The relationship between fear of COVID-19 and coping behaviors in Japanese university students

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ABSTRACT. COVID-19 is spreading all over the world, causing various social problems. The purpose of this study was to investigate the effects of fear of COVID-19 on the coping behavior of university students. 300 Japanese university students responded to the questionnaire. The results indicated that those who had a high fear of COVID-19 and emphasized tuning into others were more likely to adopt the coping behaviors of avoidance of contact and stockpiling, while those who emphasized self-determination were more likely to adopt the coping behaviors of avoidance of contact and focus on health care.

KEY WORDS: *Fear of COVID-19, University students, Coping behavior*

Introduction

In December 2019, a novel coronavirus (COVID-19) was discovered in the city of Wuhan in Hubei Province of China (World Health Organization, 2020b). As of June 23, 2020, COVID-19 continued to spread on a global scale, infecting more than 8,860,331 people in 216 countries and killing 465,740 individuals (World Health Organization, 2020a). On January 16, 2020, the first case of COVID-19 infection with a history of stay in Wuhan was confirmed in Japan (Minister of Health, Labour and Welfare, 2020a).

Subsequently, the number of infected people among Japanese who had not travelled to Wuhan City increased, and the infection spread throughout the country, mainly in Tokyo and Osaka. On April 16, 2020, the Japanese government declared a national state of 42 emergencies. The declaration of the state of emergency led to major changes, such as refraining from going out of the house unnecessarily, shifting to work at home, and closing schools. These social changes have made people anxious, and in Japan, people are buying a lot of face masks and sanitizers (stockpiling) (Asahi Shimbun Digital, 2020a). Due to some people stockpiling more than necessary to prevent infection, there were many people who could not get the products even though the supply should have been sufficient. In the absence of accurate information about the supply of products and effective preventive

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measures, it can be said that it is a natural reaction to become fearful and over-prepared. In fact, Yıldırım et al. (2021) showed that vulnerability, risk perception, and fear of infection increase preventive behaviors. However, this phenomenon is an issue that needs to be resolved in order to fight infectious diseases more effectively.

From the point of view of Yıldırım et al. (2021), fear is expected to have a positive aspect in terms of increasing preventive behaviors, but it cannot be denied that under certain conditions, it may increase inappropriate behaviors based on misinformation. Therefore, it is necessary to examine what factors cause inappropriate behaviors such as excessive stockpiling. In this study, we examined whether fear-induced behaviors lead to recommended coping behaviors such as hand washing and avoiding crowds, or inappropriate coping behaviors such as excessive stockpiling, focusing on the reasons for the coping behaviors. While it is difficult to change fear and risk perception, which have been pointed out to be related to preventive behaviors, the reasons for these behaviors are factors that can be easily changed by providing correct information and improving literacy. By showing that reasons mediate the effects of fear on coping behavior, it is possible to reduce the inappropriate coping behavior of over-stocking by intervening with a focus on the reasons for the behavior, even if fear is high.

Ahorsu (2020) developed the Fear of COVID-19 Scale (FCV-19S) to measure the fear of COVID-19. The reliability of this scale was confirmed in terms of internal consistency and

re-testing methods. In addition, the validity of the scale was confirmed by positive correlations with depression anxiety and awareness of vulnerability to infection. Therefore, the FCV-19S is a valid tool for assessing fear of COVID-19. And Wakashima et al. (2020) developed a Japanese version of FCV-19S and confirmed its validity and reliability. Therefore, in the present study, we used this scale to examine the effect of fear of COVID-19 on coping behavior, focusing on the reasons for the behavior.

In this study, university students were surveyed. The reason for this is that it has been pointed out that a certain number of university students are negatively affected psychologically by the Corona disaster. For example, Cao et al. (2020) indicate that about 24.9% of college students have experienced anxiety because of the COVID-19 outbreak. In addition, Shun et al. (2021) reported that 67.05% of Chinese university students exhibited traumatic stress, 46.73% depressive symptoms, 34.73% anxiety symptoms, and 19.56% suicidal thoughts while being forcibly isolated from interpersonal contact. From the above, university students are negatively affected by the coronary disaster, and it is important to understand the actual situation regarding the psychological responses shown by Japanese university students.

