

Impact of Internet-Based Cognitive Behavioral Therapy on University Students' Mental Health and Loneliness During COVID-19 Self-Isolation

Takashi Ohue

Graduate School of Health Sciences and Faculty of Health Sciences, Okayama university, Japan

How to cite this article: Takashi Ohue. Impact of Internet-Based Cognitive Behavioral Therapy on University Students' Mental Health and Loneliness During COVID-19 Self-Isolation. *International Journal of Nursing Education* / Vol. 17 No. 3, July-September 2025.

Abstract

Background: This study examined the effectiveness of an internet-based cognitive behavior therapy (iCBT) in alleviating loneliness and mental health issues in university students during the COVID-19 pandemic.

Methods: An iCBT program was developed and implemented with 186 students from August 2020 to February 2021. It included a 30-minute psychoeducation video created on YouTube and the column method to assess cognitive restructuring. The participants completed five columns over seven days using the university's academic information system. The evaluation tools included PHQ-9, GAD-7, and UCLA Loneliness Scale for depression, anxiety, and loneliness, respectively, and IES-R scales measuring decreases in academic and class motivation. The participants were randomly assigned to the intervention group and the control groups.

Results: The intervention group showed significantly lower scores than the control group in "Intrusion symptoms," "Avoidance symptoms," "Hyper-arousal," "PTSD," "depression," "anxiety," and "loneliness." Additionally, significant improvements were observed in the intervention group's "depression," "loneliness," and "decreased learning motivation," including "decline in class motivation" and "total decline in learning motivation" after the intervention.

Conclusion: These results demonstrated that the iCBT intervention effectively reduced loneliness, PTSD symptoms, depression, and anxiety, and also enhanced learning motivation. Thus, iCBT may effectively alleviate loneliness and mental health issues associated with self-isolation during pandemics.

Keywords: COVID-19, student mental health, loneliness, internet cognitive behavioral therapy (iCBT)

Introduction

In December 2019, cases of pneumonia caused by a novel coronavirus were first reported in Wuhan, China. Subsequently, the World Health Organization (WHO) declared it a "Public Health Emergency of

International Concern" on January 30, 2020, and a pandemic on March 11, 2020¹. Consequently, universities were forced to adopt self-isolation measures and conduct online classes. Various issues unique to the remote format were highlighted, such

Corresponding Author: Takashi Ohue, Graduate School of Health Sciences and Faculty of Health Sciences, Okayama university, Japan.

E-mail: t-ohue@okayama-u.ac.jp

Submission date: May 22, 2025

Revision date: July 1, 2025

Published date: July 30, 2025

This is an Open Access journal, and articles are distributed under a Creative Commons license- CC BY-NC 4.0 DEED. This license permits the use, distribution, and reproduction of the work in any medium, provided that proper citation is given to the original work and its source. It allows for attribution, non-commercial use, and the creation of derivative work.

as the need for proper communication infrastructure, confusion with the first-time online learning experience, and the burden of numerous assignments and information processing. Additionally, restrictions on-campus access reduced opportunities for social interactions with friends. Self-isolation and online classes during the COVID-19 exacerbated loneliness among university students. Moreover, students have been identified as a high-risk group for mental health issues globally.

The COVID-19 pandemic significantly impacted the mental health of university students worldwide. Research has shown that various stressors, including fear of infection, academic anxiety, and social constraints, contributed to psychological distress among students. For instance, Cao et al.² found that Chinese university students experienced heightened anxiety due to concerns about infection and academic pressure. Similarly, Wang et al.³ highlighted that uncertainty and stress during the early stages of the pandemic had a direct impact on students' mental health. In the United States, Son et al.⁴ identified economic concerns and the transition to online learning as key factors affecting students' psychological well-being. Meanwhile, Elmer et al.⁵ examined changes in university students' social networks and suggested that increased social constraints negatively influenced mental health.

Similar trends were observed in Japan, where Takahashi et al.⁶ reported findings consistent with those in other countries. Furthermore, Oe⁷ identified a link between loneliness and decreased motivation for learning. Among nursing students, Masuda et al.⁸ found that stress was closely related to psychological health during the COVID-19 response period. These findings align with Ochiai's⁹ assertion that university students, being in a critical stage of adolescence, are particularly vulnerable to loneliness—an emotion that plays a fundamental role in their psychological development. Given this, addressing loneliness appears to be crucial for improving students' mental well-being during the pandemic.

