

Study the Association Between Loneliness and Problematic Internet Use of Chinese Overseas Students During Covid-19 Pandemic: The Moderating Role of Emotion Regulation

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Abstract: The outbreak of COVID-19 resulted in countries all over the world publishing new strict measures which included lockdown and social distancing. During this period, people experienced a move away from social activities, with overseas students experiencing severe psychological burdens as they were unable to return home. The study was performed on Chinese overseas students and Chinese domestic students; it assessed their level of loneliness, problematic internet use, and emotion regulation under the impact of the COVID-19 pandemic. This paper explored the relationship between these variables. The result suggested that as a consequence of the pandemic, Chinese overseas students and domestic students both suffered from a high level of loneliness; the mean score for overseas Chinese students was 46.25 ± 10.66 and for domestic students in China was 45.81 ± 9.81 . This finding indicated that the level of loneliness had a positive correlation with problematic internet use ($p < 0.05$), they spent more time on the internet in order to cope with negative emotions. Nevertheless, a good emotion regulation strategy could help to overcome negative feelings in an eased way, it had a moderating effect on loneliness and problematic internet use ($p < 0.05$).

Keywords: COVID-19, loneliness, problematic internet use, emotion regulation

1. Introduction

At the end of 2019, the first case of COVID-19 was found in Wuhan, China. Within a month, this new virus hit all around China. By 11 March 2020, WHO declared the outbreak of this global pandemic. The whole world was under this unwarned threat. Not only did people suffer physical harm from the virulence and high transmission of virus, strict measures such as social distancing and prohibition of all unnecessary social interaction that were put in place also led to a severe negative impact on people's mental health [1]. Existing studies provided evidence of a significant increase in the development of depressive symptoms and other mental health problems, suggesting the pandemic situations were causing a lot of stress for people of all ages and genders all over the world [2].

1.1. COVID-19 and Loneliness

Reduced social activity and personal social contact as a consequence of physical distance restrictions and lockdowns led to higher levels of loneliness [3]. Whilst the feeling of being alone is normal, but an excessive level of loneliness over a period can cause problems and difficulties. Mental health

conditions such as poor sleeping quality and PTSD that met clinical criteria were all associated with feelings of loneliness during the pandemic [4]. This further implies that most mental health problems have an underlying cause of being isolated and experiencing loneliness [3].

Loneliness is being defined as ‘The experience of emotional and social isolation’ by Weiss [5]. It is not as obvious, but loneliness could be an obstacle to people who are seeking a healthier and happier life [6]. There was a global concern of that the COVID-19 pandemic placed everyone in a vulnerable situation, people had been physically restricted, and all measures had impacted the way of living. All of which, young people had been even more harshly affected by overwhelmed challenges [7]. International students were in a particularly tough situation where they had to choose to stay by themselves in foreign lands or take the risk to get home and where the quarantine rules were very strict too. This study is focused on Chinese international students as Chinese students make up a large proportion of world’s overseas student population. According to the data from the Ministry of Education of China, the total number of Chinese nationals studying overseas in 2019 was 703,500 [8]. Moreover, China has a more interdependent cultural background, which means Chinese people are expected to be more depressed and feel lonely in the context of the pandemic [9]. As such, they are a significant group to study how the pandemic has impacted on overseas students' loneliness.

1.2. Loneliness and Problematic Internet Use

In the 21st century, the rapid development of technologies has the outcome of people having more communications through the internet. During the pandemic, internet use had increased considerably as it was the only way for people to keep in contact with friends and distant family. Several studies indicate that loneliness level and internet use have a positive relationship [10] as appropriate use of internet can help people to relieve the feelings of anxiety and stress, and online chat can partially improve social satisfaction and companionship [11].

However, this also means an extreme high level of loneliness could potentially cause excess internet use, because the internet effectively helps to escape negative feelings from the real world [12]. This is also sometimes referred to as an addiction to internet use or problematic internet use. In addition, overseas students are a group who is most likely at the risk of problematic internet use. Because they have already settled into the way of using internet to search for new information, entertainment, and connect with friends and family at home [13]. Therefore, a hypothetical conclusion could be drawn from previous research that overseas student would have a higher level of problematic internet use, especially during the pandemic. Alheneidi et al also suggest that loneliness and problematic internet use can be risk factors for mental health issues during COVID-19 [14].

