

## Research Article

# Exploring Loneliness, Social Support and Adaptability of International Students in Canada during COVID-19

Chang Su<sup>1\*</sup> and Gordon L. Flett<sup>2</sup>

<sup>1</sup>Associate Professor, Department of Psychology, Faculty of Science, Brandon University, Manitoba, Canada

<sup>2</sup>Professor, Department of Psychology, Faculty of Health, York University, Toronto, Ontario, Canada

**Received:** 27 November, 2024

**Accepted:** 11 December, 2024

**Published:** 13 December, 2024

**\*Corresponding author:** Chang Su, Associate Professor, Department of Psychology, Faculty of Science, Brandon University, Manitoba, Canada, E-mail: [sus@brandonu.ca](mailto:sus@brandonu.ca)

**ORCID:** <https://orcid.org/0000-0002-3702-6008>

**Keywords:** COVID-19; Loneliness; Social support; Adaptability; International students in Canada

**Copyright License:** © 2024 Chang Su, et al. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

<https://www.clinsurgroup.us>



## Abstract

**Background:** The global COVID-19 pandemic has had extraordinary adverse effects, negatively impacting people's physical health, mental health, and well-being. Measures such as quarantine, lockdown, and social distancing have exacerbated social isolation, loneliness, and mental health challenges. International students, as a particularly vulnerable population, confronted numerous challenges, including a lack of social support and networks. They required considerable adaptability to cope with the changes and uncertainties brought about by the pandemic. This study explored the effects of loneliness, and social support on the adaptability of international students in Canada during the pandemic. Specifically, it aimed to: a) Examine the relationships among loneliness, social support, and adaptability. b) Investigate the potential moderating effect of social support on the relationship between feelings of loneliness and adaptability.

**Methods:** We recruited 186 international students attending universities in Canada to complete the informed consent and an online survey during the pandemic COVID-19. Participants took approximately 40 minutes; a \$10 Amazon gift card was offered to the participants as an appreciation. Participants were measured on the UCLA Loneliness Scale, Perceived Social Support Scale, Adaptability Scale, and demographic questions. The data analysis was conducted in IBM SPSS 26.

**Results:** During the pandemic COVID-19, international students in Canada demonstrated that better adaptability was significantly associated with lower levels of loneliness and greater social support. Feelings of loneliness were found to negatively impact predicted adaptability; however, the effect was fully moderated by the presence of social support. Additionally, the findings highlighted gender differences in how international students adapted to the challenges of the pandemic.

**Discussion and conclusion:** Our discussion focuses on practical suggestions that can help international students enhance their adaptability and build stronger social support networks, ultimately reducing feelings of loneliness while studying abroad in Canada.

Our conclusions emphasize the importance of enhancing adaptability among international university students to reduce feelings of loneliness during the pandemic COVID-19 in Canada. We also recommend prioritizing social support as a protective factor, which plays a crucial role in mediating the effects of loneliness on adaptability.

## Introduction

The COVID-19 pandemic, caused by the novel coronavirus in 2019, rapidly spread worldwide in early 2020, becoming a devastating global public health crisis and threat. This was due to the high mortality rate, rapid transmission of the virus, and the resulting life restrictions [1-4]. By July 2020, there were more than thirteen million people globally had been confirmed to have contracted the virus, including over 100,000 cases

in Canada [5]. This severe epidemic pandemic represented a prolonged stress sequence, a diminished sense of personal self-worth, heightened anxiety, and significantly impacted global economies, sociocultural dynamics, education system, employment, and both physical and mental health [2,6-9]. Lockdown measures, including social distancing, quarantines, and travel bans, were implemented in many countries, leading to social isolation, and fostering feelings of loneliness, emotional distress, and anxiety, which affected all aspects

of people's lives, and contributed to widespread health and mental health challenges during the pandemic period [2,4,9-13].

### Challenges for international students in Canada during COVID-19

According to Statistics Canada, there were approximately 388,782 international students in the fall of 2019, accounting for about 20% of all undergraduate students before the COVID-19 pandemic [14]. These students paid tuition fees three to four times higher than domestic students, significantly contributing to the Canadian economy [15,16]. However, data from Immigration, Refugees and Citizenship Canada (IRCC) show a 35% decrease in the number of new study permits issued in 2020 due to the pandemic COVID-19. Before COVID-19, international students pursuing academic success in Canada faced numerous challenges while studying abroad. These included cultural Adaptability, language barriers, differences in the academic and educational system, financial constraints, higher tuition fees, homesickness, and limited social networks and support compared to domestic students [17,18]. This acculturation process often causes significant stress and anxiety for international students [19,20]. Adapting to a new country and culture can be a particularly intense, and often lifelong process [21].

International students in Canada, as one of the vulnerable populations during the COVID-19, faced significant challenges and adversities that impacted their physical, and mental health as well as their overall well-being [3,18,22]. The emergence of the pandemic introduced unprecedented changes and risks that severely affected their mental health and psychological well-being. These included unsafe living conditions, disruptions to their studies, and interruptions to daily routines, and hobbies [3,23,24]. During this crisis, international students encountered numerous challenges, such as shared living arrangements that complicated social distancing, travel restrictions, vaccination protocols, the closure of schools, and a rapid transition to remote learning. They also faced financial pressures, including the high cost of airfare, reduced work hours, loss of part-time jobs, and decreased income, all of which added to their stress, and interrupted their routines [24,25]. Interestingly, a quantitative study from Moissac, et al. [26] found that international students in Canada were more likely than domestic students to report excellent mental health, higher life satisfaction, greater self-esteem, and more positive body image before the pandemic. However, they were less likely inclined to discuss their hardships before COVID-19. The onset of the pandemic brought new social and psychological distress, including emotional challenges, loss of interpersonal connections, and reduced academic performance [2].

The pandemic also contributed to increased stress, anxiety, and depression among international students [27]. A recent study by Varughese and Schwartz [25] found that approximately 55% of 600 international students in Canada were at risk of depression, and about 50% were at risk of an anxiety disorder. Students reported feelings of loneliness, mental exhaustion, panic attacks, and social isolation. Additionally, 30% of

respondents indicated difficulty adapting to online learning, which heightened their academic stress. Financial struggles and limited peer interactions further exacerbated their challenges.

### Loneliness of international students during the COVID-19 pandemic

The global adoption of containment measures such as social distancing and quarantine emerged as key strategies to combat COVID-19 worldwide. However, these measures resulted in widespread social isolation, reduced social interactions, and heightened feelings of loneliness. They also contributed to a rise in mental health issues, including depression, anxiety, and stress [12,13,28-33]. These challenges became significant problems for both individuals and society during the pandemic. Universities and colleges responded by closing campuses, transitioning to virtual classes and services, requiring students to vacate residences, leading to increased social isolation, psychological distress, particularly among international students, who experienced heightened feelings of loneliness, abandonment, helplessness, and uncertainty about their future [11,13,14,34-39]. The situation was exacerbated for international students when border closures and flight cancellations made it difficult for them to return to their home countries [14]. Those who experienced social isolation and lacked a sense of belonging at their institutions were more likely to feel lonely due to their separations from their family and friends. They often expressed a strong desire to return to their psychological well-being [36,40].

Loneliness is characterized by the absence of essential social connections and a lack of affection in existing relationships [41]. It has a detrimental impact on mental health, self-esteem, overall well-being, and the quality of life of people in Canada [42-48]. Research indicated that adolescents experiencing depression are more likely to harbor thoughts, and fear related the feelings of loneliness [49,50]. Heightened feelings of loneliness can lead to increased academic stress [45], diminished social skills, stigmatization, social withdrawal, and harm to overall well-being [33]. Loneliness is also linked to higher levels of anxiety and depression, ruminative brooding, and increased experiences of discrimination [17]. Furthermore, it is associated with various psychiatric disorders, including alcohol abuse, child abuse, sleep disturbances, personality disorders, and Alzheimer's disease [51]. A recent online study by Zheng, et al. [33], which utilized a thematic analysis of data from 521 international students, identified six key themes related to loneliness, including negative psychological and social aspects, the distressing experience of being alone; challenges in forming meaningful connections; feeling of entrapment and awareness of societal stigmatizing perceptions of oneself as lonely. International students reported that feelings of loneliness were more likely to have a range of adverse social and psychological outcomes. Similarly, Varughese and Schwartz [25] found that international students in Canada, during the interviews conducted amidst the pandemic, described their experiences of social isolation, panic attacks, mental exhaustion, feelings of loneliness, and difficulties accessing the counselling services on campus due to long waiting lists.