On the other hand, not all university students are negatively affected by the coronary disaster, and some students may be unaffected under certain conditions. Cao et al. (2020) showed that living in an urban area, living with parents, and having a stable household income inhibited the likelihood of university students experiencing

anxiety during a COVID-19 outbreak. In contrast, having relatives or acquaintances who were infected with COVID-19 was shown to increase the likelihood of experiencing anxiety. It was also shown to be associated with financial stress, social prejudice, and serious symptoms of threat to COVID-19, especially by COVID-19 (Shun et al., 2021). Furthermore, Yıldırım et al. (2021) pointed out the influence of gender on fear, indicating that women are more vulnerable to infection, higher perceived risk, higher fear, and more preventive behaviors than men. Until now, there has been no study that has investigated the actual state of fear of COVID-19 in Japanese university students. In the present study, we examined the effects of fear of COVID-19 on coping behaviors, focusing on the reasons for the behaviors, among Japanese university students. We also examined the conditions that inhibit or enhance fear.

Methods

Procedure

The study used an internet-based survey based on Survey Monkey. Informed consent was provided through an online text. The first section of the survey stated the purpose of the survey, that participation was voluntary, and that the survey was anonymous and personal information would not be disclosed to third parties. After confirming everything about the survey description, they were asked if they agreed to cooperate with the survey. Only those who agreed to cooperate in the survey would be able to proceed to the questionnaire. On the other hand, those who did not agree were

terminated from the survey. Those who withdrew from responding to the survey were also excluded from the survey.

The participants included six whose nationality was not Japanese and one whose age was over 50 years old. Seven individuals were excluded from the analysis in this study because differences in nationality and a large age gap were thought to reduce the homogeneity of the sample. The respondents of the analysis (52 men and 248 women) were in their 18 to 20s with an average age of 19.80 years ($SD = 1.36$) and were Japanese undergraduate and graduate students living in Japan. All had agreed to cooperate with the survey. The survey questionnaire was administered in May 10 and June 14, 2020.

Ethical Consideration

The first section of the survey stated the purpose of the survey, that participation was voluntary, and that the survey was anonymous and personal information would not be disclosed to third parties. Additionally, the Tohoku University Graduate School of Education's ethics committee granted ethical approval for this study (ID: 20-1-003).

Survey Description

Attributes of the respondents: The survey questionnaire asked the sex, age, nationality, and residential area (city and prefecture) of each respondent as a free answer. This item was followed by a multiple-choice question asking about the respondents' health condition at the time, which allowed for responses of 1 = "in normal condition," 2 = "having a fever of 37.5°C or higher," 3 = "having a sore throat," 4 = "having a deep fatigue," 5 = "having a cough,"

and 6 = "having other symptoms" (Minister of Health, Labour and Welfare, 2020b). The subsequent analysis combined answers that included at least one from choices 3 through 6 into one group and made three groups, including 1 = "in normal condition," 2 = "having a fever of 37.5° or higher," and 3 = "having other symptoms." The next question categorized the diseases being treated at the time into respiratory diseases, mental disorders (anxiety disorder, depression, and other mental disorders), and other diseases. Respondents who reported having a disease were asked to provide the name of the disease using an open-ended questionnaire, and based on this information, they were classified into three categories: 1=respiratory, 2=mental, and 3=other. Those who reported an illness but did not respond appropriately to the disease under treatment, such as "none" in the open-ended answer, were coded as 0. Subsequent questions asked all respondents whether they smoked. All respondents to this survey were Japanese university students. The analysis used sex, age, health condition, disease status, and smoke status at the time as their attributes.

The state of university and life style: Participants responded to the following questions about their university and lifestyle. They were asked about the timing of the start of university classes, the format of university classes, their readiness to take online classes, main means of transportation, their exercise habits, and their waking and sleeping times. Respondents responded to the three items "I have the necessary environment to study," "I am

financially deprived," and "I am satisfied with the support I am receiving from the university" on a scale of 1="not at all" to 5="very satisfied". The analysis used format of university classes, main means of transportation as their state of university and life style.

Family composition: Respondents were asked about the number of family members living with them, their relation to the respondents, their ages, whether they had respiratory or other diseases, their smoking history, and their pregnancy status (only female family members living with the respondents). In addition, the respondents were asked about changes in the amount of conversations and conflict of opinions in the family living together in the last month. The analysis used format of whether they live with family as their state of family.

