Review Article

Effects of Anti-Mattering and Fear of not Mattering on the Psychological Well-Being of International Students in Canada during the COVID-19 Pandemic

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Abstract

The COVID-19 outbreak has led to unprecedented hazards to health and mental health globally at the beginning of 2020. These issues are being exacerbated by safety concerns and disruptions of daily routines especially for people in vulnerable groups, including international students in Canada, who experience a variety of stress and challenges in a new country. Additional acculturation stress stems from language barriers and cultural conflicts that can impact well-being and life satisfaction. The current study uniquely examined how anti-mattering and fears of not matter relate to acculturative stress, discrimination and stigma, and perceived stress of international students during the COVID-19 pandemic. Anti-mattering, fear of not mattering, acculturation stress, adaptability, social support, loneliness, and well-being were examined among 186 international students. As expected, anti-mattering and fear of not mattering were associated significantly with higher acculturation stress, perceived discrimination and stigma, perceived stress, and loneliness. They were also associated with lower adaptability, lower life satisfaction, and lower psychological well-being. Regression analyses showed anti-mattering and fear of not mattering predicted well-being. Results indicated that acculturation stress fully mediated the link between anti-mattering/fear of not mattering and well-being; Acculturation stress and social support fully mediated the effect of the fear of not mattering on life satisfaction. Adaptability significantly fully mediated the effect of anti-mattering on well-being. Our empirical findings are discussed in terms of the need for prevention efforts focused on enhancing mattering, limiting anti-mattering and associated fears, reducing social loneliness, and acculturation stress, and increasing social support and adaptability that contribute to feeling mattering and life satisfaction and psychological well-being. Our discussion focuses on practical suggestions that can help and facilitate the well-being of international students, especially during inordinately challenging times.

Introduction

Impact of COVID-19 on the psychological well-being of international students

The COVID-19 outbreak became a global public health crisis, posing unprecedented hazards to both physical and mental health worldwide since early 2020. This lasted over two years until the World Health Organization (WHO) declared the end of COVID-19 as a public emergency on May 5, 2023 [1,2]. Coronaviruses, known for spreading rapidly, generated major threats to global health, while adversely disrupting the global economy, educational systems, environment, and mental health [3]. The implementation of social restrictions such as occasional confinement, lockdown, and curfew, has indeed constricted the spread of COVID-19. However, these restriction measures have also significantly limited people's social activities, social connections, and social engagement. Consequently, these restrictions have heightened feelings of loneliness among individuals [4]. There is a growing concern regarding a mental health epidemic among college and university students in Canada and elsewhere. This epidemic encompasses severe anxiety, emotional distress, and loneliness, experienced by college and university students in Canada and elsewhere, and these problems are being exacerbated by stress, disruption, and safety concerns stemming from the COVID-19 pandemic. These mental health challenges may have

adverse effects on their psychological well-being [1,2,5,6]. In a recent study spanning seven countries, including Canada, it was discovered that among university students during the COVID-19 pandemic, the prevalence of high stress was 61.3% in the total sample, while depression was affected in 40.3%, and generalized anxiety symptoms were present in 30% [5].

International students represent one of the most vulnerable populations during the pandemic outbreak, significantly impacting their recruitment and retention in Canadian Universities and throwing the future of international students in Canada into uncertainty (The Globe and Mail, 2020). International students encounter a multitude of challenges, including heightened social isolation, exorbitant airfare costs, financial hardships, anxiety, psychological distress, emotional strain, travel restrictions, vaccination protocols, diminished sense of personal self-worth, loss of interpersonal connections, and compromised academic performance since the schools' shutdown [1,7].

International students striving for academic success in Canada encounter significant challenges while studying abroad, including adapting to a new social and cultural environment and educational system. Assimilating into a new community with hurdles such as dealing with language barriers, perspectives of health, financial struggles, increased tuition fees, homesickness, limited social networks, and a lack of social support. The effects of adjusting to a new culture might be intense, and often lifelong [8,9]. The process of acculturation process significantly heightens stress and anxiety levels among international students [10]. Moreover, the COVID-19 pandemic has exacerbated the well-being challenges faced by international students, correlating with increased levels of stress, anxiety, and depression [11,12].

Anti-mattering and the fear of not mattering

Previous studies have often emphasized the importance of positive feelings of mattering indicating that individuals have a fundamental need to feel significant [13]. These feelings contribute significantly to psychological well-being. Mattering serves as a protective factor, however, the absence of such feelings can be profoundly detrimental, and an absence of feelings of mattering can be quite destructive. Mattering was negatively associated with anxiety and depression [13]. This current work also focuses on individuals who experience a profound sense of anti-mattering, which is a destructive role and refers to the feelings of not mattering to others.

A recent study by Flett, et al. [14] further explored the feeling of not mattering, suggesting that individuals perceive themselves as insignificant to others, potentially leading to negative self-perception, insecure attachment, maladjustment, less satisfaction of the needs of competence, autonomy, and connection. Individuals may feel "I do not matter!" and experience a sense of invisibility and marginalization. Previous studies focused on positive feelings of mattering which indicate people need to matter and to feel significant [15,16], which contributes to psychological well-being. Mattering can be highly protective, but an absence of feelings of mattering can be quite destructive. This current work also focuses on

individuals who experience a profound sense of anti-mattering which is a destructive role and refers to the feelings of not mattering to others.

A recent study by Flett, et al. [14] delved into the sensation of insignificance and the feeling of not mattering, which states people feel insignificant to others, leading to a markedly negative self-perception, insecure attachment, maladjustment, reduced satisfaction of competence, autonomy, and connection needs, leading to higher levels of loneliness, anxiety, and fear of missing out [17]. Such individuals may experience feelings of "I do not matter!" and a sense of invisibility, as highlighted by Flett, et al. [14], potentially leading to feelings of marginalization.

Unfortunately, the feelings of not mattering are associated with reduced psychological well-being and are uniquely implicated in depression and suicidality [18]. It is a key psychological resource in helping people adjust to the overwhelming demands of the COVID-19 pandemic, including feelings of loneliness and the social isolation that so many people feel [13,19]. Anti-mattering showed a positive correlation with depressive symptomology [14], the perception of being stigmatized [20], the feelings of loneliness and mistreatment [16], as well as stress and anxiety [18]. Consequently, it can be inferred that international students attending college or university during a pandemic would likely experience a significant need to feel valued and to avoid feelings of insignificance. Moreover, the adverse impacts of COVID-19 were notably more pronounced for one of the vulnerable groups such as international students in Canada [2].

The fear of not mattering is a recently developed concept and construct and signifies a negative or uncertain sense of self. Individuals may experience anxiety when they perceive that they may not matter to others [21]. This anxiety can stem from concerns about not being valued, acknowledged, or listened to by others who show less interest [13], and the ruminations about the potential loss of important social connections or resources, which can be associated with the feelings of loneliness [22]. Amid the COVID-19 breakout, people experience heightened fears, anxieties, and worries due to the uncertainty and high mortality rates. Individuals are more likely to feel stressed and fearful, perceiving themselves as less capable of controlling or overcoming life difficulties and lacking a sense of self-efficacy.