Researchers have examined the effects of gender on feelings of loneliness, for example, a recent study involving a pooled sample of 3,012 English-speaking Canadian adults found that women aged 18–29 years reported higher levels of loneliness than men during the COVID-19 pandemic [48]. Similarly, other studies have reported that women experience greater loneliness than men [52], however, some researchers found no significant association between gender and loneliness [53]. Additionally, younger individuals are at greater risk of experiencing symptoms of stress, depression, anxiety, and loneliness [52,54,55]. A recent study [56] explored loneliness, perceived social support, and depression among university students in the United Kingdom, Poland, and India during the COVID-19 pandemic. The findings revealed that greater loneliness was associated with lower levels of perceived social support, and higher levels of depression symptoms, which in turn further diminished perceived social support.

### Social support of international students during COVID-19

Social support is defined as “the social resources that persons *perceive* to be available or that are *actually provided* to them by non-professionals in the context of both formal support groups and informal helping relationships” [57]. It encompasses various forms of aid, including emotional support, instrumental or tangible assistance, information advice, and companionship [57]. Social support acts as a protective factor against the negative impacts of distress on mental and physical health. Positive social support has been linked to higher life satisfaction [58], and lower levels of depression and anxiety [59–61]. Individuals who received greater social support report higher well-being, and lower levels of stress [12,58,62–64]. Additionally, previous research has shown that study showed that social support moderates the relationship between adaptability and life satisfaction [65].

The COVID-19 pandemic brought significant challenges for international students in Canada, including social isolation, a lack of social networks and support, difficulties in forming social connections, loss of part-time jobs, the financial strain of high tuition fees, increased stress, the transitions of online learning, and border restrictions [6,14,25,28]. These factors heightened the risk for mental health issues and negatively impacted the well-being of international students during COVID-19 [22,66]. International students in Canada face significant barriers to accessing health support and sources of usual social support, such as difficulties in booking appointments due to the long waiting list [22,25]. Both domestic and international students who needed financial support received emergency grants from the government and Canadian universities during the pandemic [14]. A recent study by Hari, et al. [28], based on interviews with 13 international students in Ontario, revealed that students faced significant challenges during the pandemic, including border closures, strict travel restrictions, and heightened anxieties about their future careers. These difficulties increased their reliance on both economic and emotional support from their transnational families. Similarly, Belo, et al. [6] conducted interviews with international graduate

students to examine how they established resilience during the pandemic. The findings highlighted the importance of connecting with support communities and engaging in social programs to enhance academic performance.

Additionally, Khalid, et al. [67] explored the vulnerabilities and capacities of international students in Canada through semi-structured interviews. Their study identified material capacities such as financial support, knowledge about the pandemic, and mental health supports, social capacities including local social support and multilingualism, and attitudinal capacities including resilience, religious and spiritual beliefs, “it’s not just about you”, and reflexivity. However, they also uncovered several vulnerabilities. Material vulnerabilities included lack of information, reliance on public transport, food inaccessibility, and poor mental health; social vulnerabilities included lack of social support, culture shock, and racism, and attitudinal vulnerabilities included “nowhere to go”, and feeling like a burden. Notably, Moissac, et al. [26] conducted an online survey examining the mental health and support needs of international students in Canada. The results indicated that students were more likely than domestic students to report excellent mental health, higher life satisfaction, greater self-esteem, and a more positive body image. They were also less likely to disclose hardships, underscoring the importance of providing culturally adapted support services on campus. In this study, we aimed to explore the relationship between social support and both a resilient factor (e.g., adaptability) and a risk factor (e.g., loneliness). Additionally, we seek to determine whether social support can buffer the impact of loneliness on adaptability for international students in Canada during the COVID-19 pandemic.

### Adaptability of international students in Canada during COVID-19

Adaptability is defined as “the capacity to constructively regulate psycho-behavioural functions in response to new, changing, and/or uncertain circumstances, conditions, and situations” [68]. It involves making appropriate cognitive, behavioural, and affective adjustments when faced with uncertainty and novelty [68]. Adaptability serves as a critical mental source that enables individuals to thrive in rapidly changing environments, leading to positive outcomes [69,70]. A high level of adaptability is associated with greater psychological resources [71], increased well-being [72], and lower levels of depression and stress [73]. Conversely, individuals with lower adaptability often experience a negative self-concept and reduced self-efficacy [23].

A recent study by Besser, et al. [23], involving over 400 college students in Israel, found that higher self-reported adaptability to the pandemic COVID-19 was associated with greater self-esteem and feeling of mattering, as well as lower dependency, self-criticism, and fear of not mattering. Increased feelings of loneliness were linked to self-criticism, while psychological distress was associated with lower adaptability. Similarly, Street [74] reported that among 143 undergraduate students in Canada, lower adaptability during



the pandemic was associated with a lack of interest in online learning, reduced confidence, and diminished self-regulation. Students who preferred online learning demonstrated higher perceptions of its value and greater academic self-efficacy. This suggests that students are more likely to favor online learning when they enjoy the courses, feel confident in their ability to achieve their goals and adapt well to changes necessitated by the pandemic.

Varughese and Schwartz [25] found that 55% of about 600 international students in Canada reported experiencing mental health challenges during the pandemic, and 30% indicated difficulty adapting to online instruction. Many cited issues such as reduced interaction with peers, an impaired education system, and a struggle to adjust to Canadian culture.

Previous research has shown that female international students were less likely to adapt than their male counterparts, partly due to domestic responsibilities when studying abroad [75]. Moreover, the level of Adaptability was positively correlated with the duration of a student's stay in the host country [76]. Geographical origin also plays a role in which international students from non-western countries often face greater Adaptability challenges in western countries [77,78].

The current work fits with the observation that a vital developmental asset is the capacity to adapt to situations in which being alone can escalate into feelings of loneliness [79], and this is certainly the case for international students living away from home while also confronted with the consequences and complexities of a global pandemic. The reality is that the amount of time spent alone at various times in one's life will increase the susceptibility to experiencing loneliness and people who are adaptable in general should be less prone to negative experiences. There is not much research focused directly on adaptability and loneliness. However, Besser, et al. [80] showed within the context of the rapid shift to online learning during the pandemic that a modified scale tapping adaptability to the pandemic was associated with less loneliness among a large sample of students from Israel. Importantly, it was established in the Besser, et al. [80] study that adaptability predicted unique variance in loneliness beyond the variance attributable to the link between neuroticism and loneliness. A second study by Besser, et al. [80] also examined adaptability to the pandemic but not within the context of the shift to online learning. This investigation with 462 college students from Israel showed similarly that adaptability was linked with less reported loneliness. In addition, adaptability was linked with fewer thoughts related to loneliness as assessed by a measure tapping loneliness automatic thoughts. Subsequently, Rose, et al. [81] focused directly on adaptability to loneliness with a modified version of Martin's Adaptability Scale. They found that the capacity to adapt to loneliness was linked with less loneliness and psychological pain as well as less social hopelessness and a greater sense of mattering to other people.

The current study was based on measuring adaptability as a broad trait characteristic and did not focus specifically on adaptability to loneliness *per se*. This study is unique in its focus on international students who find themselves in a

unique situation that for many would be very isolating and feel potentially unbearable. It can be inferred from prior research that there should indeed be a negative association between self-reported adaptability and loneliness in the current study.

## The purpose of study and hypothesis

Social distancing measures and quarantine restrictions during the COVID-19 pandemic significantly limited opportunities for social engagement and connection and increased feelings of loneliness. International students, separated from their families and with limited social networks and support, faced numerous challenges. They struggled to adapt to many novel aspects of the pandemic and experienced a decline in mental health during this time [25]. To our knowledge, no studies have specifically examined the relationship between loneliness, social support, and adaptability among international students in Canada during the pandemic COVID-19. Additionally, early research presents inconsistencies regarding gender effects on loneliness. There is also a lack of research exploring how socio-demographic factors such as gender, education levels, country origins, and COVID-19 infection status influence the Adaptability, loneliness, and social support of international students in Canada. This research was designed to shine a spotlight on students already facing unique challenges – vulnerable international students in Canada.