1.3. The Moderating Role of Emotion Regulation

Negative emotions can be altered with well-developed emotion regulation strategies. People who are capable of emotion self-regulatory are usually more emotionally stable, because they are less likely to experience severe depressive or anxious feelings [15]. As the sense of isolation is subjective, the way in which people interpret the ongoing event and perceive emotions was affected by how well they could regulate their own emotions. People who often feel lonely were not surprisingly found out that they did not find emotion regulation strategy helpful [16].

Following on from that, the ability of self-regulation is associated with internet use. A deficiency in emotion regulation might lead to excessive internet use as a coping strategy [17]. Therefore, emotion regulation is also sometimes seen as a predictor of problematic internet use, because of the dysfunction, negative feelings such as loneliness cannot be processed and monitored in the right way [18].

Many researchers have studied the moderating effect of emotion regulation on loneliness and problematic internet use with other variables separately. But it would be interesting to explore how does emotion regulation acts as a moderator between loneliness and problematic internet use. These could have future implications.

1.4. Study Objectives

1. Did the level of loneliness of overseas Chinese students compare to Chinese domestic students during the pandemic increase significantly?
2. Is there a relation between level of loneliness and the extent of problematic internet use?
3. Whether the strategy of emotion regulation has acted an important role of moderator between two variables.

2. Method

2.1. Sampling method

This study used opportunity sampling where an online questionnaire was adopted and sent out via various Chinese social media platforms, including Douban and WeChat. They are the most popular social media among Chinese young adults. The questionnaire was set up using wxj.com and it was in either the form of one single URL and/or QR code. In order to avoid demanding characteristics, some briefing was made for the aim of the study. 'Loneliness' and 'Emotion Regulation' were briefed into the investigation of psychological state; 'Problematic internet use' was described as studying in behaviors. Additionally, there were no headings for scales that have been used in the questionnaire. The data were collected from the 26th of December 2021 to the 26th of January 2022. Clear instructions and informed consent were provided.

2.2. Participants

Students enrolled in Secondary school education and above were invited for an online survey. A total of 219 students participated in this survey, out of which 105 were Chinese domestic students and 114 were Chinese students studying abroad. After the data being screened to meet the inclusion criteria (i.e., over the age of 16 have eligibility to sign the informed consent), 5 responses were excluded. Thus, 214 data were selected for analysis (valid response rate: 99.10%) comprising 103 domestic students and 111 overseas students aged 16 to 22 years (mean: 19.64 \pm 2.30 years). All participants were given informed consent and had the right to withdraw from the study at any time if they wish to.

2.3. Measures

2.3.1. Sociodemographic Characteristics

Sociodemographic characteristics were required. This included age, gender (female, male, prefer not to say), current education attainment (Secondary School, Undergraduate, Postgraduate, PhD), and religions (Table 1). Overseas Chinese students were asked to provide further details of their background about studying abroad (i.e., how long have you been studying abroad? Did you come back to China during 2020? Who were you staying with when studying abroad?)

Table 1 Sociodemographic Characteristics

Characteristics	Overseas students		Domestic students	
	N	%	N	%
Gender				
Male			16	16.50%
Female			84	82.52%
Prefer not to say			3	2.89%
Education Attainment				
Secondary School	30	27.03%	44	43.14%
Undergraduate	47	42.34%	57	54.37%
Postgraduate	30	27.03%	2	1.94%
PhD	4	3.60%	0	0%
Religious People				
Yes	15	13.51%	7	6.80%
No	96	86.49%	96	93.20%

2.3.2. Loneliness

The level of loneliness was measured using the validated Chinese version of the UCLA Loneliness Scale with a Cronbach's alpha coefficient of 0.887. This scale (the University of California at Los Angeles Loneliness Scale) was compiled by Russell et al [19]. A 20-item scale designed to measure one's subjective feelings of loneliness arising from the gap between the desire for social interactions and the actual level of it. All items are scored on a 4-points Likert; 11 positive scored items (4 = "I often feel this way", 3 = "I sometimes feel this way", 2 = "I rarely feel this way", 1 = "I never feel this way") and 9 reversed scored items [19]. It had high internal consistency (*Cronbach's* $\alpha = 0.96$) and the test re-test relation of 0.73 [20]