Additionally, from a psychiatric nursing perspective, the prolonged social isolation and increased screen time due to online classes may have heightened risks of de-pressive symptoms, emotional exhaustion, and sleep disturbances

among students. The lack of face-to-face interactions with peers and faculty could have also exacerbated feelings of alienation, reducing opportunities for emotional support. Psychiatric nursing emphasizes the importance of early identification of mental health issues, timely interventions, and fostering resilience through structured support systems, which are crucial in mitigating the long-term psychological effects of the pandemic on students.

To mitigate loneliness, various interventions have been explored. A meta-analysis by Masi et al.¹⁰ evaluated multiple approaches, including social skills training, social support enhancement, increased interpersonal contact, and cognitive behavioral therapy (CBT). Among these, CBT demonstrated the most significant effect size in randomized controlled trials. However, due to the risks associated with face-to-face inter-actions during the pandemic, internet-based CBT (iCBT) emerged as a viable alternative. Seewer et al.¹¹ reported the effectiveness of iCBT in addressing loneliness, suggesting that it could help alleviate feelings of isolation among university students who were forced to stay home due to state-of-emergency measures during the COVID-19 pandemic. Zhou et al.¹² defined iCBT as a digital intervention grounded in CBT principles, delivered through online platforms. In Japan, Kobayashi et al.¹³ highlighted the accessibility of iCBT, noting that it overcomes geographic and economic barriers. This characteristic made iCBT particularly valuable during the pandemic, as it enabled re-mote mental health interventions while maintaining infection control measures.

Despite the growing use of iCBT, no studies have specifically examined its effectiveness in addressing the mental health challenges faced by university students in Japan during the COVID-19 pandemic. To bridge this gap, the present study aims to investigate the impact of iCBT on alleviating loneliness and psychological distress associated with self-isolation among university students.

Methods

1. Design

This study was designed as a non-randomized controlled trial (NRCT)

Trial registration: This non-randomized controlled trial was prospectively registered in the UMIN Clinical Trials Registry (UMIN000058274).

2. Research Question

How effective is iCBT in alleviating loneliness and reducing mental health issues associated with self-isolation during the COVID-19 pandemic?

3. Participants(Fig. 1)

A total of 1880 university students in Japan were invited to participate, and 186 consented. Students staying home due to the COVID-19 pandemic were included, while those with mental disorders were excluded. Forty-three students who completed both pre- and post-intervention questionnaires and participated in the cognitive restructuring method were assigned to the intervention group; another 43 formed the control group. The final sample size was 86. Questionnaire collection was difficult due to the pandemic.

The sample size was 86, with tolerance (5%), response rate (30%), and confidence (95%). Notably, it was challenging to collect questionnaire responses owing to the impact of the pandemic.

1. Inclusion and Exclusion Criteria

Inclusion Criteria

1. Enrollment Status: Currently enrolled as undergraduate or graduate students at a university.
2. Age: Aged 18 years or older.
3. Language Proficiency: Able to read and understand the language in which the intervention materials and assessments were provided.
4. Access to Technology: Had regular access to the internet and a compatible device (computer, tablet, or smartphone) for participating in the online iCBT program.
5. COVID-19 Self-Isolation: Currently experiencing or had experienced a period of self-isolation due to COVID-19 restrictions within the past 6 months.
6. Consent: Provided informed consent to participate in the study.

Exclusion Criteria

1. Severe Psychiatric Conditions: Current diagnosis of a severe mental disorder (e.g., schizophrenia, bipolar disorder) or active suicidal ideation requiring immediate clinical intervention.
2. Concurrent Psychological Treatment: Currently receiving psychotherapy or counseling for mental health issues.
3. Substance Abuse: Evidence of moderate to severe substance use disorder.
4. Inability to Commit: Unwilling or unable to complete the study assessments or the full duration of the iCBT program.