The purpose of this study aimed to (1) explore the relationships amongst adaptability, social support, and Adaptability among international students in Canada during the COVID-19 pandemic; and (2) test whether social support moderated the impact of COVID-19-related loneliness on adaptability; (3) investigate how the feelings of loneliness during COVID-19 predicted international students' adaptability, and determine whether social support—a resilience factor—mediated the effects of loneliness on adaptability in this vulnerable population; and (4) explore potential gender differences in loneliness, social support and Adaptability among international students in Canada during pandemic. To our knowledge, no quantitative research has investigated the relationship between loneliness (as a risk predictor factor), social support (as a buffer factor), and adaptability (as an outcome factor) among international college and university students in Canada during the COVID-19 outbreak.

This study would provide initial empirical evidence on adaptability to the pandemic environment, with a specific focus on loneliness, and social support. Additionally, it would examine gender differences in loneliness and adaptability. We expected loneliness would be negatively associated with adaptability and social support and would negatively predict adaptability. Moreover, we proposed a mediation framework and estimated the mediating effects of social support between the feeling of loneliness and adaptability.

The following hypotheses were proposed for this study:

1. To examine the association between loneliness, social support, and adaptability. It was hypothesized that loneliness would be negatively correlated with resilience

factors, including social support, and adaptability, among international students in Canada during the pandemic.

2. To investigate whether loneliness would be the significant negative predictor of adaptability outcomes. It was hypothesized that feelings of loneliness might serve as an indicator of how well international students adapted to a novel environment during the transition.
3. To conduct a moderation analysis examining the role of social support as a mediator. These analyses would like to explore whether social support mediates the relationship between loneliness and adaptability among international students in Canada during COVID-19.
4. To explore the main effects of demographic factors on risk and resilient factors. The study hypothesized that demographic characteristics such as gender, country of origin, income, English proficiency, and living conditions would influence levels of loneliness, and adaptability. For example, it was anticipated that female international students would report lower adaptability, and higher levels of loneliness compared to their male counterparts during the COVID-19 pandemic.

## Methods

### Participants

This research protocol has been reviewed and received a granted approval certificate by the Brandon University Research Ethics Committee (BUREC, Certificate 2021-22966). A final sample of 186 international students (aged 17-35 years,  $M = 24.02$ ,  $SD = 3.70$ , 84 females, 97 males) was recruited online for this study and tested on various measures which included demographic information (Table 1: Characteristics of participants). On average, participants had spent approximately three years studying at a Canadian university. The sample had 11 graduate students, while the undergraduate students had 25% in their second year; 28% in their third year, 18% in their

fourth year; and 5% in their fifth year or beyond. Nine students are over four years of university studying in Canada. 11.3% of students were in the first year. Additionally, nine students had been studying at a Canadian university for more than four years. Regarding geographic background, 20% of the students were from Asia, 64.5% from American, 7% from Africa, and 4.8% from Europe. Employment status revealed that 12% of students were unemployed; while 40% had part-time jobs; In terms of living conditions, 29% resided in on-campus dormitories; 54% lived in rented apartments; and 19% owned homes. In terms of income, 25% were in the low-income category; 23% in the lower-middle range, 26% in the middle-income range, 12% between middle and high; and 4% were classified as high-income. Mental health statistics showed that 15.1% of participants had been diagnosed with a condition, 8.6% had taken medication, 10.2% had been hospitalized; 21% had received counselling; and 8% had undergone psychotherapy. In terms of social support, 18% reported having no support from friends, while 76.9% indicated they had support from friends. Additionally, 43% of participants ( $N = 80$ ) had contracted COVID-19, and 41.9% reported that family members contracted the virus.

Participants were recruited between April and mid-July 2022 in Canada through various methods, including faculty research webpages at Brandon University, email outreach to faculties at other Canadian universities, as well social media platforms such as WeChat, or other apps.

### Measures

All measures have acceptable reliability and validity based on available information.

**Dependent variable :** The Adaptability Scale (TAS, Martin, Nejad, Colmar, & Liem, 2012).

It has nine items which are rated on a 7-point Likert scale to assess the adaptability from "1 strongly disagree" to "7 strongly agree". The total score represents the levels of adaptability.

One item example is "I am able to think through a number of possible options to assist me in a new situation (item 1)". It showed strong internal reliability in the current study ( $\alpha = .88$ ).

**Independent variables:** The demographic questionnaire collects information such as country origins, age, gender, education, marital status, employment status, living conditions, English proficiency, areas of study, income, length of living in Canada, participants COVID-19 history, and the year of university and so on as covariate variables.

The UCLA Loneliness Scale (Version 3, Russell, 1996) [82]. This 20-item scale measures subjective feelings of loneliness and social isolation, using a 4-point Likert scale from 1 (never) to 4 (often). One of the examples for the first item is "How often do you feel that there is no one you can turn to?" The scale has a high internal consistency ( $\alpha = .89 - .94$ ). The current sample showed a decent internal reliability ( $\alpha = 0.66$ ).

**Table 1:** Sample Characteristics ( $n = 186$ ).

Variables	Categories	n	Frequency %
Gender	Male	97	52.7
	Female	84	45.2
Age	$\leq 25$	121	65.1
	$> 25$	58	31.2
Education	High school	62	33.3
	Bachelor's degree	48	25.8
	Above Bachelor	13	7.0
	College diploma	57	30.6
Income Low	Low	90	48.4
	Middle	48	25.8
	High	37	19.9
Religion	No religion	114	67.9
	Religious	52	30.1

Multidimensional Scale of Perceived Social Support Scale (MSPSS) [83]. This 12-item scale includes three subscales that respectively assess perceived support from significant others (4 items), family (4 items), and friends (4 items), based on a 7-point Likert scale ranging from 1 (very strongly disagree) to 7 (very strongly agree). One item example is “There is a special person who is around when I am in need.” It showed strong internal consistency ( $\alpha = 0.92$ ) in Chinese (Guan, et al. 2015), which was further evident in the current sample ( $\alpha = .92$ ).

## Procedures

This online quantitative study via LimeSurvey was conducted through a snowball sampling process. The recruitment information and the research project link were shared in the faculty research webpages of BU, group lists of the international students at BU, WeChat groups, Reddit, and some community networks.

Participants were given informed consent after clicking the research link, after clicking “Continue” as an agreement to participate in the research, they were directed to the online survey package that took approximately 40 minutes. Participants were given a \$10 gift card for appreciation via email. Participants were recruited from April to the middle of July 2022 in Canada.

## Data cleaning and analysis

The data analysis was conducted in IBM SPSS 26. Missing values (approximately 1% in total data points) were replaced by the average on each scale or subscale within each participant. Participants who completed at least 80% of the items were regarded as valid data and were included in the final analysis on that scale [84]. To clear up the data, we first screened data and explored the data to check the normality distribution of each outcome variable through skewness and kurtosis reported in the histograms and normal Q-Q plots. The outliers were identified in the Stem and Leaves Plots, the Winsorizing procedure was applied to replace all the outliers which had 2.5 SDs away from the group mean with either the closest minimum or maximum values [84–86]. The normal distribution of all the variables of the skewness and kurtosis were examined. No violation of homogeneity and collinearity was detected based on Levene’s test. Third, all outcome variables with a normal distribution were centred to reduce multi-collinearity [87] before being included in the regression models.

We conducted descriptive analyses (e.g., Means, SDs) to establish the properties of these measures among international students in Canada (Table 2: Means and standard deviations of loneliness, social support, and adaptability). We also conducted correlation analyses on the key variables (Table 3: Correlations between loneliness, social support, and adaptability on participants). Finally, hierarchical regression analyses were conducted to determine the unique predictor and test possible interaction effects (Table 4: Hierarchical regression analyses for the significant main effects of loneliness on adaptability by social support). All the key variables were centered prior to analyses to reduce multi-collinearity. Hierarchical regressions were conducted with adaptability as a dependent variable,

**Table 2:** Means and standard deviations of psychological variables in the model.

Variables	Mean SD	Participants N = 186
Loneliness	M	2.528
	SD	0.245
Social support	M	4.678
	SD	1.059
Adaptability	M	4.718
	SD	0.927

**Table 3:** Correlations between loneliness, social support, self-efficacy, and adaptation.

	Loneliness	Social support	Adaptation	Self-efficacy
Loneliness	1	-.52***	-.229***	-.230**
Social support	-.52***	1	.602***	.493***
Adaptation	-.229**	.602***	1	.708***
Self-efficacy	-.230**	.493***	.708***	1

Note: \*\*\* $p < .001$

**Table 4:** Hierarchical regression analysis for the significant main effects of loneliness on adaptability by social support.