2.3.3. Problematic Internet Use

Revised Chinese Internet Addiction Scale (CIAS-R) by Chen et al was used in this survey to assess the extent of problematic internet use [21]. It has been widely used among Chinese students. It has good applicability in mainland China and its reliability and validity meet the requirement of psychometrics properties [22]. This scale contains 26 items and evaluated four dimensions of addictive internet use (i.e., compulsive use and withdrawal symptoms, tolerance, Interpersonal and health related problems, time management problems). All items are scored on a 4-points Likert, the total score represents individual problematic internet use; the higher the score, the severer the problematic internet use. The internal consistency reliability was 0.93, test re-test reliability was 0.830 [23].

2.3.4. Emotion Regulation

Emotion Regulation Questionnaire by Gross & John is 10-item self-report tool that used 7-points Likert ranging from 1 to 7 (totally disagree to total agree). It consists of two specific emotional regulation strategies which are Cognitive reappraisal (6 items) and Expressive suppression (4 items), they are antecedent-focused strategy and response-focused strategy respectively which are commonly used to regulate positive and negative emotions in everyday life [24]. The higher score indicates more capability to regulate emotions. The Chinese version of ERQ was evaluated by Wang et al, both the cognitive reappraisal (*Cronbach's* $\alpha = 0.85$) and expressive suppression (*Cronbach's* $\alpha = 0.77$) had good internal consistency reliability [25].

3. Results

Table 2 shows a set of descriptive data. The mean score of loneliness level among Chinese overseas students was 46.25 ± 10.66 and in Chinese domestic students was 45.81 ± 9.81 , indicating loneliness is a generalized feeling among students during the pandemic. A total score of 44 and above is considered to be a high level of loneliness. According to previous studies that were conducted before 2020, the average score of the UCLA Loneliness Scale assessed on Chinese college students were varied. Jia et al [26] assessed university students three-time points, the average score was 39.51 ± 8.51 , 41.51 ± 18.88 , and 41.51 ± 9.65 . There was a statistical difference on loneliness level between Chinese students before and after COVID-19 ($d > 0.6$, $d > 0.25$, $d > 0.4$ respectively) [26].

The mean score of internet addiction in Chinese overseas students was 64.13 ± 14.94 , which was above the theoretical score of diagnosing [27]; whereas Chinese domestic students had a mean score of 62.06 ± 14.44 that was also above the theoretical score of screening. This demonstrated that the issue of problematic internet use was common among Chinese young adults. Finally, the mean score of emotion regulation in both populations was very similar; overseas students had 41.38 ± 8.20 and domestic students had 41.41 ± 7.83 . Overall, the difference between the two populations on all variables was not statistically different ($p > 0.05$, $d < 0.2$).

Table 2: Mean scores of variables on Chinese overseas students and domestic students

	Overseas students			Domestic students			Effect size
	n	M	SD	n	M	SD	
UCLA Loneliness Scale	111	46.25	10.66	103	45.81	9.81	0.04
CIAS-R	111	64.13	14.94	103	62.06	14.44	0.14
Emotion Regulation Questionnaire	111	41.38	8.20	103	41.41	7.83	0.00

As the loneliness level is impacted by feelings of emptiness and abandonment, it often involves a lack of relationship and attachments [28]. Further analysis on the effect of residence status (i.e., stay with friends or stay with family) on variable scores were carried out (Table 3). Table 4 compared statistical differences in residence status and the results indicated only living on one's own and staying with friends had a significant difference ($p < 0.05$). There were not many differences when living with family or host family and on their own ($p > 0.05$). This indicated that Chinese young adults require more social connections with friends rather than with family members.