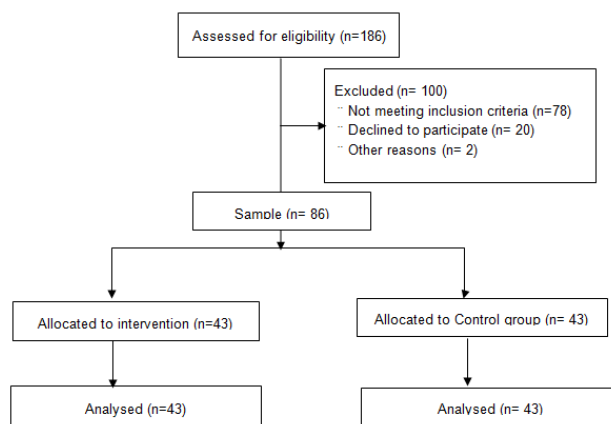


Fig 1: Participant

5. Instruments

i) The iCBT Program

The program was conducted from August 2020 to February 2021 and advertised on the university website. As one of the intervention methods for addressing loneliness, Burns 14 highlights cognitive therapy; thus, cognitive restructuring using the column method was employed. Face-to-face CBT posed the risk of infection; hence, inter-net-based cognitive behavioral therapy (iCBT) was utilized. The program development was based on a model proposed by Noguchi et al.¹⁵. Initially, a 30-min psychoeducation video was created on YouTube. This video explained the mental health risks to college students due to COVID-19, emphasized the need for mental health support, and introduced the concept of cognitive restructuring. Cognitive restructuring was conducted using the column method. Using the university's educational information system, five columns (thought record sheets) were created. Participants were instructed to record the following:

“Event causing mood decline,” “Emotions felt at that time (intensity 0-100),” “Thoughts at that time,” “More adaptive thoughts,” and “Change in emotions (intensity 0-100).” The records for these five columns were created for seven days. The participants completed the five columns using their smartphones or computers at home.

ii) The Survey

Participants’ demographic information was collected regarding their age, gender, department, and academic year. The Patient Health Questionnaire-9 (PHQ-9), consisting of nine items rated on a four-point scale (0-3), based on the frequency of symptoms over the past two weeks, was used to diagnose and assess the severity of depression. The Generalized Anxiety Disorder-7 (GAD-7), consisting of seven items rated on a four-point scale (0-3), based on the frequency of symptoms over the past two weeks, was used to evaluate symptoms of generalized anxiety disorder¹⁶. The Impact of Event Scale-Revised (IES-R), consisting of 22 items rated on a five-point scale, assessing the intensity of symptoms over the past week, was used to measure post-traumatic stress disorder (PTSD) symptoms. The UCLA Loneliness Scale developed by Russell et al.¹⁷, consisting of 20 items rated on a four-point scale, was used to assess loneliness. Subscales from the Motivation Decrease Scale, developed by Shimoyama¹⁸, were used to measure decreases in academic and class motivation. Each subscale consisted of five items rated on a five-point scale.

The PHQ-9 and GAD-7 were used with

permission, whereas the IES-R could be used without permission for research purposes¹⁹.

6. Data Collection

The video on CBT was uploaded to the university’s online platform. Additionally, each assessment scale used as an evaluation metric was made available online through Google Forms to allow participants to respond online. Furthermore, a five-column method was implemented using Google Forms to request participants to record their thoughts.

7. Ethical Considerations

This research was conducted in accordance with the Ethical principles of the re-revised Helsinki Declaration. This study was approved by the University of Hyogo University Ethics Review Committee (No. 20003).

Results

Demographic factors (Table 1):

Demographic data was obtained from 86 participants (21 boys and 68 girls). The distribution of students was as follows: 1st year (54 students, 62.8%), 2nd year (13 students, 15.1%), 3rd year (10 students, 11.6%), and 4th year (9 students, 10.5%). The age distribution was as follows: 18 years (26 students, 30.2%), 19 years (25 students, 29.1%), 20 years (18 students, 20.9%), 21 years (11 students, 12.8%), 22 years (5 students, 5.8%), and 23 years (1 student, 1.2%).