Predictor	F	df1	df2	R square	$\beta$
<b>Step one</b>					
Loneliness					-.203*
Total Model	6.458***	9	123	.321	
<b>Step two</b>					
Loneliness					.107
Social support					.557***
Total Model	39.975***	1	122	.489	
<b>Step three</b>					
Loneliness					.164*
Social support					.597***
Loneliness*Socia support					-4.593***
Total Model	21.097***	1	121	.564	

Note: \*\*\* $p < .001$ . \* $p < .05$

and loneliness and demographic variables as the independent variables. The mediation effect for social support was examined in the regression model. Analyses were performed using SPSS REGRESSION for the evaluation of assumptions.

## Results

A quantitative approach using an online survey methodology was applied to conduct this research.

### Individual demographic characteristics and group differences in outcome variables

Multivariate analyses and a series of one-way analyses of variance (ANOVAs) were performed by using SPSS to examine mean differences of demographic variables on the key outcome variables such as loneliness, social support, and adaptability. Significant effects were explored using Tukey’s Honestly Significant Difference with a  $p$ -value of .05.



The sample characteristics and the group differences in outcome variables such as Adaptability were displayed in Table 1. Based on the univariate ANOVA results, the variables with  $p \leq 0.20$  (i.e., gender, marital status, country origin, income, who they are living with, living conditions, have COVID-19 or not, and family member with COVID or not) were identified as potential sociodemographic covariates in the subsequent regression models.

### Demographic effects on the adaptability of international students

The effect of gender on Adaptability was significant,  $F(2, 184) = 4.003$ ,  $p = .020$ . Female students ( $M = 4.912$ ,  $N = 84$ ) reported more Adaptability than male students ( $M = 4.569$ ,  $N = 98$ ). The effect of country origin on Adaptability was significant,  $F(4, 183) = 5.694$ ,  $p < .001$ . Students from Africa ( $M = 5.545$ ,  $N = 13$ ) reported more Adaptability than students from the American region ( $M = 4.676$ ,  $N = 120$ ), more than from Europe ( $M = 3.840$ ,  $N = 9$ ), and marginally more than Asian students ( $M = 4.751$ ,  $N = 37$ ,  $p = .058$ ). The effect of who is living with on Adaptability was significant,  $F(5, 185) = 4.993$ ,  $p < .001$ . Students living with friends ( $M = 4.821$ ,  $N = 65$ ) reported more Adaptability than those living with parents ( $M = 4.219$ ,  $N = 37$ ). The effect of school type on Adaptability was significant,  $F(2, 186) = 5.398$ ,  $p = .005$ . Students in university ( $M = 4.828$ ,  $N = 134$ ) reported more Adaptability than those in college ( $M = 4.235$ ,  $N = 31$ ).

### Correlations among all the variables on international students in Canada

Pearson correlations were calculated for each variable which included loneliness, social support, and Adaptability (Table 3). Loneliness was negatively correlated with Adaptability ( $r = -.229$ ,  $p = .002$ ), and negatively correlated with social support ( $r = -.520$ ,  $p = .00$ ). Social support was significantly positively correlated with adaptability ( $r = .602$ ,  $p = .00$ ).

### Regression analyses from loneliness on the adaptability of international students in Canada during the pandemic

This regression model examined the prediction of loneliness on Adaptability, controlling for the potential demographic covariates (e.g., gender, marital status, country origin, income, who they are living with, whether having COVID-19 or not, whether family member having COVID-19 or not) (Table 4).

In Step 1, loneliness was entered along with the following covariates: gender, marital status, country of origin, income, who they are living with, whether having COVID-19 or not, and whether a family member has COVID-19 or not. The model rendered a significant negative prediction of loneliness on adaptability,  $R^2_{adj} = .271$ ,  $F(9, 123) = 6.458$ ,  $p < .001$ . Loneliness of international students ( $\beta = -.203$ ,  $p = .011$ ) decreased their adaptability (Table 4).

When social support was added in the second step, the equation model significantly improved,  $R^2_{adj} = .447$ ,  $F(1, 122) = 39.975$ ,  $p < .001$ . Loneliness of international students ( $\beta = .107$ ,  $p = .205$ ) did not predict Adaptability. Social support of

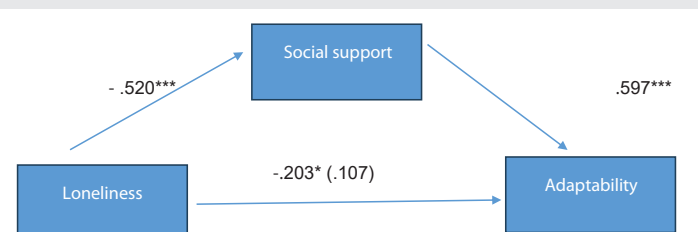
international students ( $\beta = .557$ ,  $p = .001$ ) significantly positively predicted Adaptability. Both factors explained a 39.98% variance in Adaptability ( $R^2 = .489$ ;  $R^2_{adj} = .447$ ). When the interaction of loneliness and social support was added in the third step, the equation model significantly improved,  $R^2_{adj} = .525$ ,  $F(1, 121) = 21.097$ ,  $p < .001$ .

To check if social support mediated the relationship between feelings of loneliness and Adaptability, Table 4 displays the F ratio, degrees of freedom, standardized regression coefficients ( $\beta$ ), and  $R^2$ . When controlling for the social support variable, it was a significant Adaptability ( $\beta = .557$ ,  $p = .001$ ). We therefore examined whether social support was a mediator of the relationship between loneliness variables and adaptability. According to Baron and Kenny (1986), a series of regressions were used to test the significance of the paths from the predictor (i.e., loneliness) to the mediator (i.e., social support), the mediator to the dependent variable (i.e., adaptability), and the predictor to the dependent variable.

We tested the relationship between loneliness and adaptability; The prediction of loneliness on Adaptability showed significance ( $R^2_{adj} = .044$ ,  $F(1, 184) = 9.566$ ,  $p = .002$ ). Loneliness significantly negatively correlated with adaptability ( $\beta = -.222$ ,  $p = .002$ ). We also examined the relationship between loneliness and social support (Figure 1). The prediction of loneliness on social support showed significant ( $R^2_{adj} = .044$ ,  $F(1, 184) = 68.204$ ,  $p < .001$ ). Loneliness significantly negatively correlated with social support ( $\beta = -.520$ ,  $p < .001$ ). Additionally, we tested the relationship between social support and adaptability. The prediction of social support on Adaptability showed significant ( $R^2_{adj} = .352$ ,  $F(1, 184) = 101.641$ ,  $p < .001$ ). Social support significantly positively correlated with adaptability ( $\beta = .597$ ,  $p < .001$ ). Full mediation occurs when the path from the predictor to the dependent variable drops to non-significance when the path through the mediator is included. Sobel's test confirmed that social support significantly fully mediated the effect of loneliness on adaptability.  $Z = -6.297$ ,  $p < .001$ .

### Discussion

The results of this study suggest that the feeling of loneliness does influence the adaptability of international students who are a particularly vulnerable population during the COVID-19 outbreak. Experiencing feelings of loneliness was negatively associated with social support and significantly



**Figure 1:** Mediation of Relationship between Loneliness and Adaptability by Social Support. Notes:  $-.203^{***}$  is the standardized coefficient of loneliness;  $.107$  is the standardized coefficient of loneliness when controlling social support.  $-.520^{***}$  and  $.597^{***}$  are the standardized coefficient.

predicted decreasing adaptability for international students in Canada during the pandemic. Rather, our results revealed that the impact of feelings of loneliness on adaptability was fully mediated by social support. This suggests the relationship between adaptability and loneliness is not direct but rather contingent on the availability of social support. International students with higher feelings of loneliness or experience less social support, which in turn mitigates levels of adaptability. Conversely, lower feelings of loneliness might have abilities to utilize social support networks effectively, enhancing adaptability.

To date, this is the first study to assess the relationship between COVID-19-related loneliness, social support, and adaptability among international students in Canada during the pandemic COVID-19. The findings of this study provided novel information on adaptabilities during the COVID-19 pandemic of international students in Canada due to the impact of decreased social support and increased feelings of loneliness, which we discuss further below.