Sources of information about COVID-19: Respondents were asked a multiple-choice question about media that they regarded as a valuable source of information about COVID-19. They were also asked to rank such information sources from the first to the third based on their importance. Specific sources of information indicated in the answers were 1= newspaper, 2 = news on TV, 3 = talk shows on television, 4 = websites of public organizations, 5 = news on the internet, 6 = Twitter, 7 = Facebook, 8 = Instagram, 9 = other social networking services ("SNS"), and 10 = other media. The analysis used only the most prioritized information sources and combined choices 6–9 into a single group called "SNS".

Presence of persons infected with COVID-19 around the respondents: Respondents were

asked whether anyone with whom they were acquainted had contracted COVID-19. Any respondent acquainted with an infected person was asked to describe their relationship. To assess the status of COVID-19 infection around the respondents, the survey asked whether an infected person was 1 = "in the same prefecture," 2 = "in the same municipality," or 3 = "in the same district" as the respondents or 4 = no one was infected around them. The analysis combined answers 1 through 3 into one group and labelled it 1 = "there is an infected person nearby," and those who answered 4 labelled as 0 = "there is no infected person nearby."

Measuring a fear of COVID-19: The study used a Japanese version of the Fear of COVID-19 Scale ("FCV-19S-J") developed by Wakashima et al. (2020). The Japanese version of the scale that was completed consisted of seven items in the same manner as the original. FCV-19S-J asks questions to be answered on a scale of 1 = "I am not afraid of COVID-19 at all" to 5 = "I am most afraid of COVID-19." A higher score reflects a greater fear of COVID-19.

Coping behavior against COVID-19: Respondents were asked about their coping behavior against COVID-19. Wakashima et al. (2020) produced 19 items to measure the coping behavior against COVID-19 based on the report of the Ministry of Health, Labour and Welfare (2020c) and article on social issues (Asahi Shimbun Digital, 2020b). In this study, we used the 19 items developed by Wakashima et al. (2020) as a scale of coping behavior against COVID-19. Each of these 19 items was rated on a six-point scale ranging from 1 (not at all) to 6

(very much). The coping behaviors against COVID-19 measured by these items include behaviors to prevent oneself from being infected and to prevent others from being infected, as well as behaviors necessary for daily life in the event of coronary disasters.

Reason for behavior: Respondents were asked about reason for coping behavior against COVID-19. Wakashima et al. (2020) produced 7 items to measure the reason for the coping behavior against COVID-19 based on two perspectives which one is proactive reasons (e.g., "I did it because I felt it was necessary for myself") and another one is passive reasons (e.g., "I did it because other people told me to"). Each of these 7 items was rated on a six-point scale ranging from 1 (not applicable at all) to 6 (highly applicable). These items asked respondents to give reasons for their coping behavior toward COVID-19 in general. Therefore, the respondents did not answer the reasons for each coping behavior, but answered the seven items that asked for reasons once.

Data analysis

Statistical operations were conducted using software (SPSS 23.0 and JASP 0.12.2). For confirmatory factor analysis (CFA), a robust maximum likelihood estimator (MLR) was applied in this study. To test goodness of fit, we conducted the following analyses: comparative fit index (CFI), root mean square error of approximation (RMSEA), standardized root mean square residual (SRMR) and Bayesian information criterion (BIC). The cut-off values for acceptable model fit used for this study were: RMSEA < .10 for acceptable fit and < .06 for

good fit; CFI > .90 for acceptable fit and >.95 for good fit; and SRMR < .10 for acceptable fit and < .08 for good fit (Hu and Bentler, 1999; Kline, 2011). In exploratory factor analyses (EFA), MLR and goemin rotation was applied for coping behavior and reason for behavior. We removed items with factor loadings lower than .35. Cronbach's alpha coefficients, McDonald's omega coefficients, and correlations between the FCV-19S-J and other measures were established by calculating Pearson's correlation coefficients. Reported effect sizes are interpreted using Cohen's d and η^2 , including 95% confidence intervals, respectively. All statistical analyses used two-tailed tests. For all statistical evaluations, p values less than .05 were considered indicative of significant differences. The missing values were visible only in age. Therefore, pairwise deletion was used for missing data.

Results

Reliability and validity of Japanese FCV-19S-J for university student

Confirmatory factor analyses, as described by Ahorsu et al. (2020), were used to examine the goodness of fit. Results showed that the FCV-19S-J did not fit well (Table 1).

To improve the model fit, modification indices (MIs) were used. The MI between items 1 and 4 (MI = 43.30), between items 3 and 6 (MI = 28.46) were higher values and between items 2 and 5 (MI = 16.55) were higher values. Therefore, a within factor error-covariance between items 1 and 4, between items 3 and 6, between items 2 and 5 (Model 2) was included.