Table 1: Demographic Factors

	N	%		N	%
Gender			Year		
Male	21	24.4	Freshman	54	62.8
Female	68	79.1	Sophomore	13	15.1
			Junior	10	11.6
Department			Senior	9	10.5
Business Department	14	16.3	Age		
Nutrition Management Department	18	20.9	18 years old	26	30.2
Health Systems Department	7	8.1	19 years old	25	29.1
Nursing Department	22	25.6	20 years old	18	20.9
Social Welfare Department	7	8.1	21 years old	11	12.8
Child Welfare Department	6	7.0	22 years old	5	5.8
Early Childhood Education Department	12	14.0	23 years old	1	1.2

Inter-group data comparison before intervention (Table 2):

T-tests were conducted to compare intergroup data at the pre-test stage for each subscale. Consequently, the intervention group showed significantly higher scores in "Intrusion symptoms" of PTSD compared to the control group. Although

the intervention group tended to have higher mean values on the other subscales, no significant differences were found at the 5% level of significance. Overall, the homogeneity of each group (intervention and control) at the pre-test stage was confirmed.

Table 2: Inter-group data comparison before intervention

		Intervention group		Control group		t value	p value	Cohens'd
		M	SD	M	SD			
IES-R	Intrusion symptoms	11.36	8.18	8.34	6.73	2.21	0.02	0.26
	Avoidance symptoms	12.52	7.50	9.85	7.42	1.93	0.06	0.24
	Hyper-arousal	8.15	6.24	5.88	5.07	1.95	0.06	0.26
	PTSD total	32.03	20.33	24.07	17.46	2.10	0.06	0.27
PHQ-9	Depression	13.00	3.46	4.96	4.94	1.75	0.09	1.35
GAD-7	Anxiety	6.27	5.41	4.53	4.25	1.70	0.10	0.23
UCLA Loneliness Scale	Loneliness	56.33	4.93	39.20	9.72	1.97	0.06	1.75
Decline in learning motivation	Decreased learning motivation	13.70	2.17	13.78	2.04	0.10	0.92	0.03
	Decline in class motivation	8.55	2.50	8.22	3.08	0.58	0.56	0.08
	Total decline in learning motivation	22.24	3.21	22.01	3.83	0.41	0.68	0.05

Verification of intervention effects (Table 3)

The video was viewed 117 times with an average viewing time of 3:07 min and an average playback rate of 10.4%. Participants were assigned to the intervention group (6 boys and 32 girls) or the control group (12 boys and 36 girls) voluntarily. To verify the intervention effects, ANCOVA was used, with the pre-test scores of each evaluation metric as covariates, groups (intervention group, control group) as independent variables, and the post-test scores of each evaluation metric as dependent variables. A test for the parallelism of regression, a prerequisite for ANCOVA, was conducted. The interactions between groups (intervention and control groups) as independent variables and the post-test scores of each evaluation metric as dependent variables were not significant. First, for

PTSD, the intervention group showed significantly lower values than the control group for "Intrusion symptoms" ($F(1, 82) = 5.58, p = .02, \eta^2 = .03$), "Avoidance symptoms" ($F(1, 82) = 2.96, p = .05, \eta^2 = .02$), "Hyper-arousal" ($F(1, 82) = 2.53, p = .10, \eta^2 = .01$), "PTSD total" ($F(1, 82) = 4.55, p = .03, \eta^2 = .02$), "depression" ($F(1, 182) = 5.81, p = .02, \eta^2 = .03$), "anxiety" ($F(1, 82) = 6.14, p = .01, \eta^2 = .03$), and "loneliness" ($F(1, 82) = 5.56, p = .02, \eta^2 = .03$). Next, multiple comparisons and tests for simple main effects were performed using the Bonferroni correction. Consequently, significant improvements were confirmed in the intervention group for "depression" ($p = .03$), "loneliness" ($p = .02$), "Decreased learning motivation" ($p = .02$), "Decline in class motivation" ($p = .03$), and "Total decline in learning motivation" ($p = .01$).