### Resilience Factor of Social Support for international students

The results found social support was significantly positively correlated with one of the resilient factors adaptability, international students who had more social support were more likely to adapt to the challenges during the COVID-19 pandemic. The results align with the study by Zhou and Lin [65] that social support positively correlated with adaptability and moderated the relation between adaptability and life satisfaction. This mediation highlights the critical role of social support as a buffer against the effects of loneliness on adaptability, which is a key personal trait positively associated with psychological well-being [6,12,28,58,63,72].

International students need a variety of social support and assistance to access appropriate resources during the COVID-19 pandemic due to having no direct connection with their families and experiencing less social support, access to basic supplies with difficulties, receiving insufficient information, having job insecurity and financial difficulties [27]. Because COVID-19's rapid spread resulted in a high rate of mortality, and social restrictions such as quarantine, and social distancing led to a variety of challenges and impacted many aspects of people's life, including health and mental health, work, employment, and social, economic and educational system. International students were more likely to receive greater social support from friends and family living back home than from local students [88]. Social support was found to buffer the effects of stress on psychological well-being [12,27,58,59,60,63] and moderated the stress on anxiety and depression for international students [27]. Recent studies showed that social support alleviated perceived stress, and acculturation stress of the international students in Canada during COVID-19 [58,63].

### Risk factors of feelings of loneliness for international students

The findings showed the feelings of loneliness significantly

negatively predicted adaptability for international students in Canada during the COVID-19 outbreak. Experiencing higher levels of loneliness could predict decreased adaptability, such as ineffective communication, loss of emotional regulation, struggle with social engagement, and no flexibility in interpersonal relationships. Without these adaptabilities, international students might exacerbate their sense of isolation and increase feelings of loneliness. Our results were consistent with a recent study [25], which indicated that the COVID-19 pandemic made great changes for the education systems globally, including the closures of schools and program services online, and students experienced transition difficulties to online learning. International students showed increased social isolation and more feelings of loneliness and experienced difficulties adapting to online studies in Canada. This was consistent with one recent study [74] that found undergraduate students who had lower adaptability were linked with lower self-efficacy, lack of interest in online learning, lower openness personality scores, and adapted unwell to changes brought on by the pandemic.

Our findings revealed that feelings of loneliness were negatively associated with social support, this result was consistent with the previous study [56]. An increase in loneliness has been shown to be associated negatively with psychological well-being, self-esteem, and subjective well-being [46]. Therefore, it is essential to promote social connectedness, social bonds, and support to overcome feelings of loneliness. During school closures, distance learning, and telehealth interventions are alternative means for continuing education and supportive services.

### Resilience factor of adaptability of international students

The findings of this study align with previous research, such as [89], which emphasized that adaptability was positively associated with social support. This suggests that international students with higher social support may have better adaptability, and community skills, enabling them to cultivate stronger social connections. The feelings of loneliness significantly and negatively predicted decreased adaptability, which international students who experienced higher feelings of loneliness predicted less adaptability to respond to changes or challenges, novelty, and uncertainty during the pandemic COVID-19. Loneliness may erode confidence and reduce opportunities for social interaction, further impairing adaptability. Previous research [90] found that adaptability was positively correlated with students' engagement in learning. University students abruptly shifted from traditional to online studies, which students needed to adjust to adapt to this novel situation, causing much more challenges to student engagement in academic learning, showing inactive involvement in learning and fewer social connections, they are maybe more likely to experience feelings of loneliness during COVID-19 outbreak. Findings from Varughese and Schwartz [25] showed that international students in Canada during COVID-19 reported they could not adapt well to online learning. These results underscore the importance of fostering



social support networks to enhance adaptability and mitigate the adverse effects of loneliness.

## Limitations

The limitations of this study should be acknowledged. First, this online-based data collection method may have self-selection bias, potentially affecting the generalization of the findings. Second, due to the correlational study design, it is not possible to establish causal-effect conclusions. Third, the use of a convenient sampling procedure limits the representativeness of the sample, making it difficult to generalize the results to the broader target population. Fourth, the reliance on self-reported data generates interpretation biases. Finally, this study focused exclusively on international students in Canada. Future research could explore whether the findings can be generalized to other international students' populations of international students in different contexts.

This study makes a novel contribution to the literature on international student experiences by examining both risk factors (e.g., loneliness) and protective factors (i.e., social support) for adaptability in response to the unique challenges posed by COVID-19 in Canada. This study uniquely focused on international students in Canada during the COVID-19 pandemic, examining a variety of challenges they faced—many of which would be isolating and felt overwhelming. Our findings revealed that international students reported moderate levels of loneliness as measured by the UCLA Loneliness Scale, which significantly and negatively predicted their adaptability. Notably, social support was found to mediate the relationship between loneliness and adaptability, highlighting its crucial role. This contributes to the growing body of literature on international students as a vulnerable population in global studies. For instance, recent studies [23,80] demonstrated that adaptability to the pandemic conditions was associated with less loneliness among a large sample of Israeli students. Similarly, Rose [81] found that undergraduate students with a greater capacity to adapt to loneliness experienced less loneliness and a stronger sense of mattering to others in Canada during the pandemic. Supporting this, Flett, Khan, and Su [91] emphasized that both a sense of mattering and belongingness contribute to the psychological well-being of college and university students. Su and Flett [58] showed that adaptability was significantly positively associated with a sense of mattering, and belongingness among international students during COVID-19. These findings have significant practical implications. Specifically, this study highlights that adaptability is associated with reduced loneliness, and increased perceived social support, suggesting that prevention and intervention programs for international students should focus on strengthening their social networks and addressing feelings of loneliness to help them adapt to changes and uncertainties.

International students studying abroad face various challenges during the pandemic, including job loss, language

barriers, limited social support, separation from families, and financial difficulties. These challenges may heighten their need for social support to reduce social isolation and foster resilience during this period. It is crucial for family members, relatives, or friends to provide emotional and practical support to minimize feelings of loneliness and enhance perceived social support. Additionally, developing culturally and linguistically appropriate programs can improve life satisfaction and promote psychological well-being among international students, helping them navigate the complexities of the pandemic more effectively.

## Conclusion

In summary, our empirical findings emphasize that loneliness acts as a risk factor, while social support serves as a protective buffer for adaptability – a key resilience factor—among international students in Canada during the pandemic COVID-19. Moreover, social support was found to moderate the impact of loneliness on adaptability, likely due to international students' reliance on their family and friends for both social and financial support in navigating language and cultural barriers.

These findings provide a valuable empirical foundation for government, policymakers, and stakeholders to develop effective, culturally sensitive social support programs aimed at reducing loneliness, enhancing social support, and improving adaptability among international students in Canada during the pandemic. Language-specific workshops and some targeted training programs should be implemented to help international students access services and resources, overcome cultural stigma, and fully utilize support systems in addressing their challenges. Additionally, these findings can serve as a resource for community organizers, program planners, school administrators, and policymakers across sectors, aiding in the design and delivery of culturally appropriate services that promote the well-being and resilience of international students.

## Authors contributions

First author developed the first manuscript draft, research design, recruiting data, interpreted analyses, and final manuscript revisions.

Second author conceptualized the study, research design, and final manuscript revisions.

## Acknowledgment

We would like to thank BURC research funding, all the participants, two research assistants (Kailey Tianna Thompson, and Chigozie Somtochi Akalonu), the Office of International Activities at Brandon University and some faculties who helped send the survey links to their students in various universities of Canada, and some statistics advice from Dr. Phillip Goernert and Dr. Nicholas Watier at Brandon University.

## Funding

Brandon University Research Committee Internal Research Funding 2021–2023. Awarded to Dr. Susan Chang Su (PI) & Dr. Gordon Flett (co-investigator).