Results indicated that the modified model (Model 2) was more acceptable (CFI = .960, RMSEA = .098, SRMR = .053). This was the final model. The reliability coefficients were also high (α = .84) and indicated sufficient internal consistency.

Participants' basic characteristics

Table 2 shows participants' basic characteristics. The present study had 300 participants, mostly women (82%). The results of the t-test and one-way analysis of variance

showed that women scored higher on the FCV-19S-J than men. This indicates that women have a stronger fear of COVID-19. As for corona-related symptoms, no one has a fever of 37.5°C or higher, and those who reported having other symptoms also had a low percentage (4.3%). 95.7% of people are as usual, and the impact of COVID-19 on physical condition among university students is limited. No significant differences were obtained for fear of COVID-19 due to symptoms. Regarding the disease under treatment, 92.3% of the respondents answered "None", 2.3% for "Respiratory", 1.7% for "Mental", and 3.7% for "Other". There was significant difference in fear of COVID-19 by disease under treatment. However, the results of multiple comparisons showed no significant differences between the disease groups. With regard to smoking status, 4.3% of the respondents were smokers and 95.7% were non-smokers. There was no significant difference in fear of COVID-19 by status of smoke. As of late May, 15.3% of the students were taking face-to-face classes. This indicates that many students were participating

Table 1. Factor Loadings for the FCV-19S-J

Items	Factor loadings	
	Model 1	Model 2
FCV-19S-J($\alpha=.84$ / $\omega=.86$)		
1 I am most afraid of coronavirus-19.	.545	.504
2 It makes me uncomfortable to think about coronavirus-19.	.815	.781
3 My hands become clammy when I think about coronavirus-19.	.543	.545
4 I am afraid of losing my life because of coronavirus-19.	.539	.493
5 When watching news and stories about coronavirus-19 on social media, I become nervous or anxious.	.778	.713
6 I cannot sleep because I'm worrying about getting coronavirus-19.	.507	.507
7 My heart races or palpitates when I think about getting coronavirus-19.	.780	.813
	χ^2	120.121***
	df	14
	CFI	0.868
	RMSEA	0.159
	90% CI	0.133-0.186
	SRMR	0.078
	BIC	5186.178

Note: CFI, comparative fit; RMSEA, root mean square error of approximation; SRMR, standardized root mean square residual; and BIC, Bayesian information criterion; *** $p < .001$

in the classes online. There was no significant difference in fear of COVID-19 by class format. There were also no significant differences in the main means of transportation. Regarding the type of residence, 33.3% of the participants lived with their family and 66.9% did not live with their family. There was no significant difference in fear of COVID-19 according to the type of

residence. The most important sources of information are news on TV at 44.3%, websites of public organizations at 25.3%, and social networking sites at 10%. There was no significant difference in fear of COVID-19 by the most important sources of information. Only 1% of the respondents knew someone who had been infected with the COVID-19, and most of

			FCV-19-J			
	<i>N</i> =300	%	<i>Mean</i>	<i>SD</i>	Statistics	Effect Size
Gender						
1= Men	52	17.3%	2.63	0.70	<i>t</i> (298)=4.39***	<i>d</i> =0.67
0= Women	248	82.7%	2.17	0.64		
Symptom						
0= Normal condition	287	95.7%	2.57	0.71	<i>t</i> (298)=1.69 n.s.	<i>d</i> =0.48
1= Having fever	0	0%	-	-		
2= Having other symptom	13	4.3%	2.23	0.63		
Disease						
0= Nothing	276	92.0%	2.58	0.71	<i>F</i> (3, 296)=2.70*	η^2 =0.03
1= Respiratory	7	2.3%	2.12	0.74		
2= Mental	5	1.7%	2.69	0.59		
3= Others	12	4.0%	2.12	0.53		
Smoke						
1= Yes	13	4.3%	2.53	0.63	<i>t</i> (289)=1.57 n.s.	<i>d</i> =0.45
0= No	287	95.7%	2.57	0.71		
Class Format						
1= Including face to face	46	15.3%	2.70	0.72	<i>t</i> (298)=-1.53 n.s.	<i>d</i> =-0.24
0= Not including face to	254	84.7%	2.53	0.63		
Main Means of Transport						
1= Public transport	113	38.2%	2.54	0.67	<i>t</i> (298)=-1.53 n.s.	
0= Other means	183	61.8%	2.54	0.75		
Type of Residence						
1= Living with family	200	33.3%	2.54	0.75	<i>t</i> (298)=0.27 n.s.	<i>d</i> =0.03
0= Not living with family	100	66.7%	2.56	0.67		
The most important source of information						
1= Newspaper	25	8.3%	2.82	0.78	<i>F</i> (5, 294)=1.79 n.s.	η^2 =0.03
2= News on TV	133	44.3%	2.55	0.67		
3= Talk shows on	15	5.0%	2.65	0.87		
4= Websites of public	76	25.3%	2.56	0.68		
5= News on the internet	21	7.0%	2.21	0.75		
6= SNS	30	10.0%	2.53	0.71		
Infection of an acquaintance						
1= Yes	3	1.0%	2.43	1.00	<i>t</i> (298)=.31 n.s.	<i>d</i> =0.18
0= No	297	99.0%	2.56	0.71		