Table 3: Changes in each scale before and after the intervention

		Intervention group				Control group				F value	p value	η^2
		Before		After		Before		After				
		M	SD	M	SD	M	SD	M	SD			
IES-R	Intrusion symptoms	11.36	8.18	10.33	6.35	8.34	6.73	7.90	6.44	5.58	0.02	0.03
	Avoidance symptoms	12.52	7.50	12.00	7.94	9.85	7.42	8.81	7.31	2.96	0.05	0.02
	Hyper-arousal	8.15	6.24	7.33	2.52	5.88	5.07	5.39	5.05	2.53	0.10	0.01
	PTSD total	32.03	20.33	29.67	16.44	24.07	17.46	22.11	17.46	4.55	0.03	0.02
PHQ-9	Depression	13.00	3.46	6.61	4.69	4.96	4.94	4.98	5.23	5.81	0.02	0.03
GAD-7	Anxiety	6.27	5.41	4.67	2.89	4.53	4.25	4.27	4.34	6.14	0.01	0.03
UCLA Loneliness Scale	Loneliness	56.33	4.93	42.94	9.31	39.20	9.72	39.21	9.60	5.56	0.02	0.03
Decline in learning motivation	Decreased learning motivation	13.70	2.17	11.00	2.00	13.78	2.04	13.68	2.27	0.02	0.89	0.00
	Decline in class motivation	8.55	2.50	6.67	1.53	8.22	3.08	7.36	2.61	0.29	0.59	0.00
	Total decline in learning motivation	22.24	3.21	17.67	3.21	22.01	3.83	21.04	3.27	0.02	0.89	0.00

Discussion

This study examined the effectiveness of iCBT in alleviating loneliness and mental health problems associated with self-isolation during the COVID-19 pandemic. The intervention group showed significantly lower values than the control group for "Intrusion symptoms," "Avoidance symptoms," "Hyper-arousal," "PTSD total," "depression," "anxiety," and "loneliness." Additionally, significant improvements were confirmed in the intervention group for "depression," "loneliness," "Decreased learning motivation," "Decline in class motivation," and "Total decline in learning motivation." These results suggest that iCBT interventions can reduce "loneliness"; alleviate symptoms of PTSD, depression, and anxiety; and significantly improve learning motivation among university students.

From the perspective of psychiatric nursing, loneliness and mental health distress are deeply intertwined, particularly in times of crisis such as the COVID-19 pandemic. Social isolation can exacerbate feelings of anxiety and depression, leading to increased psychological distress and potentially long-term psychiatric conditions. iCBT offers a

structured approach to addressing these issues by providing cognitive restructuring strategies that help individuals reframe negative thoughts and develop healthier coping mechanisms. Given the high rates of mental health disorders among university students during the pandemic, such interventions are essential.

Ohue conducted a mental health survey of university students in July 2020 (second wave) during the COVID-19 pandemic²⁰. The results showed that 102 participants (13.8%) reported moderate-to-severe anxiety disorders, 154 (20.9%) reported moderate-to-severe depression, and 318 (43.1%) reported moderate-to-severe PTSD symptoms. This indicates a high risk of mental health problems among university students during the COVID-19 pandemic, suggesting the need for mental health support for university students during the COVID-19 pandemic. The second wave of COVID-19 infections showed significantly lower levels of PTSD, decreased motivation to learn, and decreased motivation to attend classes compared to the third wave. It was found that early feelings of loneliness and a decline in learning motivation led to later mental health issues

²¹. Additionally, Adachi et al. stated that although the need for consultations and support at universities was significantly lower in the 2020 academic year than in the previous year ²², it is necessary to consider interventions for students who have become socially withdrawn, are unable to respond to surveys because of deteriorating health conditions and have dropped out of academic activities due to distance from universities. Therefore, "loneliness" and mental health support were considered necessary during the COVID-19 pandemic.