To our knowledge, previous investigators have not examined a likely association that should exist between feelings and fears of not mattering and stressful acculturation experiences, including perceived exposure to discrimination and prejudice in members of minority groups in general and international students in particular. Harsh and inappropriate treatment can involve anti-mattering experiences that convey a sense of being ignored, disregarded, or poorly viewed by people comprising the dominant or mainstream culture. People can be made to feel unvalued or even devalued if there is a lack of attention and interest if they, as newcomers, experience circumstances that are demeaning and blatantly unfair which can result in feeling centered out for mistreatment. We contend in the current article that the feeling of being valued or devalued among people exposed to discrimination, prejudice, and stigma is felt

palpably in the form of feelings of not mattering and associated fears due to being treated as less significant than others in ways that violate the core need that everyone has to feel a sense of mattering to others and in society. Parenthetically, it is vital to develop the capacity to adapt and be resilient in response to adverse experiences that heighten feelings and fears of not mattering.

The feeling of being someone who matters to others should be a key psychological resource that helps buffer the stressfulness inherent in the acculturation process. In this regard, Flett, Khan, and Su [15] noted that "... at the root of making someone feel like they matter is the recognition and encouragement of their unique experiences and showing that their cultural background is valued as a key part of their self-definition and identity" (p. 674). Adaptation via acculturation has been recognized as having a psychological component, but when it comes to self-worth, the focus has been on self-esteem [23], and worth in terms of belonging to others has not been an explicit focus.

In general, mattering has been contrasted with marginalization [24] and it has been noted by Schlossberg [24] that people in transition tend to quite naturally feel marginal and wonder whether they matter or they will eventually matter. This should certainly be the case for international students in general, but especially those experiencing a transition during the unprecedented COVID-19 pandemic.

Schlossberg [24] cited Park [25] as characterizing the marginal person in a new culture as someone who may be living according to traditions but who also can never feel quite accepted because of prejudice experienced in the new society. The tendency for certain people in this situation to feel invisible fits with the emphasis of anti-mattering as feelings of being unseen and unheard.

We hypothesized in the current research that international students with high levels of fear and feelings of not mattering would report higher levels of acculturative stress and stigma related to discrimination. Feelings and fears of not mattering should be linked with psychological distress and loneliness in international students due to feeling isolated during the pandemic but also not feeling a supportive positive connection and sense of affiliation in the new setting.

Perceived stress, acculturation stress, and adaptability

The emergence of coronavirus disease 2019 has become an ultimate stressor, leading to illness and being recognized as a global overwhelming threat, causing widespread fear of infection [26]. This situation has heightened uncertainty among international students within Canada. For instance, international students in Canada reported having a significant financial strain and being unable to afford necessities due to loss of employment, reduced job availability, and exclusion from government social programs. Pandemic COVID-19 has made an immeasurable negative impact globally, particularly exacerbating a severe mental health problem for international students during the pandemic outbreak. This has resulted in severe consequences for young adults' physical and mental health as well as psychological well-being. The lock down measures [27] and social distancing [28] have intensified challenges and stress in the world, especially this urgent risky situation has impacted international students learning in a foreign country, leading to heightened levels of stress and distress. They often resort to avoidance coping strategies, which have been shown to generate negative effects on well-being [29]. Additionally, international students in Canada have reported stressors related to increased social isolation, uncertainty regarding their immigration status, decreased social connections, and difficulties with communication. As a result, they are more susceptible to developing mental illnesses.

When individuals migrate from one area to another with a different lifestyle, belief system, and values, they often face the challenges of adapting to the social and cultural environment of a new society. Integrating into a new community can lead to stressors such as language barriers, differing perspectives on health, lower financial status, limited social support, and cultural conflicts. This process of acculturation typically results in heightened levels of stress and anxiety levels among international students. International students are particularly susceptible due to their distance from home, academic stress stemming from language barriers, lack of support networks, and unfamiliarity with the local healthcare system or government regulations, as they are not recognized as permanent residence. Despite their significant contributions to Canada's gross domestic product, international students in Canada often face difficulties. Language barriers can hinder their ability to connect with other students and faculty. Social and cultural differences and racial and ethnic discrimination often lead to significant social and psychological distress, which may manifest as emotional turmoil, diminished self-esteem, reduced interpersonal connections, and impaired academic task performance among international students [1]. During this adaptation process, individuals may encounter challenges and dilemmas that may conflict with their beliefs, upbringing, or culture, making it harder to adjust to their new society. Consequently, they often feel compelled to integrate into the new society while grappling with preserving their identity and evaluating their values or beliefs. This phenomenon is described as acculturation stress [30].

Adaptability is another crucial personality trait that helps determine one's response to challenges during the time transitional period of the pandemic COVID-19. With university campuses being shut down to mitigate the spread of COVID-19, students had to switch to online learning, requiring increased practices to adapt to the classroom platforms, technologies, and skills. Individuals require adaptability and a sense of self-efficacy to thrive in this new learning environment. Recent studies discovered that adaptability is positively associated with a sense of mattering [31] and negatively correlated with loneliness [31,32].

Discrimination and stigma, loneliness, and social support

An increase in racial discrimination and homesickness was observed among international students in Canada during the

pandemic [33,34]. However, the Canadian government has discriminated against international students while developing and implementing both financial and social relief programs. Due to their ethnicity or origin, international students were at a greater risk of unemployment due to the pandemic [35]. The status of international students became more emphasized during the pandemic, leading to stricter restrictions related to government support (e.g., the Canadian Emergency Response Benefit), travel, and COVID-19 regulations [35]. International students, who not only lack the student community but also the support of family and friends from their home country, may have experienced even greater challenges to their well-being compared to their domestic counter parts. International students studying abroad, unable to return to their country of origin during the COVID-19 pandemic likely faced increased levels of discrimination, and stigma, leading to increased feelings of depression and decreased well-being. Stigma can result in individuals feeling isolated, alienated, mocked, bullied, discriminated against, or excluded from social and cultural groups. Those dealing with health or mental health issues often experience self-stigma as well [36,37]. Additionally, international students encountered greater obstacles and inequitable access to COVID-19 vaccines due to their lack of a provincial health card [38]. Studies have also highlighted that international students of Asian origin were more susceptible to race-related crimes or violence due to where the virus' initial origin. Individuals who are treated unfairly or discriminated against demonstrate reduced mental health. Perceived discrimination has been linked to higher psychological distress, predicted depression, and harmed the sense of belonging and psychological well-being [39]. Experiencing discrimination is associated with poorer reported health, psychiatric diagnoses, and increased substance use. A recent study confirmed that feelings of not mattering are associated with perceived stigma by others for help-seeking, they showed greater tendencies to avoid seeking help. The feelings of shame and stigma were associated with a decreased perception of mattering [20].

Loneliness has become a significant issue for both individuals and society during the COVID-19 pandemic, leading to substantial changes in psychological and social dynamics. Within the context of COVID-19 outbreaks, international students in Canada are experiencing increasing levels of isolation, loneliness, and concerns about their future. With the closure of universities and college campuses, students have been compelled to vacate their accommodations in response to the COVID-19 crisis. Border closures and flight cancellations have further exacerbated their sense of isolation, compounded by the absence of support networks. Social distancing and quarantine measures to fight COVID-19 have restricted social interactions and engagements, amplifying feelings of loneliness. Loneliness is defined as the lack of meaningful social connections and affection within existing social relations, which significantly impacts individuals' mental health and well-being and their overall quality of life in Canada. A recent study [7] reported that there was a strong association between loneliness and feelings of not mattering among college students from Israel. Lower levels of mattering, anti-mattering, and fear of not mattering were associated with greater traits of loneliness [22].