Note: "n.s." means "not significant," * $p < .05$, *** $p < .001$

them (99%) did not know anyone who had been infected with the COVID-19. There was no significant difference in fear of COVID-19 according to the existence of a corona-infected acquaintance.

Effects of coronal anxiety on coping behavior

A factor analysis was conducted of coping behaviors and the reasons for these behaviors. Results show that 14 items from three factors were extracted for coping behavior (Table 3); 6 items from two factors were extracted for reasons for the behavior (Table 4).

Three factors were identified for coping behavior: contact avoidance, consisting of items such as "Avoided places with large crowds"; focus on health care, consisting of items such as "Monitored health condition more carefully than before"; and stockpiling, consisting of items such as "Purchased food in larger quantities than usual". The factor structure of the coping behaviors showed an acceptable fit and the reliability of each factor was satisfactory. Two factors were identified for reason for behavior: Tuning into others, consisting of items such as "I followed other people"; and Self-determination, consisting of items such as "I did it because I felt it was necessary for myself". The factor structure of the coping behaviors showed a good model fit and the reliability of each factor was acceptable. The descriptive statistics of these scales are presented in Table 5.

To examine direct and indirect effects of fear of COVID-19 on coping behavior mediated by reason for these behaviors, the bootstrap method (bootstrap sample size 5000) conducted with PROCESS v2.16.1 created by Preacher et al.

(2007). The results are shown in Table 6. According to Murayama (2007), the indirect effect is considered significant when the 95% confidence interval obtained from the bootstrap method does not include zero. As a result, FCV-19S-J showed a direct effect on the avoidance of contact and an indirect effect mediated by tuning into others and self-determination. As a result, FCV-19S-J showed a direct effect on the avoidance of contact and an indirect effect mediated by tuning into others and self-determination. FCV-19S-J showed a direct effect on the focus on health care and an indirect effect mediated by self-determination. FCV-19S-J showed a direct effect on the stockpiling and an indirect effect mediated by confirming behavior.

Discussion

This study examined the reliability and validity of the Japanese version of the FCV-19S for university students in Japan in order to examine the effects of fear of COVID-19 on coping behavior, focusing on the reasons for the behavior. As in Ahorsu et al. (2020), the results of factor analysis indicated a single factor structure. The α coefficient and ω coefficient in FCV-19S-J returned sufficient values, which suggests adequate reliability and validity. In FCV-19S-J, the goodness of fit was made an acceptable value by assuming an error correlation between items 1 and 4, between items 3 and 6, between items 2 and 5.

The average FCV score of Japanese university students was 2.55. On the other hand, in a survey of Spanish university students by Martínez-