Insights from past studies suggest that approaches such as online support groups, mindfulness programs, and television counseling are effective in improving the mental health of university students ²³. Furthermore, Valeri et al. demonstrated in a randomized controlled trial (RCT) focusing on loneliness related to COVID-19 that video-based interventions can effectively reduce loneliness and related negative emotions such as fear and social prejudice. Participants who participated in the video interventions reported more significant reductions in loneliness than those who only received information sheets ²⁴. Similarly, our study confirmed the effectiveness of CBT via an online intervention for mental health support during the COVID-19 pandemic. This program was developed based on the 5-minute cognitive reconstruction method of Noguchi et al. ¹⁵ and Burns' 14 CBT for loneliness. Similarly, by implementing cognitive reconstruction methods that can be conducted in about five minutes a day, intervention effects for "depression," "anxiety," and "PTSD" were verified. Additionally, Burns reported factors related to loneliness such as "becoming defensive," "fearing criticism," "having unrealistically high expectations," and "being excessively self-critical" ¹⁴. University students may have experienced various problems unique to remote learning during the COVID-19 pandemic, such as securing the communication environment necessary for online classes, confusion about online classes for the first time, and the burden of handling large amounts of assignments and information, that may affect their mental health. Additionally, some universities restricted access during the COVID-19 pandemic, reducing opportunities for socializing with friends and communicating less. University students may have become more defensive due to

fear of infection and rumors during the COVID-19 pandemic, exacerbating loneliness. Loneliness is also commonly experienced during adolescence as self-discovery progresses ⁹; therefore, interventions to address these feelings of loneliness assumed greater importance during the COVID-19 pandemic. Cognitive reconstruction is one of the CBT techniques to alleviate loneliness ¹⁴. This method was effective in recognizing these negative thoughts, overcoming painful emotions, and fostering more positive and realistic thinking, in this study.

From a psychiatric nursing perspective, these findings emphasize the importance of emotional support systems in conjunction with iCBT. Nurses and mental health professionals play a crucial role in facilitating these interventions, providing additional counseling, and ensuring that students have access to appropriate psychological re-sources. Further research is needed to explore the long-term impact of iCBT on mental health and to determine the most effective combination of digital and human support.

Future Challenges and Conclusions

In this study, iCBT was implemented during the COVID-19 pandemic. A total of 117 students (6.2% of the university population) watched educational videos, and only 43 (2.0%) engaged with the cognitive reconstruction method. This low participation may indicate that high-risk students did not access the program. The limited reach could be due to the rapid development and deployment necessitated by the pandemic. To prepare for future emergencies, more robust and accessible support systems are needed.

This was a non-randomized trial, and random sampling was difficult under pandemic conditions. Future research should consider randomized controlled trials (RCTs) for more reliable results.

The study also had limitations. The sample was skewed toward female and first-year students, which may affect the generalizability of the findings. Mental health and loneliness can differ by gender and academic year, and our sample may not reflect the broader student population. Although no significant interactions were found in subgroup analyses, the potential influence of sample imbalance cannot be ruled out.

Future studies should aim for more balanced recruitment and apply appropriate statistical adjustments to improve representativeness. Longitudinal designs may also help assess long-term effects.

Despite these limitations, this study suggests that iCBT has potential as an effective mental health support for university students during isolation periods. Further research with improved design and broader participation is needed to confirm its effectiveness and applicability.

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

Source of Funding: The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: This research was funded by JSPS Grant-in-Aid for Scientific Research (KAKENHI) (24K13590).