## References

- Al-Oraibi A, Fothergill L, Yildirim M, Knight H, Carlisle S, O'Connor M, et al. Exploring the psychological impacts of COVID-19 social restrictions on international university students: A qualitative study. *Int J Environ Res Public Health*. 2022;19(13):7631. Available from: <https://doi.org/10.3390/ijerph19137631>
- Firang D. The impact of COVID-19 pandemic on international students in Canada. *Int Soc Work*. 2020;63(6):820-824. Available from: <https://doi.org/10.1177/0020872820940030>
- Guadagni V, Umilta A, Laria G. Sleep quality, empathy, and mood during the isolation period of the COVID-19 pandemic in the Canadian population: Females and women suffered the most. *Front Glob Women's Health*. 2020;1:585938. Available from: <https://doi.org/10.3389/fgwh.2020.585938>
- Ochnik D, Gogowska MA, Kusnierz C, Jakubiak M, Cuero-Acosta AY. Mental health prevalence and predictors among university students in nine countries during the COVID-19 pandemic: A cross-national study. *Sci Rep*. 2021;11(1):18644. Available from: <https://doi.org/10.1038/s41598-021-97697-3>
- World Health Organization. Coronavirus (COVID-19) events as they happen. Available from: <https://www.who.int/emergencies/diseases/novel-coronavirus-2019/events-as-they-happen>
- Bello J, Cho S, Liang S, Luo C. Living through COVID-19 pandemic as international students in Canada: Collaborative autoethnography of struggles and resilience. *Emerg Perspect*. 2021;5(2):17-22. Available from: <https://dx.doi.org/10.11575/PRISM/39415>
- Lu L, Wang X, Wang X, et al. Association of COVID-19 pandemic-related stress and depressive symptoms among international medical students. *BMC Psychiatry*. 2022;22:20. Available from: <https://doi.org/10.1186/s12888-021-03671-8>
- Pawar M. The global impact of and responses to the COVID-19 pandemic. *Int J Community Soc Dev*. 2020;2. Available from: <https://doi.org/10.1177/2516602620938542>
- Sim PP, Prihadi DK. Social comparison and life satisfaction in social media: The role of mattering and state self-esteem. *Int J Public Health Sci*. 2020;9(3):245. Available from: <http://doi.org/10.11591/ijphs.v9i3.20509>
- Elmer T, Mepharm 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. Available from: <https://doi.org/10.1371/journal.pone.0236337>
- Leal Filho W, Wall T, Rayman-Bacchus L, Mifsud M, Pritchard DJ, Lovren VO, et al. Impacts of COVID-19 and social isolation on academic staff and students at universities: A cross-sectional study. *BMC Public Health*. 2021;21:1213. Available from: <https://doi.org/10.1186/s12889-021-11040-z>
- Su C, Yang L, Dong L, Zhang W. The psychological well-being of older Chinese immigrants in Canada amidst COVID-19: The role of loneliness, social support, and acculturation. *Int J Environ Res Public Health*. 2022;19:8612. Available from: <https://doi.org/10.3390/ijerph19148612>
- Zarowski B, Giokaris D, Green O. Effects of the COVID-19 pandemic on university students' mental health: A literature review. *Cureus*. 2024;16:e54032. Available from: <https://doi.org/10.7759/cureus.54032>
- Gomez C, Kalata N, Singh I, Loiero J. International students feel isolated and financially strapped as they wait out pandemic. *CBC News*. 2020. Available from: <https://www.cbc.ca/news/canada/covid-international-students-universities-pandemic-1.5505222>
- Burman D. International students concerned about fee increases, future in Canada during coronavirus pandemic. *CityNews*. 2020. Available from: <https://www.citynews.ca>
- Firang D, Mensah J. Exploring the effects of the COVID-19 pandemic on international students and universities in Canada. *J Int Stud*. 2022;12(1). Available from: <https://doi.org/10.32674/jis.v12i1.2881>
- Maleku A, Kim YK, Kirsch J, Um M, Haran H, Yu M, et al. The hidden minority: Discrimination and mental health among international students in the US during the COVID-19 pandemic. *Health Soc Care Community*. 2022;30(5):e2419–e2432. Available from: <https://doi.org/10.1111/hsc.13683>
- Zhang X, Wong GTF, Liu CH, Hahm H, Chen JA. International student stressors and mental health during the COVID-19 pandemic: A qualitative study. *J Am Coll Health*. 2022;72(7):2031-2038.
- Fritz VM, Chin D, DeMarinis V. Stressors, anxiety, acculturation and adjustment among international and North American students. *Int J Intercult Relat*. 2008;32(3):244-259. Available from: <https://doi.org/10.1016/j.ijintrel.2008.01.001>
- Wu W, Hammond M. Challenges of university adjustment in the UK: A study of East Asian master's degree students. *J Further Higher Educ*. 2011;35:423–438. Available from: <https://doi.org/10.1080/0309877X.2011.569016>
- Berry JW, Phinney JS, Sam DL, Vedder P. Immigrant youth: Acculturation, identity, and Adaptability. *Appl Psychol*. 2006;55(3):303-332. Available from: <https://doi.org/10.1111/j.1464-0597.2006.00256.x>
- Brunsting N, Zachry C, Takeuchi R. Predictors of undergraduate international student psychosocial adjustment to US universities: A systematic review from 2009-2018. *Int J Intercult Relat*. 2018;66:22-33. Available from: <https://doi.org/10.1016/j.ijintrel.2018.06.002>
- Besser A, Flett GL, Nepon T, Zeigler-Hill V. Personality, cognition, and adaptability to the COVID-19 pandemic: Associations with loneliness, distress, and positive and negative mood states. *Int J Ment Health Addict*. 2020;20(2):971-995. Available from: <https://doi.org/10.1007/s11469-020-00421-x>
- Rathakrishnan B, Bikar Singh SS, Kamaluddin MR, Ghazali MF, Yahaya A, et al. Homesickness and socio-cultural Adaptability towards perceived stress among international students of a public university in Sabah: An exploration study for social sustainability. *Sustainability*. 2021;13:4924. Available from: <https://doi.org/10.3390/su13094924>
- Varughese A, Schwartz S. The pandemic exposed the vulnerability of international students in Canada. Available from: <https://theconversation.com/the-pandemic-exposed-the-vulnerability-of-international-students-in-canada-174105>
- de Moissac D, Graham JM, Prada K, Gueye NR, Rocque R. Mental health status and help-seeking strategies of international students in Canada. *Can J High Educ*. 2020;50(4):52-71. Available from: <https://journals.sfu.ca/cjhe/index.php/cjhe/article/view/188815>
- Reid C, Beckstead J, Salinas-Miranda A. COVID-19 stress, social support, and coping in international students during the COVID-19 pandemic: A moderated analysis on anxiety and depression. *J Am Coll Health*. 2022;72:1-7. Available from: <https://doi.org/10.1080/07448481.2022.2089044>
- Hari A, Nardon L, Zhang H. A transnational lens into international student experiences of the COVID-19 pandemic. *Glob Networks*. 2023;23(1):14-30. Available from: <https://doi.org/10.1111/glob.12332>

