. There is worry amongst some individuals that COVID-19 will drastically shift the landscape of industry. Although 14% viewed these changes in a positive light, a significant portion, 67% of students expressed reservations related to a downside, believing that the COVID-19 situation will have a greater negative impact on their ***career*** in the future (average, 3.05).

For the ***willingness to adapt new tech and gather new information***, 64% of the participants were at least "much" willing/ interested to engage with new and unfamiliar tools and technologies while switching to remote learning (average, 3.94). Likewise, a majority of the participants were at least

"much" interested in researching information online to facilitate this switch to remote learning (average, 3.71). Then, looking at the self-evaluation of ***infection status*** in Nagasaki, which was a low-to-mild infection rate in Japan, we can see that international students were not stressed that largely, as the impact on mental health was moderate-to-low at 2.47. Compared to the impact of overall infection rate in Japan and home country on people's mental health, which were 3.01 and 2.99, respectively, this score is lower for Nagasaki. staying informed and having people to help are crucial in responding to a crisis or emergency. ***Communication barrier*** was one of concern for the international students (average, 3.18). In that regard, we asked additional questions whether international students have difficulty obtaining relevant information in their preferred language (not shown in the table), the score of 'Lack of information about medical facilities in case of infection' and 'Lack of general information on COVID-19 in English or own language' were 2.99 and 2.53, relatively lower than other concerns.

5.4 Hierarchical regression analysis results

The correlation between the preset variable and mental health impact and study relating to COVID-19 were identified using a hierarchical regression analysis. As shown in **Table 3 and Table 4**, the significance probability (P) of the f value of all models is less than 0.05, so these regression models are suitable and discussed here. In addition, although not shown in the table, all models' the values of tolerance (TOL) are greater than 0.1, and the variance inflation factors (VIF) are less than 10, confirming that there was no problem of multicollinearity between variables.

(1) The impact of COVID-19 pandemic on mental health

Several explanatory variables were found to

Table 3 Hierarchical regression analysis results

Pandamic impact on mental health		MODEL 1-1				MODEL 1-2				MODEL 1-3			
		Unstandardized Coef.		Standardized Coef.	t	Unstandardized Coef.		Standardized Coef.	t	Unstandardized Coef.		Standardized Coef.	t
		B	Stderr	Beta		B	Stderr	Beta		B	Stderr	Beta	
	(Coef.)	2.396	0.495		**4.837*****	2.158	0.527		**4.097*****	1.101	0.595		**1.849***
Control	Grade	-0.003	0.025	-0.009	-0.124	0.006	0.026	0.018	0.232	-0.001	0.025	-0.003	-0.037
	Gender	0.294	0.156	0.144	**1.887***	0.310	0.157	0.151	**1.970***	0.318	0.150	0.155	**2.113****
Internal condition	Financial concern	0.119	0.033	0.293	**3.637*****	0.105	0.035	0.260	**3.013*****	0.040	0.036	0.100	1.106
	Willingness of new technology	-0.038	0.111	-0.033	-0.345	-0.036	0.112	-0.031	-0.321	-0.020	0.107	-0.017	-0.185
	Willingness of new information	-0.036	0.117	-0.029	-0.311	-0.037	0.119	-0.029	-0.308	-0.031	0.114	-0.025	-0.271
	Communication difficulty	0.176	0.060	0.230	**2.958*****	0.171	0.065	0.224	**2.626*****	0.183	0.063	0.239	**2.929*****
	Carrier impact	-0.002	0.056	-0.003	-0.036	0.012	0.056	0.017	0.210	0.043	0.055	0.060	0.780
Social element	Stigma against infection					0.016	0.078	0.020	0.200	-0.022	0.080	-0.028	-0.272
	Discrimination					-0.062	0.076	-0.085	-0.823	-0.099	0.074	-0.135	-1.352
	Cultural differences					0.127	0.079	0.162	1.606	0.085	0.077	0.109	1.104
External pressure	Border blockade									0.147	0.069	0.165	**2.115****
	Fear of infection									0.116	0.072	0.146	1.611
	Social distance									0.217	0.071	0.252	**3.043*****
	University support									-0.011	0.051	-0.016	-0.215
F(p)		**4.842*****				**3.711*****				**4.353*****			
R^2		0.189				0.207				0.306			
Adjusted R^2		0.150				0.151				0.236			

*p<0.1, **p<0.05, ***p<0.01

be significantly correlated to the impact on mental health caused by the COVID-19 pandemic. In contrast existing studies that concluded female had higher levels of COVID-19-related depression and stress, this study found that male students' mental health was more affected, showing some difficulties in gauging a specific gender vulnerability to the crisis.

While enrolling in the program doesn't demand knowledge of Japanese, numerous international students find it challenging to assimilate into Japanese society without prior familiarity with the language. The research reveals that language barriers do pose a moderate concern for students and a significant factor affecting mental health.

The social element in this study did not show a significant correlation with students' mental health. Among external factors, as confirmed by the statistical analysis, international students' mental health has been heavily related to international travel difficulties due to the border blockade. As substantial body of literature has demonstrated, this study confirmed a strong relationship between social distancing and international students' mental health.

Meanwhile, the university's support policy showed a negative relationship, meaning that it improved mental health. However, this survey not statistically significant enough to yield a conclusive result. Generally, pandemics are a source of fear and distress for everybody. However, fear of infection was not significantly associated with international students' mental health. This is consistent with the results of their self-evaluation of the level of infection in Nagasaki, in comparison to other Japanese cities and their home country was perceived as mild.