References

- World Health Organization. Coronavirus disease (COVID-19) pandemic Internet. 2020. Available from: <https://www.who.int/emergencies/diseases/novel-coronavirus-2019>
- Cao W, Fang Z, Hou G, Han M, Xu X, Dong J, Zheng J. The psychological impact of the COVID-19 epidemic on college students in China. *Psychiatry Res.* 2020;287:112934. doi: 10.1016/j.psychres.2020.112934.
- Wang C, Pan R, Wan X, Tan Y, Xu L, Ho CS, Ho RC. Immediate psychological responses and associated factors during the initial stage of the 2019 coronavirus disease (COVID-19) epidemic among the general population in China. *Int J Environ Res Public Health.* 2020;17(5):1729. doi: 10.3390/ijerph17051729.
- Son C, Hegde S, Smith A, Wang X, Sasangohar F. Effects of COVID-19 on college students' mental health in the United States: Interview survey study. *J Med Internet Res.* 2020;22(9):e21279.
- Elmer T, Mepham K, Stadtfeld C. Students under lockdown: Comparisons of students' social networks and mental health before and during the COVID-19 crisis in Switzerland. *PLoS One.* 2020;15(7):e0236337.
- Takahashi A, Kitagawa S, Sasaki T, et al. The impact of the COVID-19 pandemic on the mental health of university students. *Ment Health Nurs.* 2021;29(2): 85-92.
- Oe M. Loneliness and learning motivation in university students during the COVID-19 pandemic. *Jpn J Educ Psychol.* 2024;72(1):1-10.
- Masuda Y, Takahashi T, Hiraoka R, et al. A study on stress and psychological health of nursing students during the COVID-19 pandemic. *J Jpn Nurs Univ.* 2021;44(1):37-45.
- Ochiai Y. The structure of loneliness in adolescence. Tokyo: Kazama Shobo; 1989.
- Masi CM, Chen HY, Hawkey LC, Cacioppo JT. A meta-analysis of interventions to reduce loneliness. *Pers Soc Psychol Rev.* 2011;15(3):219-66.
- Seewer N, Skoko A, Käll A, Andersson G, Berger T, Krieger T. Predictors and moderators of outcome of ICBT for loneliness with guidance or automated messages - A secondary analysis of a randomized controlled trial. *Internet Interv.* 2023;35:100701. doi: 10.1016/j.invent.2023.100701.
- Zhou T, Li X, Pei Y, Gao J, Kong J. Internet-based cognitive behavioral therapy for subthreshold depression: A systematic review and meta-analysis. *BMC Psychiatry.* 2016;16(1):356. doi: 10.1186/s12888-016-1061-9.
- Kobayashi K, Yamada T, Fujii Y. Prospects of cognitive behavioral therapy using computers and the Internet. *Bull Meisei Univ Psychol.* 2019; 37:25-32.
- Burns DD. How to find a wonderful partner using cognitive behavioral therapy: Overcoming loneliness, shyness, and sexual anxiety - Learning from Dr. Burns. Hayashi T, translator. Tokyo: Seiwa Shoten; 2016.
- Noguchi R, Sekizawa Y, Mune M, Yamaguchi S, Shimizu E. Do five-minute online cognitive behavioral therapy and mindfulness exercises for accepting emotions alleviate depressive symptoms? Verification by a randomized controlled trial. *RIETI Discussion Paper Series.* 2016;16-J-013. Available from: <https://www.rieti.go.jp/jp/publications/dp/16j013.pdf>.
- Muramatsu K. Japanese version of Patient Health Questionnaire (PHQ-9, PHQ-15) and Generalized Anxiety Disorder-7: up to date. *Niigata Seiryō Univ Grad Sch Clin Psychol Res.* 2014; 7:35-39.
- Russell D, Peplau LA, Ferguson ML. Developing a measure of loneliness. *J Pers Assess.* 1978;42(3):290-294. doi: 10.1207/s15327752jpa4203_11.
- Shimoyama H. A study on the enervation of male university students. *Jpn J Educ Psychol.* 1995;43: 145-155.

19. Tokyo Metropolitan Institute of Medical Science. PTSD symptom evaluation scale Internet. 2014. Available from: <https://mentalhealth-unit.jp/research/ptsd>.
20. Ohue T. Impact of self-restraint by COVID-19 pandemic on mental health in university students- COVID-19 cross-sectional survey during the second wave in Japan. *Hyogo Univ J.* 2024; 30:157-166.
21. Ohue T. Impact of COVID-19 Pandemic Self-restraint on College Students' Mental Health: A Longitudinal Survey of the Second and Third Waves. *Int J Nurs Educ.* 2024;16(4):56-63.
22. Adachi Y, Yoshikawa H, Fujiwara T, Fujiwara H. The impact of the COVID-19 pandemic on university students: Realities and changes as seen from health survey questionnaires. *Campus Health.* 2021;58(2):190-196.
23. Worsley JD, Pennington A, Corcoran R. Supporting mental health and wellbeing of university and college students: A systematic review of review-level evidence of interventions. *PLoS One.* 2022;17(7):e0266725. doi: 10.1371/journal.pone.0266725.
24. Valeri L, Amsalem D, Jankowski S, Susser E, Dixon L. Effectiveness of a video-based intervention on reducing perceptions of fear, loneliness, and public stigma related to COVID-19: A randomized controlled trial. *Int J Public Health.* 2021;66:1604164. doi: 10.3389/ijph.2021.1604164.