29. Kilgore WDS, Cloonan SA, Taylor EC, Dailey NS. Loneliness: A signature mental health concern in the era of COVID-19. *Psychiatry Res.* 2020;290:113117. Available from: <https://doi.org/10.1016/j.psychres.2020.113117>
30. Lampropoulou A, Georgakakou-Koutsonikou N, Hatzichristou C. Student Adaptability, loneliness and mental health profiles second wave of the pandemic COVID-19. *Educ Sci.* 2023;13(7):644. Available from: <https://doi.org/10.3390/educsci13070644>
31. Mariel A, Bagaforo S, Jawed M, Shah MS. Impact of COVID-19 restrictions on mental health of international students in higher education: A narrative review. *JPHE.* 2024;8. Available from: <https://jphe.amegroups.org/article/view/10099/html>
32. Statistics Canada. Mental health among health care workers in Canada during the COVID-19 pandemic. 2021a. Available from: <https://www150.statcan.gc.ca/n1/daily-quotidien/210202/dq210202a-eng.htm>
33. Zheng K, Johnson S, Jarvis R, Victor C, Barreto M, Qualter P, et al. The experience of loneliness among international students participating in the BBC Loneliness Experiment: Thematic analysis of qualitative survey data. *Curr Res Behav Sci.* 2023;4:100113. Available from: <https://doi.org/10.1016/j.crbeha.2023.100113>
34. Amoah PA, Mok EWC. COVID-19 and well-being of non-local students: Implications for international higher education governance. *High Educ Policy.* 2022;35:651-672. Available from: <https://doi.org/10.1057/s41307-022-00270-4>
35. Garg AK, Rosada CR Jr, Ariken J. Experiences of international students in Vancouver, British Columbia, Canada. *J Comp Int High Educ.* 2023;15(3):109-125. Available from: <https://files.eric.ed.gov/fulltext/EJ1402624.pdf>
36. Indra GH, Radyani AM, Oriza IID. The relationship between stress and well-being: The mediating roles of students' psychological flexibility and loneliness during the coronavirus pandemic. *Psychol Res Urban Soc.* 2021;4(2):3-17. Available from: <https://doi.org/10.7454/proust.v4i2.100>
37. Jamshaid S, Bahadar N, Jamshed K, Rashid M, Afzal MI, Tian L, et al. Pre- and post-pandemic (COVID-19) mental health of international students: Data from a longitudinal study. *Psychol Res Behav Manag.* 2023;16:431-46. Available from: <https://doi.org/10.2147/prbm.s395035>
38. McCallum SM, Calear AL, Cherbuin N, Farrer LM, Gulliver A, Shou Y, et al. Associations of loneliness, belongingness and health behaviors with psychological distress and wellbeing during COVID-19. *J Affect Disord.* 2021;6:100214. Available from: <https://doi.org/10.1016/j.jadr.2021.100214>
39. Tull MT, Edmonds KA, Scamaldo KM, Richmond JR, Rose JP, Gratz KL. Psychological outcomes associated with stay-at-home orders and the perceived impact of COVID-19 on daily life. *Psychiatry Res.* 2020;289:113098. Available from: <https://doi.org/10.1016/j.psychres.2020.113098>
40. Phillips R, Seaborne K, Goldsmith A, Curtis N, Davies A, Haynes W, et al. Student loneliness through the pandemic: How, why, and where? *The Geographical Journal.* 2022;188(2):277-293. Available from: <https://doi.org/10.1111/geoj.12438>
41. Rubin A. Research and therapy. In: Peplau LA, Perlman D, editors. *Loneliness: A Sourcebook of Current Theory.* New York: Wiley; 1982;255-68.
42. Çiçek I. Mediating role of self-esteem in the association between loneliness and psychological and subjective well-being in university students. *Int J Contemp Educ Res.* 2021. Available from: <https://doi.org/10.33200/ijcer.817660>
43. Dong X, Chang ES, Wong E, Simon M. Perception and negative effect of loneliness in a Chicago Chinese population of older adults. *Arch Gerontol Geriatr.* 2012;54:151-159. Available from: <https://doi.org/10.1016/j.archger.2011.04.022>
44. Li J, Xu L, Chi I. Challenges and resilience related to aging in the United States among older Chinese immigrants. *Aging Ment Health.* 2017;22:1548-1555. Available from: <https://doi.org/10.1080/13607863.2017.1377686>
45. Munir T, Shafiq S, Ahmad Z, Khan S. Impact of loneliness and academic stress on psychological well-being among college students. *Acad Res Int.* 2015;6(2).
46. Özdoğan AC. Subjective well-being and social-emotional loneliness of university students: The mediating effect of the meaning of life. *J Pedagogical Res.* 2021;5(1):18-30. Available from: <https://doi.org/10.33902/JPR.2021066865>
47. Solmi M, Veronese N, Galvano D, Favaro A, Ostinelli EG, Noventa V, et al. Factors associated with loneliness: An umbrella review of observational studies. *J Affect Disord.* 2020;271:131-138. Available from: <https://doi.org/10.1016/j.jad.2020.03.075>
48. Wickens CM, McDonald AJ, Elton-Marshall T, Wells S, Nigatu YT, Jankowicz D, et al. Loneliness in the COVID-19 pandemic: Associations with age, gender, and their interaction. *J Psychiatr Res.* 2021;136:103-108. Available from: <https://doi.org/10.1016/j.jpsychires.2021.01.047>
49. Abdollahi A, Allen KA, Taheri A. Moderating the role of self-compassion in the relationship between perfectionism and depression. *J Ration-Emotive Cogn-Behav Ther.* 2020;38(4):459-471. Available from: <https://psycnet.apa.org/doi/10.1007/s10942-020-00346-3>
50. Arslan G. School belongingness, well-being, and mental health among adolescents: Exploring the role of loneliness. *Aust J Psychol.* 2020;1-10. Available from: <https://doi.org/10.1111/ajpy.12274>
51. Mushtaq R, Shoib S, Shah T, Mushtaq S. Relationship between loneliness, psychiatric disorders, and physical health? A review on the psychological aspects of loneliness. *J Clin Diagn Res.* 2014;8(9):1-4. Available from: <https://doi.org/10.7860/JCDR/2014/10077.4828>
52. Bu F, Steptoe A, Fancourt D. Who is lonely in lockdown? Cross-cohort analyses of predictors of loneliness before and during the COVID-19 pandemic. Unpublished manuscript. 2020. Available from: <https://www.medrxiv.org/content/10.1101/2020.05.14.20101360v1>
53. Groarke JM, Berry E, Graham-Wisener L, McKenna-Plumley PE, McGlinchey E, Armour C. Loneliness in the UK during the COVID-19 pandemic: Cross-sectional results from the COVID-19 psychological wellbeing study. *PLoS One.* 2020;15(9):e0239698. Available from: <https://doi.org/10.1371/journal.pone.0239698>
54. Ahmed MZ, Ahmed O, Aibao Z, Hanbin S, Siyu L, Ahmad A. Epidemic of COVID-19 in China and associated psychological problems. *Asian J Psychiatry.* 2020;51:102092. Available from: <https://doi.org/10.1016/j.ajp.2020.102092>
55. Qiu J, Shen B, Zhao M, Wang Z, Xie B, Xu Y. A nationwide survey of psychological distress among Chinese people in the COVID-19 epidemic: Implications and policy recommendations. *Gen Psychiatry.* 2020;3(2):e100213. Available from: <https://doi.org/10.1136/gpsych-2020-100213>
56. Boksaczanin A, Palace M, Brown W, Gladys O, Tripathi R, Shree D. Depression, perceived risk of COVID-19, loneliness, and perceived social support from friends among university students in Poland, UK, and India. *Psychol Res Behav Manag.* 2023;9(16):651-663. Available from: <https://psycnet.apa.org/doi/10.2147/PRBM.S380318>
57. Cohen S, Underwood LG, Gottlieb BH, editors. *Social support measurement and intervention: A guide for health and social scientists.* Oxford University Press; 2000. Available from: <https://doi.org/10.1093/med:psych/9780195126709.001.0001>
58. Su C, Flett G. Psychological well-being on international students in Canada amidst COVID-19: The role of mattering, Adaptability, social support, and