International students have faced social isolation and stress during the COVID-19 pandemic. The lack of social support may exacerbate the risk of mental health issues and diminish overall well-being [11]. Social support serves as a vital means of coping with stress and fostering mental well-being [40,41]. Its significance extends to life satisfaction and mental health in the later stages of life [42,43]. Particularly during times of transition of a pandemic outbreak, social support, defined as verbal or non-verbal information, advice, tangible aid, or simply the presence of social connections [44] becomes crucial. Social support manifests in various forms, both formal and informal, encompassing emotional, instrumental, and tangible (e.g., information, advice, and companionship [45]. Research has shown a positive correction between social support, life satisfaction, and psychological well-being in older adults of Chinese under COVID-19. In this study, we aim to explore the relationship between social support and the other resilient factors and risk factors among international students in Canada during the COVID-19 pandemic.

Purpose of this study

The current study was conducted in response to growing concerns that there is an epidemic of mental health problems being experienced by college and university students in Canada and elsewhere, and these problems are being exacerbated by the stress, disruption, and safety concerns arising from the COVID-19 pandemic. The current proposal is designed to shine a spotlight on students already facing unique challenges – vulnerable international students.

The current research is an extension of our previous research with children and adolescents and follows from our recent review paper which outlined how and why universities and colleges should promote feelings of mattering among their students. Unfortunately, the feelings of not mattering which refers to the feelings of not mattering to others have a negative self-view, and less satisfaction with the needs of competence, autonomy, and connection are associated with reduced psychological well-being. It is a key psychological resource in helping people adjust to the overwhelming demands of the COVID-19 pandemic, including feelings of loneliness and the social isolation that so many people feel [7]. To our knowledge, there has been no quantitative research reported thus far that focuses specifically on the risk roles of both not mattering and the fear of not mattering in international college and university students. This proposed work was designed to address this significant void, and it is intended as a first step in a program of research that will ultimately examine these issues from a qualitative perspective as well and then take the information and incorporate it into prevention interventions and policy recommendations for putting this information into action.

The present study aimed to assess the effects of anti-mattering (fear of not mattering), perceived stress, acculturative stress, loneliness, adaptability, and social support on psychological well-being during the COVID-19 pandemic on international students from universities and colleges in Canada. The potential mediators such as acculturation stress, loneliness, adaptability, and social support were identified

and examined how predict psychological well-being. We expected anti-mattering and the fear of not mattering would be significantly negatively associated with high levels of adaptability, social support, and well-being; and significantly positively associated with risk factors such as loneliness, perceived stress, acculturation stress, discrimination, and stigma. Demographic factors such as gender, income, English proficiency, and living conditions might differ in the risk and resilience factors. Female international students might report higher stress, perceive more stigma and discrimination, and have more mental health issues than males under COVID-19.

It was hypothesized that:

1. Anti-mattering and the fear of not mattering would be negatively associated with psychological well-being, and the resilience factors such as social support, and adaptability, would be positively associated with the risk factors to the well-being such as perceived stress, acculturation stress, loneliness, discrimination, and stigma.

2. Anti-mattering and the fear of not mattering would be the significantly negative predictors of the outcomes of psychological well-being.

3. The demographic factors such as gender, income, English proficiency, and living conditions would differ on the risk and resilience factors. Female international students would report higher stress, perceive more stigma and discrimination, and more mental health issues than males under COVID-19.

4. Potential mediators for anti-mattering and the fear of not mattering on psychological well-being in this study would be identified such as loneliness, acculturation stress, perceived stress, adaptability, and social support among international students in Canada during the COVID-19 pandemic.

Methods

Participants

The final sample consisted of 186 university students (98 men, 84 women, two people who reported "other," and two who did not report). Their age was from 17 to 35 years old (M = 24.02, SD = 3.70). Participants (37 students were from Asia; 15 students were from Africa; 120 students were from the North America region; nine students were from the European Union; Four reported they were from the other place) were recruited via the international students' list serve, and the recruiting announcement from some faculties on their class website, WeChat, the internet, and Reddit websites from the beginning of April to the end of July 2022. Participants were directed to the online self-report questionnaires after the first year, about a quarter were in their completing the online informed consent. Participants received a $10 gift card (Amazon) as a token compensation.

Measures

The survey was built in Lime survey at Brandon University and includes the demographic questionnaires and the package of measures. The demographic questionnaire collects information such as gender, age, marital status, education, English proficiency, employment status, income, religion, living arrangements, and family situations under COVID-19 as potential covariates.

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

Key adjustment variables

The Satisfaction with Life Scale [46]. This 5-item scale assesses the global cognitive judgments of individuals' life satisfaction based on a 7-point Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree). The sum score (ranging from 5 – 35) indexes life satisfaction, with a higher score meaning higher satisfaction. One of the examples for the first item is "In most ways, my life is close to my ideal." It has a strong internal reliability (a = .79 - .89) and a moderate temporal stability (r = .50 - .84 over 2 weeks to 4 years, Pavot & Diener, 1993) [46]. The current sample showed a strong internal reliability (a = .87). The World Health Organization-5 (WHO-5, 1998). This 5-item scale assesses subjective well-being during the past two weeks (e.g., "I have felt cheerful and in good spirits") based on a 6-point Likert Scale from 0 (at no time) to 5 (all of the time). The score (4 times the raw sum score) ranged from 0 (worst) to 100 (best), with a higher score meaning better well-being. It has high reliability (a = .89) (WHO-5, 1998), further confirmed in the current sample (a = .88).

Key predictor variables

The Anti-Mattering Scale [14]: It is a five-item self-report scale that is designed to measure an individual's perception of their insignificance, invisible to others, or unimportance to others. It is rated on a 4-point scale, ranging from 1 (Not at all) to 4 (A lot). Participants indicate their degree of agreement with items such as "To what extent have you been made to feel like you are invisible?" and "How much do you feel like you will never matter to certain people?". It showed strong internal reliability in the current study (a = .81).

Fear of not mattering inventory [7,14]: It is a five-item scale designed to measure anxiety related to the fear of not mattering to others. Items focus on a feared loss of mattering in the future. It is rated on a Likert-type scale ranging from "not at all (0)" to "almost all of the time (3)". Participants indicate their degree of agreement with items such as, "How often do you worry that others will see you as unimportant or insignificant?" and "Do you worry that others will stop taking an interest in you?" It showed the strong internal reliability in the current study (a = .86).

The discrimination and stigma scale [47]: This scale has 32 items to measure the level of discrimination and stigma when people are treated unfairly because they are seen as being different from others. These items are rated on a 5-point Likert scale from 1 (Not at all) to 5 (Not applicable). One of the

examples is item 2, which is "Have you been treated unfairly by the people in your neighborhood?" The current sample showed a decent internal reliability (a = 0.91).

Perceived stress scale [48]**:** These ten items measure the degree to which an individual has perceived life as unpredictable, uncontrollable, and stressful situations.

Items are rated on a 5-point Likert scale from "0-Never" to "4-Very often". One of the examples for item 2 is "In the last month, how often have you felt that you were unable to control the important things in your life?" The Cronbach's alpha of the PSS-10 was evaluated at >.70. The current sample showed decent internal reliability (a = 0.65).

Acculturative stress scale [49]**:** It has 36 items to measure the levels of acculturation stress. This scale has 36 items to measure stress levels. Scale items tap various factors representing such key themes as stress due to change and culture shock (e.g., multiple pressures are placed on me after migration), homesickness (e.g., I feel sad leaving my relatives behind), fear (e.g., I fear for my safety due to my different cultural background), perceived discrimination (e.g., many opportunities are denied me), and perceived hate/rejection (e.g., people show hatred to me verbally). Items are rated on a 5-point Likert scale from 1 (strongly disagree) to 5 (strongly agree). One of the examples for item 6 is "I feel sad living in unfamiliar surroundings." The current sample showed a decent internal reliability (a = 0.95).