(2) The impact of COVID-19 pandemic on academic motivation and productivity

There were no external factors among the variables related to the impact of COVID-19

Table 4 Hierarchical regression analysis results

Impact on study motivation and productivity		MODEL 2-1				MODEL 2-2				MODEL 2-3			
		Unstandardized Coef.		Standardized Coef.	t	Unstandardized Coef.		Standardized Coef.	t	Unstandardized Coef.		Standardized Coef.	t
		B	Stderr	Beta		B	Stderr	Beta		B	Stderr	Beta	
	(Coef.)	0.590	0.567		1.040	0.108	0.568		0.190	-0.045	0.655		-0.069
Control	Grade	-0.037	0.027	-0.093	-1.387	-0.038	0.026	-0.096	-1.445	-0.042	0.027	-0.106	-1.530
	Gender	-0.001	0.168	0.000	-0.004	0.063	0.163	0.026	0.386	0.072	0.166	0.029	0.432
Internal condition	Financial concern	0.189	0.036	0.389	**5.212*** **	0.155	0.037	0.320	**4.234*** **	0.160	0.040	0.330	**4.022*** **
	Willingness of new technology	0.014	0.118	0.010	0.114	-0.026	0.114	-0.019	-0.228	-0.029	0.116	-0.020	-0.247
	Willingness of new information	0.169	0.124	0.113	1.364	0.240	0.121	0.159	**1.981** **	0.248	0.123	0.165	**2.009** **
	Communication difficulty	0.165	0.065	0.180	**2.536** **	0.065	0.068	0.071	0.956	0.063	0.070	0.068	0.897
	Carrier impact	-0.018	0.059	-0.021	-0.307	-0.001	0.058	-0.001	-0.018	-0.002	0.060	-0.002	-0.034
	Mental impact	0.239	0.088	0.199	**2.711*** **	0.228	0.086	0.190	**2.660*** **	0.238	0.092	0.199	**2.578** **
Social element	Stigma against infection					-0.027	0.079	-0.029	-0.339	-0.022	0.086	-0.024	-0.254
	Discrimination					0.223	0.077	0.253	**2.882*** **	0.238	0.080	0.270	**2.956*** **
	Cultural differences					0.086	0.081	0.091	1.056	0.073	0.084	0.078	0.868
External pressure	Border blockade									0.015	0.077	0.014	0.196
	Fear of infection									0.016	0.079	0.016	0.198
	Social distance									-0.054	0.080	-0.052	-0.670
	University support									0.039	0.056	0.047	0.694
F(p)		**10.513*** **				**9.693*** **				**7.025*** **			
R^2		0.369				0.431				0.435			
Adjusted R^2		0.334				0.386				0.373			

*p<0.1, **p<0.05, ***p<0.01

on academic performance. There was one significant social element correlation and three significant internal condition correlations.

The financial situation of international students is a major factor in delaying or continuing studies abroad, and previous studies have shown that exposure to financial losses is associated with immediate and long-term psychological effects. While our study did not observe the impact of deterioration of the economy due to the COVID-19 pandemic on mental health, it did reveal a strong association with a negative impact on students' academic motivation. Responding students have actively adapted to learning how to use new devices or applications and gathering new information, which will help reduce the stress caused by the change in class format and the pandemic situation. However, there was a negative correlation between students who collected a lot of information about the pandemic and their study. The overwhelming amount of information during the pandemic had negative effects on students who didn't limit their intake of it.

On the other hand, among all the variables designated as social elements, the discrimination factor was the only one that exhibited a significant relationship with study concern, which can be seen in Model 2-2 and 2-3. Although there were only a few students who were interviewed that indicated that they had felt discrimination, those previous experiences may have resulted in a negative effect.

6. Discussions and suggestions

This study aims to understand the concerns and experiences of international students during the COVID-19 pandemic, specifically impacts on student mental health and study motivation and productivity.

Nearly 75% of students surveyed exhibited symptoms of psychological distress during the pandemic, including feelings of worry, uncertainty, anxiety, and depression. The study found that the pandemic's impact on students' mental health had a knock-on effect on academic motivation and productivity. We observed that the mental health of students was largely impacted by external factors. Notably, students were most concerned about the COVID-19 situation in their home countries, given their inability to return to their home. This highlights a distinct difference between the experiences of domestic residents and foreigners. Although the university introduced various support policies in a timely manner, international students' evaluation of the usefulness of these policies was not high, and there was no significant improvement in mental health. We found during the interview that although schools provide many support groups and resources, students tend to rely on alternative communities, such as students from their home country or religious organizations. During the pandemic, social distancing was mandatory. This practice highlighted the significance of interpersonal communication. Language, being one of the key tools for communication, is vital. Therefore,

communicating in a non-native language inevitably creates some limitations.

Furthermore, the mode of expression can differ depending on the cultural background, creating more potential impediments both to communicating one's emotions and to a practitioner's ability to detect symptoms. Our study showed that communicating feelings requires emotional intelligence and empathy which surpass the language itself. Therefore, impairment of these factors can have a negative psychological impact. Given the findings indicating high levels of isolation experienced by international students and the importance of communication, providing supports like group sessions, social hours, and community outreach will be instrumental in addressing the needs of this demographic and increase psychological flexibility (Tindle et al., 2022).

It is also important to provide, student-centered, timely, and culturally competent support. The school's capacity to address voluntary gathering of foreign students would be quite limited. However, it seems useful to provide multilingual consultation for international students and provide space for mutual communication and support for international students from the same country, region or religion, to eliminate or reduce the loneliness of international students and improve the quality of life and learning abroad. In addition, there is a need to create a platform for both domestic and international students to share community information and to encourage exchanges.

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