Table 3. Factor Loadings for the coping behavior

Items	Factor loadings		
	F1	F2	F3
F1 Avoidance of contact ($\alpha=.79$ / $\omega=.80$)			
2 Avoided places with large crowds.	.970	-.160	-.026
1 Avoided places with poor ventilation.	.729	-.005	.072
3 Avoided having a conversation or utterance in proximity to another person.	.666	.030	.054
16 Refrained from eating out.	.351	.246	.000
F2 Focus on health care ($\alpha=.71$ / $\omega=.75$)			
10 Monitored health condition more carefully than before.	.081	.629	.107
19 Voluntarily collected information.	-.087	.629	.107
4 My heart races or palpitates when I think about getting coronavirus-19.	.240	.547	-.124
5 Washed hands, gargled, or sanitized hands and fingers using alcohol.	.188	.485	-.058
14 Concentrated on what you needed to do such as work and study.	.026	.462	-.023
17 Sought connection with others through SNS or the Internet.	-.190	.450	.127
15 Did something you liked that you were able to do at home	.022	.444	-.088
9 Observed changes in your health condition by measuring body temperature, etc.	-.033	.404	.083
F3 Stockpiling ($\alpha=.91$ / $\omega=.91$)			
8 Purchased food in larger quantities than usual.	.028	-.007	.988
7 Purchased commodities in larger quantities than usual.	.032	.028	.815
	F1	-	
	F2	.621	-
	F3	.282	.313
			-
	χ^2	211.432***	
	df	74	
	CFI	0.901	
	RMSEA	0.079	
	90% CI	0.066-0.091	
	SRMR	0.062	
	BIC	12472.544	

Note: CFI, comparative fit; RMSEA, root mean square error of approximation; SRMR, standardized root mean square residual; and BIC, Bayesian information criterion; *** $p < .001$

Table 4. Factor Loadings for the reason for behavior

Items	Factor loadings	
	F1	F2
F1 Tuning into others ($\alpha=.76$ / $\omega=.75$)		
4 I followed other people.	.816	-.084
5 I did it because other people told me to.	.741	-.014
6 I did it out of a fear of criticism that would be raised by other people.	.576	-.010
F2 Self-determination ($\alpha=.59$ / $\omega=.64$)		
1 I did it because I felt it was necessary for myself.	-.002	.771
3 I did it based on my own decision.	-.259	.604
7 Doing it made me feel secure.	.218	.416
	F1	-
	F2	-.065
	χ^2	37.753***
	df	8
	CFI	0.916
	RMSEA	0.111
	90% CI	0.077-0.148
	SRMR	0.092
	BIC	5598.676

Note: CFI, comparative fit; RMSEA, root mean square error of approximation; SRMR, standardized root mean square residual; and BIC, Bayesian information criterion;

*** $p < .001$

Table 5. Descriptive statistics of the scale

	<i>Mean</i>	<i>SD</i>	<i>Min</i>	<i>Max</i>
FCV-19-J	2.55	.71	1.00	4.57
Coping behavior				
Avoidance of contact	4.91	.94	1.00	6.00
Focus on health care	4.60	.71	1.00	6.00
Stockpiling	3.50	1.43	1.00	6.00
Reason for behavior				
Tuning into others	3.33	1.10	1.00	6.00
Self-determination	4.40	.86	1.00	6.00

Lorca, et al. (2020), the average FCV score was 2.40. In this survey, 82% of the respondents were female and 18% were male, which is roughly the same composition as the gender ratio in this study, so it can be said that Japanese university students tend to be slightly higher than their Spanish counterparts. In addition, a survey conducted in Spain and the Dominican Republic, covering a wide range of generation groups, found that the average FCV was 2.17. In this survey, 26.8% of the respondents were males and 73.2% were females, which is similar to the ratio of males and females in the present survey, so it can be said that Japanese university students tend to have a slightly higher FCV. On the other hand, in a survey by Wakashima et al. (2020), which covered a wide range of generations in Japan, the average score for FCV was 3.04. Since there were more males and females in this survey (65% and 35%, respectively), it is not possible to make a simple

comparison with this survey, but it is apparent that Japanese university students are less fearful than other generations. As we have seen above, the fear of university students in Japan tends to be low, but Japan as a whole tends to have a high level of fear compared to other countries. It should be noted that the above discussion is not a statistical study. It is necessary to compare the tendency of fear among Japanese university students using statistical methods, and this is an issue for the future.

In order to also examine the conditions that inhibit or enhance the fear of university students, the factors influencing the fear of COVID-19 was investigated by t-test and analysis of variance. The results showed that women had a higher fear of COVID-19. As already mentioned, Yıldırım et al. (2021) showed that vulnerability, risk perception, and fear of infection increase preventive behaviors. Also, depressive symptoms in adolescent and adult females are higher than in males (Oliver & Simmons, 1985), and females are known to be at higher risk for post-traumatic stress disorder than males (Weems et al., 2010). These findings suggest that women were more emotionally affected by stress situations than men, and therefore women demonstrated a more intense fear of COVID-19.