The UCLA loneliness scale [50,51]**:** This 20-item scale measures subjective feelings of loneliness and social isolation, using a 4-point Likert scale from 1 (never) to 4 (often). The sum score (ranging from 20-80) was used to index loneliness, with a higher score meaning higher loneliness. 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 (a =.89 - .94) and 1-year test-retest reliability (r = .73, Russel, 1996) [50]. The current sample showed a decent internal reliability (a = 0.66).

Multidimensional scale of perceived social support scale [52]**:** 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). The total score ranges from 12 to 84, with a higher score indexing a higher level of perceived support. one item example is "There is a special person who is around when I am in need." It showed strong internal consistency (a= 0.92) in Chinese, which was further evident in the current sample (a= .92).

The adaptability Scale [53]**:** 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 can think through several possible options to assist me in a new situation (item 1)" and "When uncertainty arises, I can minimize frustration or irritation so I can deal with it best. (item 8)". It showed strong internal reliability in the current study (a = .88).

Demographic and background information

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.

Procedures

This online quantitative study via Lime Survey was conducted through a snowball sampling process. The recruitment information and the research project link were shared on 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 anonymously completed the survey online after providing a signed consent form. The snowball sampling process continued until a sufficient sample size was reached. A $10 Amazon gift card was offered to the participants as a token of compensation. SPSS version 28.0 was used to analyze the data. Measures online questionnaires based on the relevant pieces of literature are listed below. 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. 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 [54]. To clear up the data, we first screed 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 Winserizing 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 [54-56]. After the Winserizing procedure, the normal distribution of all the variables of the skewness and kurtosis were examined, and a base-10 Logarithmic transformation for the following scale originally did not meet the normal distribution was turned into approximately normal distribution for PSS (Skewness = -.237; Kurtosis = 1.124), Log transformation to reduce their skewness for DSS (Discrimination Stigma. Skewness = -1.177 originally, Log transformed skewness = .374), ASSIS (Acculturation Stress from Skewness = -.799

originally into –.071), and TAS (Adaptability Skewness from .437 originally, which greater than double standard errors were transformed into Log transformation, skewness = .137). A Shapiro–Wilk's test for the variable residuals ($p > .05$) [57,58] and a visual inspection of their histogram, normal Q–Q plots, and box plots were explored and showed normally distributed (Shapiro–Wilk = .222, Kolmogorov–Smirnov = .200, $p > .05$) [57]. All the following variables including mean mattering, mean support, Winserizing loneliness, Winserizing perceived stress, Log10 winserizing belongingness, Log10 adaptability, Log10 Acculturation stress, and Log10 discrimination were used in the data analyses. Second, no violation of homogeneity and collinearity was detected based on Levene's test. Third, all outcome variables with a normal distribution were centered to reduce multi-collinearity before being included in the regression models. The data analysis was conducted in IBM SPSS 26. We first performed univariate analysis of variance models (ANOVAs) on the two psychological well-being outcome scores stratified by sociodemographic variables (Table 1). These analyses aimed to describe the mean and standard deviation of samples and identify potential sociodemographic predictors to serve as covariates in the subsequent regression models. As per convention [59], variables with a $p \leq 0.20$ from the ANOVAs were identified as potential covariates in the subsequent corresponding multiple linear regression models (Tables 2). Secondly, we performed a series of regressions

Table 1: Sample characteristics and their relationship with the two outcome variables: WHO-5 and SWLS (N=186).

Variables	Categories	Sample Size N (%)	WHO-5 M(SD)	F	P	SWLS M(SD)	F	P
Age	> 25 years old <= 25 years old	58 (31.2) 121 (65.1)	2.325 (1.164) 2.771 (1.274)	5.112	.025	4.317 (.928) 4.388 (1.236)	.150	0.699
Marital status	Single Separated Divorced Widowed Common law Married	138 (74.7) 4 (2.2) 4 (2.2) 9 (4.8) 2 (1.1) 28 (15.1)	2.718 (1.312) 1.750 (1.500) 2.655 (1.247) 1.556 (.881) 2.310 (.438) 2.607 (1.031)	1.864	.103	4.404 (1.217) 4.550 (0.998) 4.500 (0.416) 4.111 (0.481) 3.700 (0.424) 4.093 (1.131)	0.559	0.731
Education	High school gra Bachelor's degree Above Bachelor College diploma	62 (33.3) 48 (25.8) 13 (7.0) 57 (30.6)	2.843 (1.329) 2.909 (1.387) 2.385 (1.387) 2.344 (1.123)	4.782	0.001	4.306 (1.495) 4.517 (0.841) 3.800 (1.695) 4.304 (0.775)	1.013	0.402
Income	Low Lower than middle Middle Over middle high Very High	47 (25.3) 43 (23.1) 48 (25.8) 21 (11.8) 7 (3.8) 9 (4.8)	3.090 (1.310) 2.224 (1.356) 2.813 (0.982) 2.234 (1.380) 2.286 (1.380) 2.624 (0.484)	2.655	0.017	4.339 (1.629) 4.261 (0.967) 4.313 (1.023) 4.600 (0.802) 4.057 (0.412) 4.378 (0.891)	0.290	.941
Family member has COVID-19 or not	Yes No	78(41.9) 97(52.2)	2.452 (1.374) 2.795 (1.166)	3.071	0.081	4.276 (1.342) 4.446 (.930)	.907	.342
Who is Living with	Parents/siblings children friends relatives Others	37 (19.9) 14 (7.5) 64 (34.9) 11 (5.9) 26 (14.0)	2.541 (1.216) 2.357 (1.277) 2.660 (1.271) 3.091 (1.300) 2.678 (0.968)	0.471	0.798	4.065 (1.112) 4.243 (1.115) 4.409 (1.067) 4.418 (1.208) 4.114 (1.357)	1.503	0.191
Year of school	First-year Second year Third year Fourth-year Over 4 years Graduate school	21 (11.3) 46 (24.7) 52 (28.0) 33 (17.7) 9 (4.8) 11(5.9)	2.601 (1.562) 2.505 (1.165) 2.635 (1.138) 3.049 (1.226) 3.405 (1.078) 2.455 (1.508)	1.375	.236	4.181 (1.724) 4.182 (0.869) 4.465 (1.026) 4.546 (1.070) 4.933 (1.371) 3.273 (1.534)	2.913	0.015
Living (situation) condition	Self-purchase Renting Home stay others	36 (19.4) 101 (54.3) 28 (15.1) 12 (6.5)	2.449 (1.363) 2.809 (1.121) 2.214 (1.424) 2.833 (1.030)	2.029	0.112	4.757 (.890) 4.189 (1.245) 4.450 (1.136) 4.050 (1.059)	2.526	0.059
Country Origin	Asia American Africa Europe Australia Oceania region Other places	37 (19.9) 120 (64.5) 13 (7.0) 9 (4.8) 1 (0.5) 1 (0.5) 4 (2.2)	2.865 (1.357) 2.486 (1.259) 2.769 (1.641) 2.778 (.441) 3.000 (0.000) 2.000 (0.000) 3.405 (1.078)	.797	.573	4.119 (1.402) 4.524 (0.924) 3.858 (1.978) 3.378 (0.587) 3.400 (0.000) 4.400 (0.000) 5.100 (1.361)	2.653	0.017
Who is Living with	Parents/siblings children friends relatives Others	37 (19.9) 14 (7.5) 64 (34.9) 11 (5.9) 26 (14.0)	2.541 (1.216) 2.357 (1.277) 2.660 (1.271) 3.091 (1.300) 2.678 (0.968)	0.471	0.798	4.065 (1.112) 4.243 (1.115) 4.409 (1.067) 4.418 (1.208) 4.114 (1.357)	1.503	0.191

to examine how mattering, adaptation, social support, and loneliness were related to life satisfaction and well-being (Table 3). Standard multiple regressions were conducted with life satisfaction and well-being as the dependent variable and mattering and some demographic variables ($p \leq 0.20$) as the independent variables. The mediation effect for social support, loneliness, and adaptation was examined in the regression model. Analyses were performed using SPSS REGRESSION for the evaluation of assumptions.

