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The Relationship Between International Students' Perceived Discrimination and Self-reported Overall Health During COVID-19: Indirect Associations Through Positive Emotions and Perceived Social Support

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ABSTRACT

Since the outbreak of the COVID-19 pandemic, cases of discrimination and hate crimes against minority populations including international students have soared in the U.S. This study explores the relationship between international students' perceived discrimination and their self-reported overall health and the role of social support and positive emotions in such relationship. In total, 203 international students studying at two U.S. universities participated in an online survey. The results indicated that (1) when international students perceive higher levels of discrimination, they experience lower levels of positive emotions and have lower levels of perceived social support; and (2) positive emotions were significantly associated with both psychological distress and physical health. Perceived social support was only significantly associated with physical health not psychological distress. We also provided meaningful implications for higher educational institutions that strive to enhance international students' overall health.

Keywords: discrimination, international students, perceived social support, physical health, positive emotions, psychological distress

Experiences of discrimination were not uncommon among international students in the United States before the pandemic (Maffini, 2017). Since the outbreak of COVID-19, cases of discrimination and hate crimes towards minority populations

have soared in the U.S., especially towards Asians/Asian Americans (He et al., 2020). Recent studies demonstrate that the majority of non-White international students' experience various forms of discrimination, isolation, segregation, and unwelcoming and unsafe environment during the COVID-19 pandemic (Koo et al., 2021; Ma & Miller, 2021). These psychological stressors and burdens may be negatively associated with international students' overall health since the COVID-19 has placed international students in U.S. universities in a more vulnerable position than ever before.

Despite increasing challenges, international students in the U.S. were reported to utilize less counseling services and have lower willingness to seek help than domestic students (Xiong & Pillay, 2022a). Therefore, there is an urgent need to explore international students' experience of discrimination and how it may be related to their mental and physical health.

Past research has found positive associations between perceived discrimination and psychological distress among undergraduate international students (Zeng et al., 2022) and negative associations between discrimination and physical health among minoritized populations in the U.S. (Bogart et al., 2013). Yet little is known about the mechanisms underlying these associations, which motivates our research to focus on identifying the mediating factors in these relationships. In general, positive emotions (Park et al., 2017) have shown to be significant mediators between discrimination and mental health. Moreover, social support was found to be a significant mediator between discrimination and a series of psychological and physical symptoms (Chen et al., 2021; Lee & Waters, 2020). Given these aspects, we included positive emotions and perceived social support to investigate the mediating role in the link between discrimination and physical and psychological health among international students.

Psychological Distress

International students in the U.S. report unique stressors compared to domestic students, such as acculturation (Xiong, 2018), lack of social support (Ra & Trusty, 2017), and discrimination and hate crimes (Maffini, 2017). All these stressors may be associated with international students' psychological distress (Zhang & Goodson, 2011). Research has indicated that international students in the U.S. present higher rates of depression, anxiety, self-harm, and suicidal attempts than domestic students (Xiong, 2018; Xiong & Yang, 2021).

During the COVID-19 pandemic, international students in the U.S. are in an even more vulnerable situation because of increased stresses (Zhai & Du, 2020). Similar to their domestic peers, they experience stress related to the transition to online learning, social isolation, financial difficulties, and uncertainties about their future (Mpungose, 2020; Song et al., 2021). In addition, they may suffer from travel bans between countries (Centers for Disease Control and Prevention, 2021), worry about parents or relatives in their home countries (Zhai & Du, 2020), and increased discrimination (Wu et al., 2021). These COVID-19 related complications may be associated with increased levels of denial, stress, anxiety, and fear among international students (Song et al., 2021). Specifically, in a study of international students' psychological reactions to the COVID-19 pandemics in the U.S., one-third of the participants reported some Post-Traumatic

Stress Disorder (PTSD) symptoms and about half of those participants reported moderate-to-severe anxiety (Song et al., 2021).