Table 3: The Effect of Residence Status of Chinese Students on Scale Scores

		UCLA Loneliness Scale		CIAS-R	ERQ
		N	M \pm SD	M \pm SD	M \pm SD
Overseas students					
Back to China	64		45.48 ± 10.30	65.39 ± 13.20	41.5 ± 8.38
Stayed abroad	47		46.68 ± 11.26	63.28 ± 16.30	41.3 ± 7.71
Living with					
By self	48		48.98 ± 10.23	65.22 ± 13.96	40.84 ± 7.73
Family	10		46.80 ± 12.71	68.50 ± 15.83	39.20 ± 5.57
Partner	1	49		50	35
Friends	38		42.08 ± 10.85	62.33 ± 15.05	41.53 ± 9.19
Host family	14		45.57 ± 8.12	65.64 ± 15.18	45.21 ± 7.27

Table 4: Further Comparison on Differences of Residence Status Using t-test

	1	2	3	4	5
1 Stay on the own	1				
2 With family	.51038	1			
3 With Partner			1		
4 With Friends	2.9783***	-1.0703		1	
5 With Host Family	1.3067	.26898		-1.2348	1

Note. Gaps are where have not get enough data for a t-test

*** $p < 0.05$

Table 5 shows correlations between variables in both groups. As expected, the level of loneliness and problematic internet use had a positive correlation ($p < 0.05$). In Chinese overseas students, the mean scores of CIAS-R and ERQ were negatively correlated ($p < 0.05$) which supports previous findings. However, there was no correlation between problematic internet use and loneliness level in the two populations. Chinese domestic students did not show a correlation between emotion regulation and problematic internet use ($p > 0.05$). For a better visualisation of the results, please see Figure 1 and Figure 2.

Table 5: Correlations between variables

	1	2	3
	Overseas students	Domestic students	Overseas students
UCLA Loneliness Scale	1	1	
CIAS-R	.5292***	.4044***	1
ERQ	-.1551	.06751	-.2639***