However, the fear scores did not indicate a significant difference based on other factors such as the symptom, disease, smoke, class format, main means of transport, source of information, whether they lived with their family, and whether they knew of an infected acquaintance. Cao et al. (2020) reported that having a family member or acquaintance

Table 6. The direct and indirect effects of FCV-19-J on coping behavior

Independent variable	Mediating variable	Dependent variable	Effect size	SE	95% CI	
	=====>		.198	.096	.010	.387
FCV-19S-J	=> Tuning into others =>	Avoidance of contact	.029	.021	.001	.089
	=> Self-determination =>		.111	.040	.043	.200
	=====>		.218	.051	.117	.319
FCV-19S-J	=> Tuning into others =>	Focus on health care	.014	.011	-.0002	.047
	=> Self-determination =>		.072	.026	.029	.135
	=====>		.362	.115	.136	.589
FCV-19S-J	=> Tuning into others =>	Stockpiling	.039	.025	.005	.112
	=> Self-determination =>		.032	.024	-.005	.097

infected with COVID-19 would raise people's anxiety and that living with parents would help reduce their anxiety. They also showed that financial stress, social prejudice, and threats to COVID-19 were associated with serious psychiatric symptoms (Shun et al., 2021). The results of this study and those reported by Cao et al. (2020) and Shun et al. (2021) showed different results. The reasons for the different results include differences in the attributes of culture and social conditions. In particular, the COVID-19 infection situation in Japan was not as severe as in China, and restrictions on going out were not mandatory. It is possible that some people living alone may not have chosen to live with their families because of their low fear of COVID-19. On the other hand, people who wanted to live with their families but could not live with them due to various restrictions may

continue to have high levels of fear of COVID-19. While there were many students like the latter in China, there was a certain percentage of students like the former in Japan. In summary, although we cannot exclude the possibility that family members could be a factor in suppressing fear of COVID-19, there was no effect in Japan because a certain number of people did not choose to live with family members due to a low level of fear. It is also possible that the situation of infection in Japan was improving at the time this study was conducted, and therefore the need for family support may not have been high. The effects of these factors might explain the slight difference in the level of a fear of COVID-19 held among the respondents in this study despite their varying attributes.

To assess the impact of a fear of COVID-19 on people's coping behavior, this study

examined effect of a fear of COVID-19 on three types of coping behaviors, including avoidance of contact, focus on health care, and stockpiling, mediated by two reasons for behaviors, including self-determination and tuning to others. These results showed that fear of COVID-19 had a direct impact on all coping behaviors. Intense fear of COVID-19 increases any coping behavior. This supports the report by Yıldırım et al. (2021) that vulnerability, risk perception, and fear of infection increase preventive behaviors, and a strong fear of COVID-19 increases all coping behaviors. On the other hand, tuning into others is a mediating effect on an avoidance of contact and stockpiling. In addition, self-determination showed a mediating effect on avoidance of contact and focus on health care. Tuning into others is unique for increasing stockpiling. Among the reasons for such behavior, a fear of COVID-19 propelled the act of stockpiling on goods through the act of tuning to others. Therefore, it is expected that people with high tuning into others are more likely to be actively engaged in stockpiling because they are strongly influenced by others. In contrast, self-determination is unique in enhancing focus on health care. People with higher self-determination are more likely to increase their focus on health care because of the importance they place on their own judgmental criteria. Such findings imply that avoidance of contact and focus on health care might be instigated voluntarily in some cases and by fear in other cases. The conclusions of this study indicate that the influence of fear on coping behavior is mediated by reasons. In particular,

coping behaviors based on reasons of tuning in to others may lead to inappropriate behaviors such as stockpiling. Conversely, coping behaviors based on self-determination may lead to effective preventive behaviors such as managing one's own health. Therefore, even if the fear of COVID-19 was high, it was suggested that refraining from behaviors based on tuning in to others and promoting behaviors based on self-determination might inhibit inappropriate coping behaviors such as excessive stockpiling and promote appropriate coping behaviors such as hand washing.

There is a need to examine in more detail when the fears of university students become problematic. For example, when fear exceeds a certain threshold, negative effects may be more likely to occur. It is necessary to examine in detail when fear causes problems, rather than just fear as a problem. In addition, it is necessary to compare the fears of university students with those of other groups. Fear among Japanese university students tends to be somewhat higher than in other countries and lower than in other generations in Japan. In this way, it is important to understand the characteristics of the target population and to implement infection prevention measures accordingly.

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