Physical Health

Aside from psychological distress, physical health is another important indicator of health since it is significantly related to future mortality and morbidities (Jylhä, 2009) and it interacts with mental health (Seaward, 2015). Navigating health concerns in a non-native language environment with limited social resources poses various challenges for international students (Martin & Dyer, 2017). As compared to pre-pandemic data, university students reported deteriorated physical health due to decrease in physical activity (Wilson et al., 2021), drop in sleep quality (Romero-Blanco et al., 2020), and physical assaults in discrimination incidents during the pandemic (Karalis Noel, 2020). Microaggression, another subtle expression of discrimination (Sue, 2010), was found to be significantly related to worse physical symptoms, such as fatigue and headache, in a meta-analysis among general populations (Lui & Quezada, 2019). While a myriad of studies have demonstrated university students' decreasing physical health during the pandemic (e.g., Lee et al., 2021), there is insufficient quantitative research focusing on international students in the U.S. or using both mental health and self-reported physical health as outcomes of interest. By including physical health as another dimension of health, this study aims to paint a more holistic picture of international students' health during the pandemic.

Perceived Discrimination, Psychological Distress, and Physical Health

Perceived discrimination is defined as an individual's perception of experiencing discrimination and marginalization (Williams et al., 1997). It has been found to be negatively related to people's mental and physical health (Rodrigurz-Seijas et al., 2015). The form of discrimination that international students experienced includes antilocution, behavioral discrimination, avoidance, and physical assault in and outside the classroom by peers, faculty and community (Krahé et al., 2005). Furthermore, international students who report more perceived discrimination tend to have less self-esteem (Wong et al., 2014), less satisfaction towards their academic programs, less confidence in communication with others (Karuppan & Barari, 2010), and more depression and anxiety symptoms (Taliaferro et al., 2020; Wong et al., 2014).

In recent studies on international students in the U.S. during the COVID-19 pandemic, perceived discrimination was found to be associated with higher levels of depression, anxiety, and stress as well as lower level of wellbeing (Prasath et al., 2022; Zeng et al., 2022). Moreover, discrimination maintains an active physiological stress response, which creates stressors on individuals' well-being. On top of that, anticipated discrimination from others, especially healthcare givers, can make individuals reluctant to seek for professional treatment (Link & Phelan, 2006).

By exploring potential meditators between perceived discrimination and mental and physical health among international students, the study may provide evidence on factors that protect international students from the potential harms of

experiencing discrimination. However, currently there appears to be a lack of such research (Xiong et al., 2022b).

Role of Positive Emotions and Perceived Social Support

Positive Emotions

Positive emotions, in positive psychology literature, are viewed as "brief, multisystem responses to some change in the way people interpret—or appraise—their current circumstances" (see meta-review Fredrickson, 2013, p. 3). Fredrickson's (2001) research illuminates relatively frequently experienced positive emotions in people's daily life including joy, gratitude, serenity, interest, hope, pride, amusement, inspiration, awe, and love. Positive emotions are measured by people's self-reports of their own subjective experiences (Fredrickson, 2013). As such, positive emotions play a protective role in the development of adverse illnesses (Richman et al., 2005). Intervention strategies focused on cultivating positive emotions have shown to be suitable specifically for preventing and treating problems rooted in negative emotions, such as anxiety, depression, and stress-related health problems (Fredrickson & Joiner, 2002). Additionally, positive emotions serve as an efficient antidote for negative emotions as well as ill health (Fredrickson, 2013). Although past research has established the association between positive emotions and health, as well as the connection between experiences of discrimination and decreased positive emotions (Smart Richman et al., 2010), there is a paucity of research investigating the mediating role of positive emotions in the relationship between discrimination and health.

Perceived Social Support

In general, researchers describe perceived social support as an individual's perception of having others providing informational, tangible, emotional, esteem and companionship support (Pascoe & Richman, 2009). Social support creates a safe haven, which provides comfort, help, and reassurance (Bowlby, 1988). When facing life adversities, social support helps to reframe the adversity and develop coping strategies, which in turn promote long-term mental and physical health outcomes (Freeney & Collins, 2015). More research is needed to understand the mediating role of social support with regards to health. Recent literature provides promising evidence for the mediating role of social support. Numerous literature in the past has found social support to effectively alleviate psychological distress (e.g., Song, 2011). With regard to the pandemic-related lockdown, social distancing, and quarantining, many international students, similar to other college students and general population, may be experiencing isolation and a lack of social support, and thus resulting in higher incidence of depression, anxiety, stress, and ill health (Xu, 2021). Moreover, socioemotional support, which is commonly accessible for college students in the form of social connections, is found to be the mediator between stressors and mental health (Kshtriya et al., 2020) and stressors and physical quality of life (Pan et al., 2019). Building on these results, this

research investigates the mediating role of social support in the relationship between discrimination and mental and physical health.