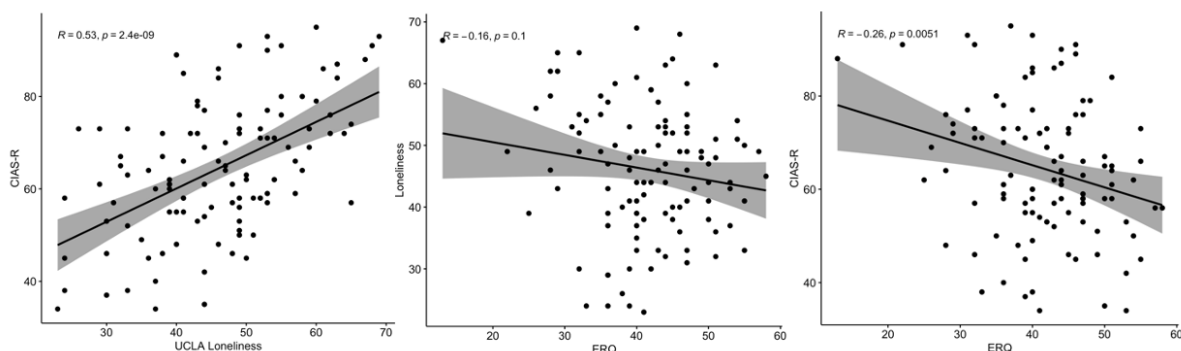


Figure 1: Correlation Graph of Variables of Chinese Overseas Students

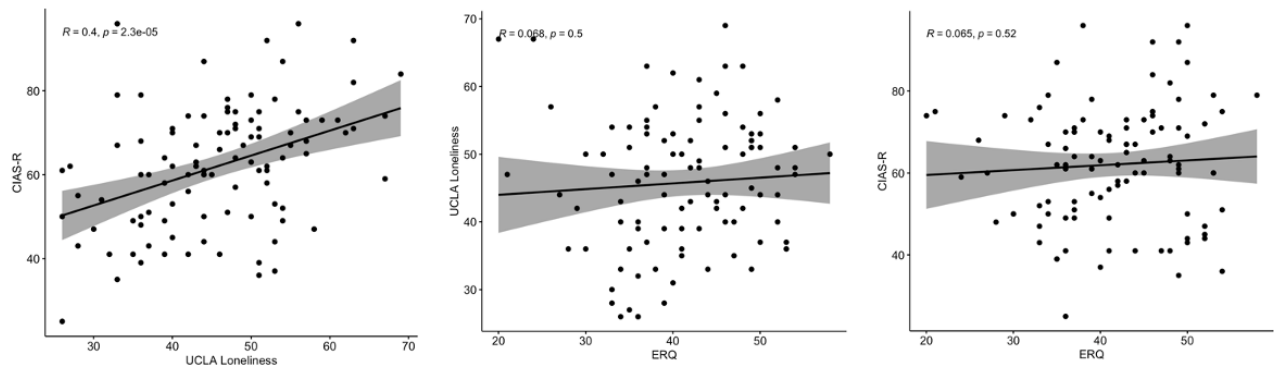


Figure 2: Correlations Graph of Variables of Chinese Domestic Students

Figure 3 and Figure 4 demonstrate the moderating effect of emotion regulation on loneliness level and problematic internet use based on the mean scores of these two variables. As both groups had a similar set of data, the graphs show a similar moderating effect. They both support the hypothesis of the emotion regulation strategy plays a moderating role between the level of loneliness of problematic internet use ($p < 0.01$).‘

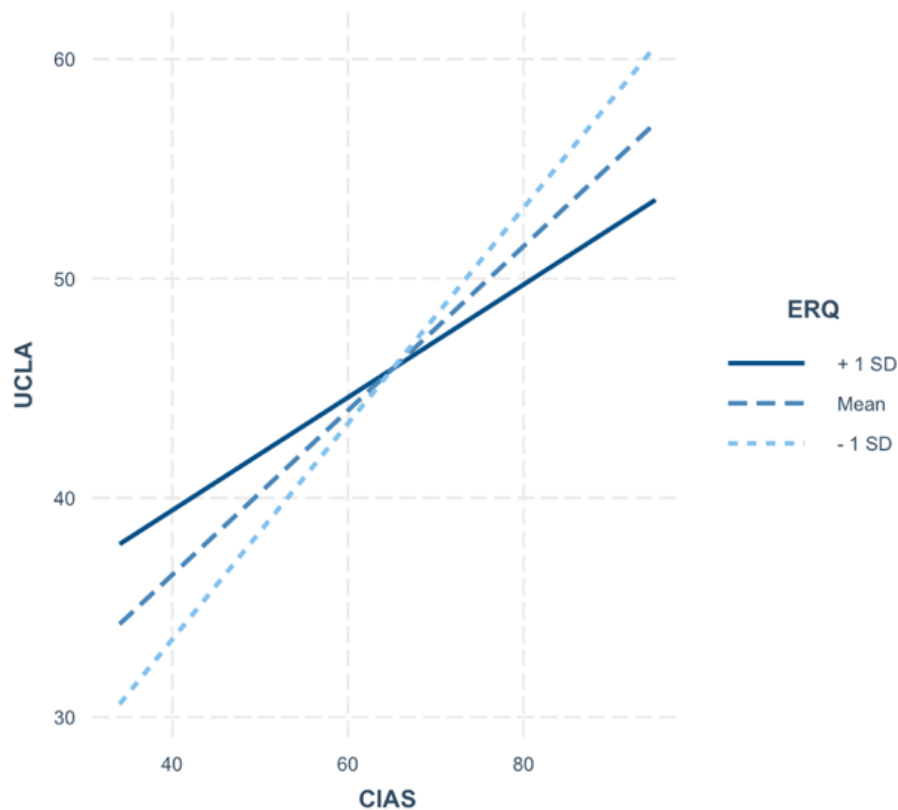


Figure 3: The Moderating Effect of Emotion Regulation on two Variables of Chinese Overseas Students