- loneliness. International Convention Psychological Society. March 9-11th. Brussels, Belgium. Poster #43818. 2023.
59. Reid C, Beckstead J, Salinas-Miranda A. COVID-19 stress, social support, and coping in international students during the COVID-19 pandemic: A moderated analysis on anxiety and depression. *J Am Coll Health*. 2022;72(5):1617–1623. Available from: <https://doi.org/10.1080/07448481.2022.2089044>
60. Su C, Hynie M. Cross-cultural comparison of parenting stress and social support on maternal depression. In: Yuan Y, editor. *Managing Ethno-Cultural Diversity in China and Canada: Comparative Perspective*. Shanghai Jiao Tong University Press; 2012;154-165.
61. Su C, Khanlou N. Effects of stress, social support, and cultural beliefs on immigrant mothers of children with developmental disabilities. *INYL J*. 2023;11(2).
62. Shakespeare-Finch J, Obst PL. The development of the 2-way social support scale: A measure of giving and receiving emotional and instrumental support. *J Pers Assess*. 2011;93:483–490. Available from: <https://doi.org/10.1080/00223891.2011.594124>
63. Su C, Flett G. Mattering, Anti-mattering, and fear of not mattering on life satisfaction of international students in Canada during COVID-19 pandemic. 14th Asian Psychology Convention. March 25–29, 2024. Tokyo, Japan.
64. Su C, Hynie M. Effects of life stress, social support, and cultural norms on parenting styles among mainland Chinese, European Canadian, and Chinese Canadian immigrant mothers. *J Cross-Cult Psychol*. 2011;42(6):945-963. Available from: <https://doi.org/10.1177/0022022110381124>
65. Zhou M, Lin W. Adaptability and life satisfaction: The moderating role of social support. *Front Psychol*. 2016;7:1134. Available from: <https://doi.org/10.3389/fpsyg.2016.01134>
66. Chew QH, Wei KC, Vasoo S, Chua HC, Sim K. Narrative synthesis of psychological and coping responses towards emerging infectious disease outbreaks in the general population: Practical considerations for the COVID-19 pandemic. *Singapore Med J*. 2020;61:350–356. Available from: <https://doi.org/10.11622/smedj.2020046>
67. halid A, Naidu J, Turin TC. "It's not just about you": International students' vulnerabilities and capacities during the first phase of the COVID-19 pandemic in Canada. *PLoS One*. 2024;19(10):e0311514. Available from: <https://doi.org/10.1371/journal.pone.0311514>
68. Martin AJ, Nejad HG, Colmar S, Liem GAD. Adaptability: How students' responses to uncertainty and novelty predict their academic and non-academic outcomes. *J Educ Psychol*. 2013;105:728–746. Available from: <https://psycnet.apa.org/doi/10.1037/a0032794>
69. Stockinger K, Rinas R, Daumiller M. Student adaptability, emotions, and achievement: Navigating new academic terrains in a global crisis. *Learn Individ Differ*. 2021;90:102046. Available from: <https://doi.org/10.1016/j.lindif.2021.102046>
70. Wilkins KG, Santilli S, Ferrari L, Nota L, Tracey TJG, Soresi S. The relationship among positive emotional dispositions, career adaptability, and satisfaction in Italian high school students. *J Vocat Behav*. 2014;85:329–338. Available from: <https://doi.org/10.1016/j.jvb.2014.08.004>
71. Ployhart RE, Bliese PD. Individual Adaptability (I-ADAPT) theory: Conceptualizing the antecedents, consequences, and measurement of individual differences in adaptability. In: Burke SC, Pierce LG, Salas E, editors. *Understanding adaptability: A prerequisite for effective performance within complex environments*. Advances in Human Performance and Cognitive Engineering Research. Vol. 6. Emerald Group Publishing Limited; 2006;3–39. Available from: [https://www.emerald.com/insight/content/doi/10.1016/s1479-3601\(05\)06001-7/full/html](https://www.emerald.com/insight/content/doi/10.1016/s1479-3601(05)06001-7/full/html)
72. Maggiori C, Johnston SC, Krings F, Massoudi K, Rossier J. The role of career adaptability and work conditions on general and professional well-being. *J Vocat Behav*. 2013;83(3):437-449. Available from: <http://dx.doi.org/10.1016/j.jvb.2013.07.001>
73. Dyson R, Renk K. Freshmen Adaptability to university life: Depressive symptoms, stress, and coping. *J Clin Psychol*. 2006;62(10):1231-1244. Available from: <https://doi.org/10.1002/jclp.20295>
74. Street R. Perceptions of online learning: Relationships with personality, learning strategies, adaptability, and academic performance. Retrieved from: Brandon University Thesis Summary.
75. Marville A. The case of the international student: A foreign student reports. *College Board Review*. 1981;120:23-26. Available from: <https://eric.ed.gov/?id=EJ250039>
76. Oei TP, Notowidjojo F. Depression and loneliness in overseas students. *Int J Soc Psychiatry*. 1990;36(2):121–130. Available from: <https://doi.org/10.1177/002076409003600205>
77. Furnham A, Bochner S. Social difficulty in a foreign culture: An empirical analysis of culture shock. In: Bochner S, editor. *Cultures in contact*. Oxford: Pergamon Press; 1982. doi:10.1016/B978-0-08-025805-8.50016-0. Available from: <https://doi.org/10.1016/B978-0-08-025805-8.50016-0>
78. Sam DL, Eide R. Survey of mental health of foreign students. *Scand J Psychol*. 1991;32:22–30. Available from: <http://dx.doi.org/10.1111/j.1467-9450.1991.tb00849.x>
79. Flett GL, Rose AL, Goldberg JO, Nepon T. The pervasiveness and public mental health significance of loneliness: Assessing, understanding, and preventing unbearable and enduring loneliness. In: Zangeneh M, editor. *Essentials in health and mental health: Advances in mental health and addiction*. Cham: Springer; 2024;1–26. Available from: [https://doi.org/10.1007/978-3-031-56192-4\\_1](https://doi.org/10.1007/978-3-031-56192-4_1)
80. Besser A, Flett GL, Zeigler-Hill V. Adaptability to a sudden transition to online learning during the COVID-19 pandemic: Understanding the challenges for students. *Sch Teach Learn Psychol*. 2022;8(2):85–105. Available from: <https://doi.org/10.1037/stl0000198>
81. Rose AL, Goldberg JO, Flett GL, Nepon T, Besser A. Totally all alone with my thoughts: Development, psychometric properties and correlates of the Loneliness Automatic Thoughts Questionnaire. *Psychol Res Behav Manag*. 2024;17:1073–1085. Available from: <https://doi.org/10.2147/prbm.s433211>
82. Wang L. College students' psychological problems and countermeasures. *Forward Position*. 1995;5:41–42. Available from: <https://www.scrip.org/reference/referencespapers?referenceid=2895282>
83. Zimet GD, Powell SS, Farley GK, Werkman S, Berkoff KA. Psychometric characteristics of the multidimensional scale of perceived social support. *J Pers Assess*. 1990;55(3-4):610–617. Available from: <https://doi.org/10.1080/00223891.1990.9674095>
84. Tabachnick BG, Fidell LS. *Using multivariate statistics*. 4th ed. Needham Heights, MA: Allyn & Bacon; 2001. Available from: <https://www.scrip.org/reference/referencespapers?referenceid=1998945>
85. Hoaglin DC, Iglewicz B. Fine tuning some resistant rules for outlier labeling. *J Am Stat Assoc*. 1987;82:1147–1149. Available from: <https://doi.org/10.1080/01621459.1987.10478551>
86. Reifman A, Keyton K. Winsorize. In: Salkind NJ, editor. *Encyclopedia of Research Design*. Sage; 2010.
87. Kraemer CH, Blasey MC. Centring in regression analyses: A strategy to prevent errors in statistical inference. *Int J Methods Psychiatr Res*. 2004;13:141–151. Available from: <https://doi.org/10.1002/mpr.170>
88. Chavajay P. Perceived social support among international students at a U.S. university. *Psychol Rep*. 2013;112(2):667–677. Available from: <https://doi.org/10.2466/17.21.pr0.112.2.667-677>

89. Holliman A, Waldeck D, Holliman MD. Adaptability, social support, and psychological wellbeing among university students: A 1-year follow-up study. *Front Educ.* 2022;6:1036067. Available from: <https://doi.org/10.3389/feduc.2022.1036067>

90. Zhang K, Wu S, Xu Y, Cao W, Goetz T, Parks-Stamm EJ. Adaptability promotes student engagement under COVID-19: The multiple mediating effects of academic emotion. *Front Psychol.* 2021;6(11):633265. Available from: <https://doi.org/10.3389/fpsyg.2020.633265>

91. Flett G, Khan A, Su C. Mattering and psychological well-being in college and university students: A review and recommendations for campus-based initiatives. *Int J Ment Health Addict.* 2019;17(48):1–14. Available from: <https://link.springer.com/article/10.1007/s11469-019-00088-4>

92. Canadian Bureau for International Education (CBIE). International students in Canada. 2019. Available from: <https://cbie.ca/infographic/>

93. Canadian Bureau for International Education (CBIE). International students in Canada. CBIE Research in Brief Numbers. Ottawa, CBIE; 2020.

## Discover a bigger Impact and Visibility of your article publication with Peertechz Publications

### Highlights

- ❖ Signatory publisher of ORCID
- ❖ Signatory Publisher of DORA (San Francisco Declaration on Research Assessment)
- ❖ Articles archived in worlds' renowned service providers such as Portico, CNKI, AGRIS, TDNet, Base (Bielefeld University Library), CrossRef, Scilit, J-Gate etc.
- ❖ Journals indexed in ICMJE, SHERPA/ROMEO, Google Scholar etc.
- ❖ OAI-PMH (Open Archives Initiative Protocol for Metadata Harvesting)
- ❖ Dedicated Editorial Board for every journal
- ❖ Accurate and rapid peer-review process
- ❖ Increased citations of published articles through promotions
- ❖ Reduced timeline for article publication

**Submit your articles and experience a new surge in publication services**

<https://www.peertechzpublications.org/submission>

*Peertechz journals wishes everlasting success in your every endeavours.*