The Present Study

Existing literature mostly focuses on the association between discrimination and psychological distress instead of physical health (Robinson-Perez et al., 2020). Studies that include both physical health and psychological distress as outcomes tend to sample groups of people that are easy targets of pandemic discrimination, such as the Chinese diaspora (Chen et al., 2021) or Asian Americans (Lee & Waters, 2020), instead of focusing on all international students. The present study contributes to the literature by using more holistic indicators of health (e.g., psychological distress and physical health) and investigating a broader scope of participants having similar experiences (e.g. international students). In this study, we explored two research questions:

1) To what extent is perceived discrimination during the COVID-19 pandemic associated with psychological distress and physical health?

2) To what extent is perceived discrimination during the COVID-19 pandemic associated with psychological distress and physical health via positive emotions and perceived social support?

We hypothesize that perceived discrimination is negatively related to international students' positive emotions and perceived social support, and their psychological and physical health. We also hypothesize that their positive emotions and perceived social support are both negatively related to psychological distress, but positively related to physical health.

This study contributes to the field by 1) investigating the mediating role of positive emotions in the relationship between discrimination and health, 2) including both psychological distress and physical health to paint a more holistic picture of overall health, and 3) investigating a broader scope of participants having similar experiences (e.g., international students) instead of just Asian students.

METHOD

Participants

The participants in this study were 203 international students from 45 different countries, with China, Mexico, and India being the top three countries of origin. The distribution of countries of origin fit the public profile of international students at the two universities where participants enrolled. Table 1 presents the participants' socio-demographic characteristics. The percentage of missing data for variables range from 0.00% to 18.23%. Chi-squared tests demonstrate that samples at university 2 have significantly more missing values than university 1, which might indicate potential risks of bias.

Table 1: Descriptive Statistics for Participants' Sociodemographic Characteristics

Characteristics	*n*	Mean (SD) or percentage	% Missing	Min	Max
Demographics					
Age (year)	174	25.25 (5.78)	14.29	18	56
Gender (male = 1)	182	100%	9.85		
Male	73	40.11%			
Female	109	59.89%			
Country of Origin	179	100%	11.82		
China	40	20.73%			
Mexico	25	12.95%			
India	23	11.92%			
Bangladesh	9	4.66%			
Brazil	8	4.15%			
Vietnam	6	3.11%			
Nepal	5	2.59%			
Canada	5	2.59%			
Australia	5	2.59%			
Other countries	53	34.71%			
Educational background					
Degree program	180	100%	11.33		
Bachelor's degree	71	39.44%			
Master's degree	50	27.78%			
Doctoral/post-doctoral degree	59	32.78%			
University	203	100%	0.00		
University 1	94	46.31%			
University 2	109	53.69%			
Months stayed in the U.S.	179	29.24 (28.83)	11.82	0	180
Current location	183	100%	9.85		
U.S	163	89.07%			
Home country or others	20	10.93%			
COVID-19 testing and diagnosis status					
Self Diagnosed with COVID-19	203	100%	17.73		
Yes	13	7.78%			
No	154	92.22%			
Self Test with COVID-19	203	100%	17.73		
Yes	104	62.28%			
No	63	37.72%			
Family Diagnosed with COVID-19	203	100%	18.23		
Yes	46	27.71%			

No		120	72.29%

Note. SD = standard deviation; Min = minimum; Max = maximum

Procedures

Participants were recruited from two large universities in the U.S. University 1 is a private not-for-profit university in the Mid-Atlantic urban region with approximately 20% of international students among all students. University 2 is a public university in the south-central suburban region with around 3% international students among all students. The research protocol was approved by the Institutional Review Boards at both universities. The sample was collected through a combination of convenience sampling and snowball sampling. Participants were asked to fill out self-reported measures in an online Qualtrics survey. Survey invitations were sent out through each university's department newsletters, authors' personal networks, and social media student groups. The data were collected between January and April 2021. As an incentive, participants were entered into a lucky draw for $10 Amazon gift cards.