Note. UCLA stands for UCLA Loneliness Scale
CIAS stands for CIAS-R

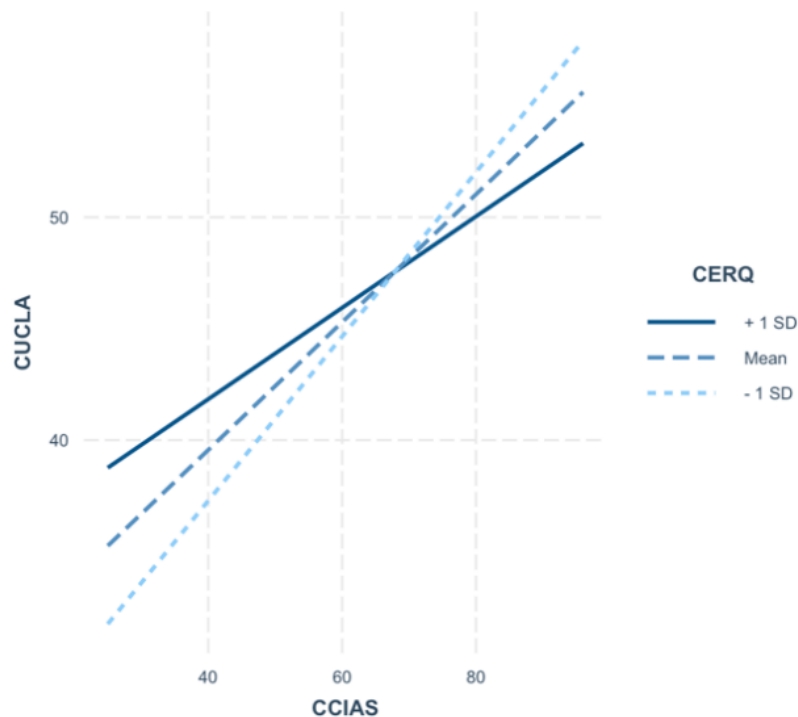


Figure 4: The Moderating Effect of Emotion Regulation on two Variables of Chinese Domestic Students

Note. UCLA stands for UCLA Loneliness Scale
CCIAS stands for CIAS-R

4. Discussion

The result rejected two null hypotheses and had one unexpected finding. Firstly, the level of loneliness had increased for both Chinese overseas students and international students, however, there was no significant difference between the two groups. This implies that the pandemic affected people to a similar extent, and that all Chinese young adults perceived similar feelings. When people were facing with restrictions, the consequence of fewer social connections would indeed result in feeling isolated and abandoned. Furthermore, loneliness level only had a significant difference when overseas students lived with friends or on their own during the pandemic which indicates that Chinese young adults are becoming more independent and having less attachment with elders in comparison to previous research.

Secondly, the level of loneliness and problematic internet use were positively correlated in both groups. Hence, this finding supports earlier studies where people prefer to use internet in order to manage their negative feelings. On the internet, they can meet new friends and share feelings without too much concern. Convenience of the use of technologies improved people's life to a large extent as different social media help people to stay in contact with each other. For example, during the pandemic, they could talk to each other and make video calls. As such, participants who had higher scores on the UCLA loneliness scale also had a higher score on CIAS-R. However, we cannot ignore the negative impact of spending too much time on the internet. The result also reflected that most young people are developing an addiction to internet use. Especially among overseas students, the average score was as high as the theoretical score for diagnosing addiction to internet use. Once the problematic use of the internet has persisted for a long time, it could have opposite effect, i.e., internet use becomes addictive and pathological. Therefore, interventions should be considered. On the other

hand, there had no correlation between problematic internet use and emotion regulation; this was unexpected. A potential explanation can be that there were errors in the study design, or this was a suggestion that internet use has become a real problem among young people. The previous abnormal use of internet has become normal amount of use of internet; it has increased overall. Moreover, despite only Chinese overseas students population illustrated a correlation between loneliness level and emotion regulation, this finding cannot be generalized. Because a limitation of self-reporting is that participants may exhibit demand characteristics. Another limitation can be that they were answering rationally where when they are in real life situation i.e., in a bad mood, they might not perform in the way that they think they would.

In conclusion, emotion regulation as a useful strategy had a moderating effect on the level of loneliness and problematic internet use. The better a person's ability to regulate their emotion, the less that person will feel lonely and pursue comfort through the internet. This brings an important implication of the necessity of being able to regulate own emotions. It improves one's mental health by using correct and healthy methods to cope with negative feelings in a timely manner.

This study could be improved by stating more detailed and accurate instructions, so participants could perform their best. The sociodemographic data can be better organized and unnecessary questions can be deleted. In future research, a large sample size will help with more precise findings.

5. Conclusion

This study obtained results from 214 responses that demonstrates the COVID-19 pandemic had stressed Chinese students who were either studying abroad or in China. The level of loneliness had increased during the pandemic due to difficulties in all aspects. Based on the result, there was an association between loneliness level and problematic internet use, but emotion regulation and loneliness were not correlated. Alternatively, emotion regulation had a moderating effect on loneliness level and problematic internet use, therefore, it would be beneficial for us to master this coping strategy.

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