All the key variables were centered before analyses to reduce multi-collinearity. Missing values from each survey were replaced by the item mean of the whole sample. Only participants who completed at least 80% of the items concerning each scale were retained in the analyses [54]. Approximately 1% of the sample data were replaced by mean values.

Results

Roles of anti-mattering on psychological well-beings of international students under COVID-19

We first reported the sample characteristics and the group differences in outcome variables were displayed in Table 1. Then correlations among the key outcome measures were computed (Table 2) to examine the associations among these key variables. Finally, hierarchical regression models (Tables 3,4) were conducted to identify significant predictors for the two outcomes of psychological well-being which include WHO-5 and SWLS, each with a 2-step model. In Step 1, anti-mattering, and fear of not mattering together with sociodemographic covariates, were entered. In Step 2, acculturation stress, perceived stress, adaptability, loneliness, social support, and discrimination were added as mediators.

Sample 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 variables such as anti-mattering, fear of not mattering, social support, adaptation, life satisfaction, well-being, loneliness, perceived stress, acculturation stress, discrimination, and stigma. 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 WHO-5 and SWLS.

The sample characteristics and the group differences in outcome variables such as WHO-5 and SWLS were displayed in Table 1. Based on the univariate ANOVA results, the variables with $p \leq 0.20$ (i.e., age, marital status, education, income, living conditions, with friend support, and family member with COVID or not for WHO-5; living conditions, who is living with, country origin, year of school, program types, with friend support, and having mental health treatment for SWLS) were identified as potential sociodemographic covariates in the subsequent regression models.

Demographic effects on life satisfaction of international students. Univariate ANOVA was performed and found the effect of country origins on life satisfaction was significant, $F (3, 177) = 4.388$, $p = .005$. Students from North America (M =4.520, N = 120) reported more life satisfaction than students from Africa (M = 3.858, N = 13) and students from Europe (M = 3.378, N = 9). The effect of students in the year of university on life satisfaction was significant, $F (5, 166) = 2.913$, $p = .015$. Students in graduate school (M = 3.273, N = 11) reported less life satisfaction than students in the third year (M = 4.465, N = 52), and the fourth year (M = 4.546, N = 33).

Demographic effects on the psychological well-being of international students. The effect of income on psychological well-being was significant, $F (6, 179) = 2.6653$, $p = .017$. Students with near middle income (M = 2.224, N = 43) reported less psychological well-being than those from high income (M = 3.090, N = 47).

Correlations between anti-mattering, the fear of not mattering, perceived stress, acculturation stress, social

Table 2: Correlational analyses among variables of anti-mattering, fear of not mattering, discrimination and stigma, perceived stress, acculturation stress, loneliness, social support, adaptability, life satisfaction, and Well-being in the entire group.

N = 186	1	2	3	4	5	6	7	8	9	10
1	1	.630**	.396**	.416**	.437**	.511**	-.266**	-.149**	-.297**	-.375**
2	.630**	1	.486**	.401**	.552**	.296**	-0.14	-0.139	-.194**	-.399**
3	.396**	.486**	1	.157*	.675**	.329**	-.253**	-.240**	-0.112	-.295**
4	.416**	.401**	.157*	1	.260**	.445**	-.232**	-.234**	-.364**	-.313**
5	.437**	.552**	.675**	.260**	1	.384**	-0.139	-.239**	-0.080	-.386**
6	.511**	.296**	.329**	.445**	.384**	1	-.571**	-.293**	-.570**	-.405**
7	-.266**	-.140	-.253**	-.232**	-0.139	-.571**	1	.602**	.673**	.330**
8	-.149*	-.139	-.240**	-.234**	-.239**	-.293**	.602**	1	.457**	.258**
9	-.297**	-.194**	-0.112	-.364**	-0.080	-.570**	.674**	.457**	1	.315**
10	-.375**	-.399**	-.295**	-.313**	-.386**	-.405**	.330**	.258**	.315**	1

*Note: * p < 0.05, ** p < 0.01.*
1-Anti-mattering; 2-Fear of not mattering; 3- Discrimination and stigma; 4-Perceived stress;
5-Acculturative stress; 6-Loneliness; 7-Social support; 8-Adaptability; 9-life satisfaction;
10-Well-being.

Table 3: Hierarchical regression analysis for the significant main effects of anti-mattering on well-being by acculturation stress, discrimination and stigma, social support, adaptability, and loneliness.

Predictors	F	df1	df2	R square	β
Step one					
Anti-mattering					-.361***
Age					.086
Income					-.069
Marital status					-.056
Education					-.136
Living place					-.058
Family member has COVID or not					.089
Total Model	5.205***	7	154	.191	
Step two					
Anti-mattering					-.156
Age					.033
Income					-.104
Marital status					-.024
Education					-.096
Living place					-.043
Family member has COVID or not					.122
Acculturation stress					-.209*
Discrimination					.024
Support					.115
Adaptability					.256*
Loneliness					-.136
Total Model	6.529***	5	149	.580	

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

Table 4: Hierarchical regression analysis for the significant main effects of anti-mattering on life satisfaction by acculturation stress, discrimination and stigma, social support, adaptability, and loneliness.

Predictors	F	df1	df2	R square	β
Step one					
Anti-mattering					-.639***
Living condition					-.142
Who is living with					-.069
Country from					.336
International student program					-.061
Have mental health treatment					-.031
Total Model	8.287	7	59	.496	
Step two					
Anti-mattering					-.167
Living condition					-.088
Who is living with					.036
Country from					.151
International student program					-.012
Have mental health treatment					.128
Perceived stress					-.168
Acculturation stress					.080
Discrimination					.023
Support					.399**
Adaptability					.086
Loneliness					-.272*
Total Model	6.341***	6	53	.706	

Note: ***$p < .001$, **$p < .01$, *$p < .05$

support, adaptability, loneliness, life satisfaction, and well-being: Pearson correlations (Table 2) among the key psychosocial variables showed well-being was significantly positively correlated with adaptability (r = .258, p < .01); social support (r = .330, p < .01); with life satisfaction (r = .315, p < .01); Well-being was significantly negatively correlated with anti-mattering (r = -.375, p < .01); with fear of not mattering (r = -.399, p < .01); with acculturation stress (r = -.420, p < .010); perceived stress (r = -.318, p < .010); with loneliness (r = -.386, p < .01); and with discrimination and stigma (r = -.295, p < .01).

Life satisfaction was significantly positively correlated with adaptability (r = .457, p < .01); with social support (r = .674, p < .01); with well-being (r = .315, p < .01); Life satisfaction was significantly negatively correlated with anti-mattering (r = -.297, p < .01); with fear of not mattering (r = -.194, p < .01); with perceived stress (r = -.364, p < .010); with loneliness (r = -.570, p < .01).

Correlational analyses confirmed that psychological well-being and life satisfaction were positively associated significantly with each other, both were positively associated significantly with the predictors including adaptation, and social support, and were negatively associated significantly with anti-mattering, fear of not mattering, the feelings of loneliness, and perceived stress.