In total, 717 responses were recorded. Participants who did not grant consent (n = 48) or identified as coming from the U.S. (n = 3) were excluded from the analysis. In the process of data cleaning, the research team noticed that 463 entries from Guinea-Bissau were recorded in rapid succession over a 29-hour period with three-minute intervals in between them, almost all with identical responses to all questions. After internal discussions among authors, consensus was reached to drop these 463 entries from the analysis because of the possibility of survey bots filling out these 463 entries given the pattern of the records. Furthermore, Guinea-Bissau, as a West African country, is not among the top countries of origin for international students at both universities, thus receiving 65% of the responses from this country is very unlikely to happen, even after considering that our sampling strategy is convenience sampling and snowball sampling. After excluding these cases, the final valid analytical sample comprised 203 responses. Given the cross-sectional nature of the current data, the nature of our sampling method (non-representative sample) and the means of data collection (self-report), the study's findings may need to be interpreted with caution.

Measures

Physical Health

Physical health is measured by a subscale from the PERMA (Positive emotions, Engagement, Relationship, Meaning, and Accomplishment) profiler (Seligman, 2011). The PERMA Health subscale includes three questions asking 1) participants' subjective sense of physical health through self-rated health, 2) self-rated satisfaction of physical health, and 3) self-rated health compared to peers of the same age and sex. Responses were recorded on a 11-point Likert scale (0 = terrible to 10 = excellent). The mean score of these three items was used as an observed variable representing physical health (Cronbach's alpha = .92).

Psychological Distress

Psychological distress was measured by the 21-item Depression, Anxiety, and Stress Scale-21 (DASS21) (Lovibond & Lovibond, 1995), which consists of depression, anxiety, and stress subscales. Each of the three subscales is composed of seven items. Participants rated their emotional states of depression, anxiety, and stress on a 4-point Likert scale (0 = did not apply to me at all to 3 = applied to me very much or most of the time). The sum of seven items multiplied by two gave the final scores on each subscale (Cronbach's alpha = 0.91 for depression, 0.89 for stress, 0.84 for anxiety).

Perceived Discrimination

Perceived discrimination, as an independent variable, was measured by the Everyday Discrimination Scale (Williams et al., 1997). This nine-item Likert scale (0 = never to 5 = almost everyday) assesses frequency of perceiving discrimination on a daily basis by asking participants the number of times they were treated with less courtesy and respect, called names or insulted, threatened or harassed, etc. We used the mean score of the nine items as a single composite score for perceived discrimination (Chronbach's alpha = .91).

Positive Emotions

Positive emotions were measured by a three-item PERMA positive emotion subscale (Butler & Kern, 2016), which assesses frequencies of feeling joyful, positive, or contented. We used mean scores of the three items in the following analyses (Chronbach's alpha = .83).

Perceived Social Support

Perceived social support was measured by a three-item PERMA relationship subscale (0 = not at all to 10 = completely) that assesses one's perceived degree of social support, feelings of being loved, and satisfaction with personal relationships. We used mean scores of the three items in the following analyses (Chronbach's alpha = .80).

Covariates

To control for socio-demographic factors, we included a set of covariates including students' age in years, sex (1 = male, 0 = female), degree program (1 = undergraduate, 0 = graduate), months of living in the U.S., current location during the pandemic (1 = U.S., 0 = other countries), self-diagnosed with COVID-19 at least once (1 = yes, 0 = no), self-test with COVID-19 at least once (1 = yes, 0 = no), and one or

more members of the participant's family were infected with COVID-19 at least once (variable name = family-diagnosed with COVID-19, 1 = yes, 0 = no). Due to the surging anti-Asian hate crimes reported in the U.S. (Center for the Study of Hate & Extremism, 2020), appearing as East Asian or South Asian may be related to incidences of discrimination international students encounter in their daily life. Using the country of origin as a proxy for students' race, we also controlled for appearing as East Asian (China, South Korea, and Vietnam) and appearing as South Asian (India, Pakistan, Nepal, and Bangladesh).

Data Analysis Plan

All analyses were conducted using Stata 15.1. The kurtosis and the skewness of key variables are within the threshold for acceptable normality (+/- 2.0 for skewness and +/- 7.0 for kurtosis, West et al., 1995). All scale measures demonstrated good internal consistency (Cronbach's alphas > 0.70; Tavakol & Dennick, 2011). Structural equation modeling was used to answer the two research questions. To assess model fit, the following criteria were adopted: (1) non-significant p-value of $\chi 2$ is expected (Tschannen-Moran et al., 2013); (2) a comparative fit index (CFI) greater than .90 indicating good fit (Browne & Cudeck, 1992); (3) a root-mean-square error of approximation (RMSEA) less than .05 as close fit (Browne & Cudeck, 1992). Indirect associations were tested using 5000 bootstrapped samples (Kline, 2016). The significance of indirect associations was estimated by a Sobel test (Sobel, 1982). Missing data were handled by full information maximum likelihood (FIML) estimation to preserve all valid data points in the sample (Acock, 2005).