Regression analyses: Hierarchical regression models were conducted to identify significant predictors for the two outcomes of well-being (WHO-5) and life satisfaction (SWLS), each with a 3-step model. In Step 1, either anti-mattering, or the fear of not mattering with sociodemographic covariates, were entered (i.e., age, marital status, education, income, living conditions, with friend support, and family member with COVID or not for WHO-5; living conditions, who is living with, country origin, year of school, program types, and having mental health treatment for SWLS) were identified as potential sociodemographic covariates in the subsequent regression models, which was based on the Univariate ANOVA results, the variable with $p \leq 0.20$.

In Step 2, perceived stress, acculturation stress, discrimination and stigma, loneliness, adaptability, and social support were added as moderators respectively. In Step 3, the interaction of either anti-mattering, or fear of not mattering, perceived stress, acculturative stress, discrimination and stigma, loneliness, adaptability, and social support.

Regression on psychological well-being (WHO-5): This regression model examined the prediction of anti-mattering, the fear of not mattering on WHO-5 score (emotional psychological well-being), controlling for potential demographic covariates (i.e., age, gender, income, marital status, education, living place) identified in Table 3.

In Step 1, anti-mattering was entered along with the following covariates: income level, age, gender, education, marital status, and living place. The model was rendered significant, $R2\ adj$ = .155, $F(7, 154)$ = 5.205, p < .001. A total of 19.1% of the variance in anti-mattering was predicted by

this equation. The results showed a negative prediction of anti-mattering on well-being ($\beta = -.361$, $p < 0.001$). In Step 2, perceived stress, acculturation stress, discrimination and stigma, social support, adaptability, and loneliness were entered. The model was rendered significant $R2\ adj = .283$, $F(5, 149) = 6.109$, $p < .001$. The results showed acculturation stress negatively associated with well–being ($\beta = -.367$, $p = 0.013$). Adaptability increased well–being ($\beta = .256$, $p = 0.02$). All the other variables did not show significant prediction ($p \geq 0.071$). The third step did not show significance when entering the interaction of all the variables, $R2\ adj = .279$, $F(1, 148) = .302$, $p = .769$.

As can be seen in Figure 1, the relationship between anti–mattering and well–being dropped from $\beta = -.354$ ($p = .00$) to no significance ($\beta = -.128$, $p = .126$), when acculturation stress, perceived stress, discrimination, and stigma, adaptability, loneliness, and social support were included in the equation. To check if acculturation stress mediated the relationship between anti–mattering and psychological well–being, the relationship between anti–mattering and acculturation stress was significant ($\beta = .437$, $p < .001$), and the relationship between acculturation stress and well–being was significant ($\beta = -.386$, $p < .001$). Full mediation emerges when the path from the predictor to the dependent variable drops to no significance when the path through the mediator (acculturation stress/ or adaptation) is included. Partial mediation occurs when the direct path from the predictor to the dependent variable is significantly reduced but not reduced to no significance. A Sobel test on the drop in the predictive power of anti–mattering confirmed that acculturation stress significantly fully mediated the effect of anti–mattering on well–being ($Z = -4.308$, $p < 0.001$) (Figure 1). Moreover, we also checked if adaptability mediated the relationship between anti–mattering and psychological well–being, the relationship between anti–mattering and adaptability was significant ($\beta = -.149$, $p < .001$), and the relationship between adaptability and well–being was significant ($\beta = .258$, $p < .001$). A Sobel test of the drop in the predictive power of anti–mattering confirmed that adaptability significantly fully mediated the effect of anti–mattering on well–being ($Z = 2.554$, $p < 0.010$) (Figure 2).

We conducted the same regression analyses on the effects of the fear of not mattering on well-being. In step 1, the fear of not mattering was entered along with the following covariates: income level, age, education, marital status, and family member with COVID-19 or not. The model was rendered significant, $R2\ adj = .169$, $F(7, 153) = 5.651$, $p < .001$. A total of 20.5% of the variance in fear of not mattering was predicted by this equation. The results showed a negative prediction of fear of not mattering on well–being ($\beta = -.387$, $p < 0.001$). Education negatively predicted well–being ($\beta = -.153$, $p = .041$). In Step 2, perceived stress, acculturation stress, discrimination and stigma, social support, adaptability, and loneliness were entered. The model was rendered significant $R2\ adj = .296$, $F(6, 147) = 5.595$, $p < .001$. The results showed a negative marginal prediction of education ($\beta = -.124$, $p = 0.077$), acculturation stress marginally negatively associated with well–being ($\beta = -.177$, $p = 0.062$). All the other variables did not show significant
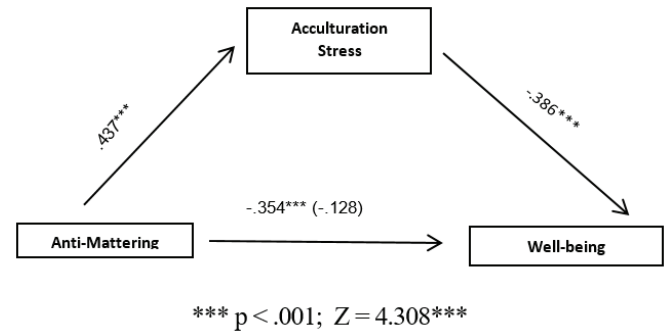

Figure 1: Mediation effect of acculturation stress in the prediction of anti-mattering for psychological well-being.
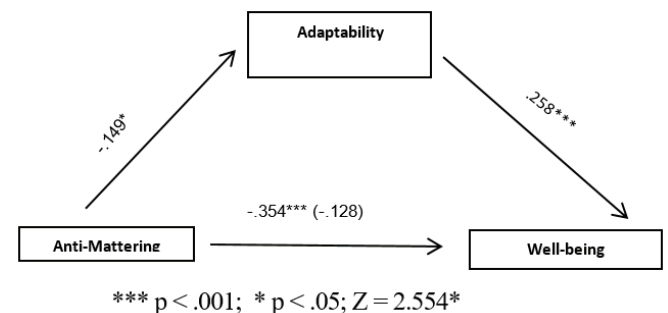

Figure 2: Mediation effect of adaptability in the prediction of anti-mattering for psychological well-being.

prediction ($p \geq 0.077$). The third step did not show significance when entering the interaction of all the variables, $R2\ adj = .293$, $F(1, 146) = .369$, $p = .545$.

As can be seen in Figure 2, the relationship between the fear of not mattering and well-being dropped from $\beta = -.387$ ($p = .00$) to $\beta = -.206$ ($p = .018$) in Step 2, when acculturation stress was included in the equation. Acculturation stress was negatively marginally associated with well–being ($F = -.177$, $p = 0.062$). To check if acculturation stress mediated the relationship between the fear of mattering and psychological well–being, the relationship between the fear of not mattering and acculturation stress was marginally significant ($\beta = .197$, $p = .007$), and the relationship between acculturation stress and well–being was significant ($\beta = -.386$, $p < .001$).

Sobel test showed acculturation stress had significantly mediated the effect of fear of anti–mattering on well–being, $Z = -5.567$, $p < 0.001$ (Figure 3).

Regression on life satisfaction (SLWS)

This regression model examined the prediction of anti–mattering, the fear of not mattering on SLWS score (life satisfaction), controlling for potential demographic covariates (i.e., living conditions, who is living with, country origin, years of school, program types, and having mental health treatment) identified in Table 4. In Step 1, anti–mattering was entered along with the following covariates: living conditions, who is living with, country of origin, years of school, program types, and having mental health treatment. The model was rendered

significant $R_2\ adj$ = .087, $F(7, 59)$ = 8.287, $p < 0.001$. A total of 49.6.5% of the variance in anti-mattering was predicted by this equation. The results showed a negative prediction of anti-mattering on life satisfaction (β = −.639, $p < 0.001$). In Step 2, perceived stress, acculturation stress, discrimination and stigma, social support, adaptability, and loneliness were entered. The model was rendered significant $R_2\ adj$ = .634, $F(6, 53)$ = 6.341, $p < .001$. The results showed a positive prediction of social support on life satisfaction (β = .399, p = .006). All the other variables did not show significant prediction ($p \geq .095$). The third step did not show the significance when entering the interaction of all the variables, $R_2\ adj$ = .632, $F(1, 52)$ = .713, p = .402.

As can be seen in Figure 4, the relationship between anti-mattering and life satisfaction dropped from β =−.340 ($p < .001$) to nonsignificance (β = −.025 (p = .766) in Step 2, when perceived stress, acculturation stress, discrimination and stigma, social support, loneliness, adaptation were included in the equation. Loneliness was negatively associated with life satisfaction (β = −.272, p = .023). To check if loneliness mediated the relationship between anti-mattering and psychological life satisfaction, the relationship between anti-mattering and loneliness was significant (β = .519, $p < .001$), and the relationship between loneliness and life satisfaction was significant (β = −.579, $p < .001$). Sobel test showed loneliness fully significantly mediated the effect of anti-mattering on life satisfaction, Z = −6.310, $p < 0.001$ (Figure 4). Social support was positively associated with life satisfaction (F = .570, $p < 0.001$). To check if social support mediated the relationship between anti-mattering and psychological life satisfaction, the relationship between the anti-mattering and social support was significant (β = −.266, $p < .001$), and the relationship between social support and life satisfaction was significant (β = .674, $p < .001$). Sobel test showed social support significantly fully mediated the effect of anti-mattering on life satisfaction, Z = −3.556, $p < 0.001$ (Figure 5).

The same procedures for regression analyses were conducted via three steps, the fear of not mattering was entered along with the following covariates: living conditions, who is living with, country of origin, years of school, program types, and having mental health treatment in the first step. The model was rendered marginally significant $R_2\ adj$ = .054, $F(7, 103)$ = 1.890, p = .079. The fear of not mattering marginally predicted life satisfaction (β = −.289, p = 0.003). When perceived stress, acculturation stress, discrimination and stigma, social support, adaptability, and loneliness were added in the second step, the equation model was rendered significantly improved, $R_2 ch$= .11, $R_2\ adj$ = .576, $F(6, 97)$ = 22.145, $p < .001$. A total of 33.7% of the variance in the fear of not mattering was predicted by this equation. Social support was found to be associated with increased life satisfaction (β = .565, p = .023). The results showed a negative prediction of year of school on life satisfaction (β = −.157, p = 0.027). Loneliness was negatively associated with life satisfaction (β = −.289, p = .009). The results showed a negative prediction of acculturation stress on life satisfaction (β = .228, p = .017). All the other variables did not show significant prediction ($p \geq .108$). The third step did not improve the fit of
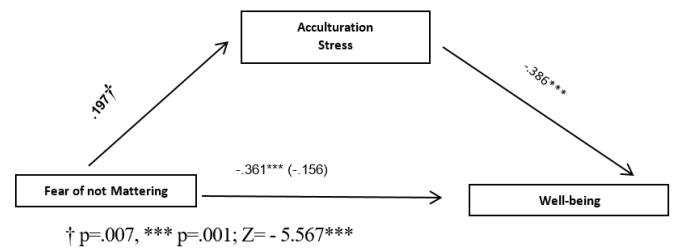

Figure 3: Mediation effect of acculturation stress in the prediction of the fear of not mattering for psychological well-being.
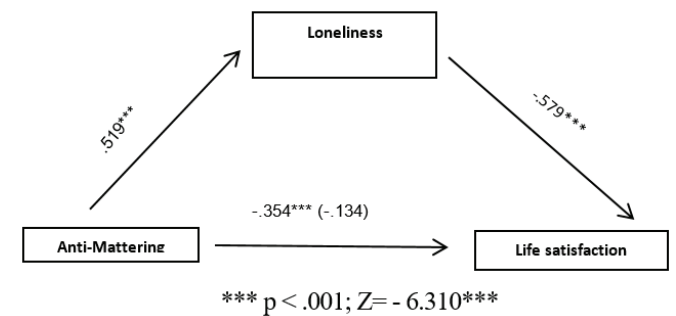

Figure 4: Mediation effect of loneliness in the prediction of anti-mattering for life satisfaction.
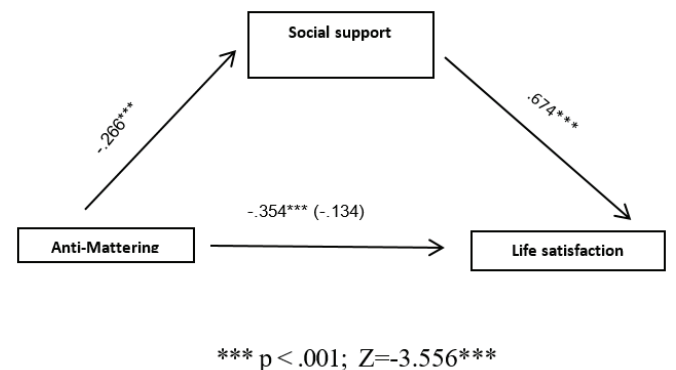

Figure 5: Mediation effect of social support in the prediction of anti-mattering for life satisfaction.

the equation when entering the interaction of all the variables, $R_2\ adj$ = .573, $F(1, 96)$ = .379, p = .539.

To check if social support, acculturation stress, and loneliness mediated the relationship between fear of not mattering and life satisfaction. As can be seen in Figure 6, the relationship between fear of not mattering and life satisfaction dropped from β =−.289 ($p < .003$) to significance (β = −.177 (p = .032) in Step 2, when social support, loneliness, acculturation stress, adaptability, perceived stress, discrimination, and stigma were included in the equation. Social support was positively associated with life satisfaction (F = .505, $p < 0.001$). To check if social support mediated the relationship between the fear of not mattering and psychological life satisfaction, the relationship between the fear of not mattering and social support was significant (β = −.140, $p < .001$), and the relationship between social support and life satisfaction was significant (β = .674, $p < .001$). Sobel's test showed social support significantly
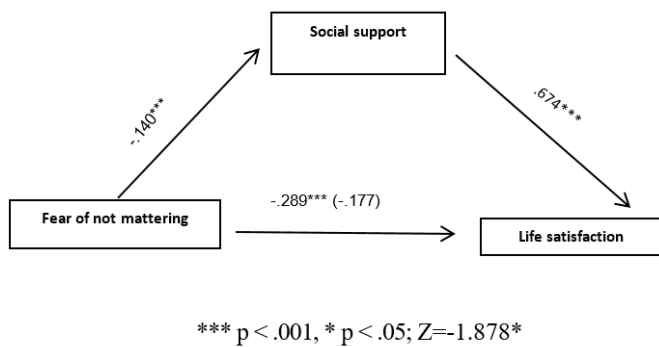
Figure 6: Mediation effect of social support in the prediction of fear of not mattering for life satisfaction.

fully mediated the effect of the fear of not mattering on life satisfaction, Z = -1.878, $p < 0.030$.

To check if loneliness mediated the relationship between the fear of not mattering and psychological life satisfaction, the relationship between the fear of not mattering and loneliness was significant ($\beta = -.105$, $p < .001$), and the relationship between loneliness and life satisfaction was significant ($\beta = .674$, $p < .001$). Sobel test showed loneliness significantly fully mediated the effect of anti-mattering on life satisfaction, Z = -3.848, $p < 0.000$.

To check if acculturation stress mediated the relationship between the fear of not mattering and psychological life satisfaction, the relationship between the fear of not mattering and acculturation stress was significant ($\beta = .573$, $p < .001$), and the relationship between acculturation stress and life satisfaction was significant ($\beta = -.127$, $p < .001$). Sobel test showed acculturation stress significantly fully mediated the effect of the fear of not mattering on life satisfaction, Z = -1.077, $p < 0.141$.

Discussion

This study examined the associations among anti-mattering, the fear of not mattering, perceived stress, acculturation stress, discrimination and stigma, social support, loneliness, adaptability, and psychological well-being among international students in Canada during the COVID-19 pandemic. The findings revealed various associations between resilience and risk factors, identifying key predictors and mediators of psychological well-being. The central hypotheses of this research were supported.

Most notably, it was established uniquely in the current study that feelings of not mattering as assessed by the AMS, and fears of not mattering as assessed by the FNMI were associated with higher levels of acculturation stress, perceived stress, and discrimination and stigma in international students. Links were also established with loneliness. These results fit with the notion that anti-mattering and fears of not mattering are predominant among many students and experiences occurring during a difficult transition and this can result in painful feelings of being devalued and unvalued, as well as feeling isolated and perhaps ostracized. Moreover, as

would be expected given past research, anti-mattering and the fear of not mattering were associated substantially with higher distress and lower life satisfaction. These results go beyond earlier findings by Besser, Flett, and Zeigler-Hill [7] that showed how feelings of not mattering were linked with poorer adjustment to the sudden and abrupt transition to online learning during the pandemic; the results of the current study illuminate the challenges faced by those students who are in the minority and who feel "at the margins" due, at least in part, to experiences that leave them feeling devalued or unvalued in the eyes of other people.

The results of the current study needed to be evaluated for their replicability in subsequent research. Because this work is cross-sectional, it cannot be established that adverse experiences related to the transition and acculturation experience had a causal role. It is possible, for instance, that some students were already quite vulnerability due to predominant feelings and fears of not mattering and they were sensitive to experiences that reflected their sense of being insignificant to other people.

Additionally, the study analyzed diverse demographic variables within the sample of international students in Canada. The results confirmed that the unprecedented challenges arising from the COVID-19 pandemic, including increased stress, acculturative stress, loneliness, perceived discrimination and stigma, significantly impacted the mental health of this vulnerable population. These factors were found to be negatively associated with psychological well-being [1,7,60,61].

This study analyzed various demographic factors within a sample of international students in Canada. It was found that international students from North America reported higher life satisfaction compared to those from Africa and Europe. This finding aligns with previous research [62], which suggested that North American students tend to have greater life satisfaction due to factors such as a larger social network, financial support, and shared cultural values. North American students may benefit from stronger social connections, including family and friends, fewer cultural conflicts, and fewer barriers, contributing to their higher life satisfaction compared to their African and European counterparts. Moreover, the study revealed that graduate international students face greater academic challenges than undergraduate students. These challenges include heightened academic stress, uncertainty about future goals and careers, and financial difficulties, consistent with prior research [63]. Our results found that male students had higher levels of acculturation stress than females, which was inconsistent with the previous finding that women showed higher levels of acculturation stress than men [60].

This research confirmed that certain psychosocial profiles, such as anti-mattering and the fear of not mattering, are significant risk predictors for psychological well-being among international undergraduate students in Canada during the COVID-19 pandemic. Psychological well-being was assessed through measures of global emotional well-being (WHO-5) and cognitively perceived life satisfaction (SWLS). Both anti-

mattering and the fear of not mattering were identified as risk factors, reflecting universal feelings of insignificance that negatively impact students' mental health and overall well-being [60]. Deficits in mattering were linked to various risk factors, including loneliness, perceived discrimination, and stigma, and were inversely associated with life satisfaction [64,65].

Our findings revealed that adaptability mediated the relationship between anti-mattering and psychological well-being, aligning with previous studies [66]. Higher levels of adaptability were associated with greater well-being and life satisfaction among students [67]. The results also indicated that adaptability was negatively associated with fear of mattering and anti-mattering, and it was strongly linked with perceived social support. We can better address the needs of international students, enrich their lives, and enhance their overall well-being by strengthening social support networks and fostering adaptability, while also strengthening self-regulation when faced with feelings and fears of not mattering to others.

Our findings showed that loneliness was negatively associated with well-being and life satisfaction, consistent with the previous studies [16,68]. Furthermore, loneliness was found to be negatively associated with psychological well-being and cognitively perceived life satisfaction [16]. Notably, the current results also showed that perceived deficits in adaptability were linked strongly with loneliness. Additionally, loneliness was identified as a mediator in the relationship between the fear of not mattering and life satisfaction. The COVID-19 pandemic measures, such as quarantine, lock downs, and social distancing, while effective in controlling the virus' spread, also contributed to social disconnection and heightened feelings of loneliness [28].

Our findings also demonstrated that acculturation stress was negatively associated with well-being and served as a negative predictor of emotional and psychological well-being. Moreover, acculturation stress mediated the relationship between anti-mattering/the fear of not mattering and well-being, aligning with previous studies [16,68].

In line with prior research, our results also suggested that social support mediated the effects of anti-mattering/the fear of not mattering and life satisfaction. This finding aligns with previous studies [42,43]. Social support was found to be negatively associated with perceived stress, acculturation stress, serving as a critical source for coping with stress [40,41,69,70-74].

This study provides a novel contribution to the existing literature on international students' experiences during the COVID-19 pandemic by examining both risk factors (e.g., perceived stress, acculturation stress, loneliness, discrimination and stigma, anti-mattering and fear of not mattering) and protective factors (i.e., adaptability, and social support) on well-being in Canada. A notable limitation of this cross-sectional design is its inability to establish causal-effect relationships among these variables. Moreover, the use of convenience sampling for online-based data collection may have generalization biases to the sample. Additionally, self-reported data may generate subjective interpretation biases.

Future studies will aim to investigate a broader population of international students across various cultural contexts. A longitudinal design will be implemented in follow-up studies to address the limitations of this research and to explore the temporal relationships among these variables conducted in the future.

Conclusion

In summary, our empirical findings affirmed that both anti-mattering and the fear of not mattering negatively predicted psychological well-being among international students in Canada during the COVID-19 pandemic, and they both were positively linked with risk factors such as perceived stress, acculturation stress, and discrimination and stigma. Social support and adaptability emerged as protective factors, buffering against these risk factors. Adaptability was found to significantly mediate the relationship between anti-mattering on well-being. Similarly, acculturation stress significantly mediated the effects of both anti-mattering and the fear of not mattering on well-being. Additionally, social support and loneliness mediated the effects of anti-mattering and the fear of not mattering on life satisfaction. This research underscores how these stressful circumstances of the COVID-19 crisis have deteriorated the psychological well-being and life satisfaction of international students. These findings provide an empirical foundation for government, policymakers, and stakeholders to support international students to adapt to a new country with supportive programs to mitigate their feelings of not mattering, alleviate their feelings of loneliness, and perceived discrimination, and enhance their social engagement. Educators, policymakers, and various practitioners need to prioritize the provision of enhanced student services, workshops, and social activities aimed at fostering stronger social connections, promoting mattering to feel valued, and adaptability among international students in Canada.

Authors contributions

The first author developed the first manuscript draft, research design, recruiting data, interpreted analyses, and final versions of the manuscript.

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

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