RESULTS

Descriptive Statistics and Correlations

Descriptive statistics and correlations among key variables are presented in Table 2. This sample, on average, experienced discrimination more than once per year, had a moderate level of positive emotions and perceived social support. They also had above-average levels of physical health, mild depression, mild anxiety, and a normal level of stress.

Table 2: Descriptive Statistics, Psychometric Properties, and Bivariate Correlations among Key Variables

	1	2	3	4	5	6	7
1. Depression	-						
2. Anxiety	.74***	-					
3. Stress	.84***	.79***	-				
4. Physical Health	-.41***	-.43***	-.44***	-			
5. Perceived Discrimination	.16*	.30***	.21**	-.16*	-		
6. Perceived Social Support	-.48***	-.44***	-.41***	.51***	-.29***	-	
7. Positive Emotions	-.68***	-.50***	-.59***	.50***	-.22**	.72***	-
Descriptive statistics							
n	203	203	203	172	167	172	173
Mean	10.05	8.07	12.23	6.56	1.45	6.26	5.91
SD	10.69	8.67	11.10	2.08	1.04	2.00	1.83
Skewness	1.08	1.14	0.78	-0.56	0.58	-0.49	-0.25
Kurtosis	3.34	3.87	2.70	2.86	2.59	2.73	2.58
% Missing	0.00	0.00	0.00	15.27	17.73	15.27	14.78
Theoretical range	0-42	0-42	0-42	0-10	0-5	0-10	0-10
Range	1-40	0-42	0-42	0.67-10	0-4.22	0-10	1.33-10
Cronbach's α	0.91	0.83	0.89	.92	.91	.80	.83

Note. SD = standard deviation.
* $p < .05$. ** $p < .01$. *** $p < .001$

Path Analysis

The proposed model showed an excellent fit, $\chi^2(35) = 37.396$, p = 0.360, RMSEA = .018, 90% CI [0.000, 0.055], and CFI = 0.997. The proportions of variance explained for each outcome variable are presented in Figure 1. Table 3 and Figure 1 presents path analysis results for the research model using structural equation modeling.

Results from path analysis are partially consistent with our prespecified hypotheses. As shown in Figure 1, international students' perceived discrimination was associated with lower perceptions of positive emotions (β = -0.54, SE = 0.14, p < .001,

95% CI [-0.82, -0.25]) and social support (β = -0.69, SE = 0.18, p < .001, 95% CI [-1.05, -0.34]). However, perceived discrimination was not directly associated with any indicators of psychological or physical health. Positive emotions were significantly associated with depression (β = -3.38 , SE = 0.44, p < .001, 95% CI [-4.23, -2.53]), anxiety (β = -1.98, SE = 0.42, p < .001, 95% CI [-2.80, -1.16]), stress (β = -3.07, SE = 0.56, p < .001, 95% CI [-4.14, -2.00]), and physical health (β = 0.36, SE = 0.13, p = .008, 95% CI [0.09, 0.63]), but social support was only significantly associated with students' physical health (β = 0.31, SE = 0.12, p = .010, 95% CI [0.07, 0.55]).

Although perceived discrimination was not directly associated with psychological distress or physical health, they were indirectly associated via positive emotions and perceived social support. Specifically, perceived discrimination was indirectly associated with all three indicators of psychological health via positive emotions (Depression: β = 0.17, SE = 0.05, p < .001, 95% CI [0.08, 0.27]; Anxiety: β = 0.12, SE = 0.04, p = .002, 95% CI [0.05, 0.20]; Stress: β = 0.15, SE = 0.001, p = .001, 95% CI [0.06, 0.24]), not perceived social support (Depression: β = 0.01, SE = 0.03, p = .833, 95% CI [-0.05, 0.07]; Anxiety: β = 0.02, SE = 0.04, p = .622, 95% CI [-0.06, 0.10]; Stress: β = -0.01, SE = 0.03, p = .707, 95% CI [-0.08, 0.05]). Meanwhile, perceived discrimination was indirectly associated with physical health via both positive emotions (β = -0.09, SE = 0.04, p = .029, 95% CI [-0.18, -0.01]) and social support (β = -0.11, SE = 0.05, p = .043, 95% CI [-0.21, -0.003]).

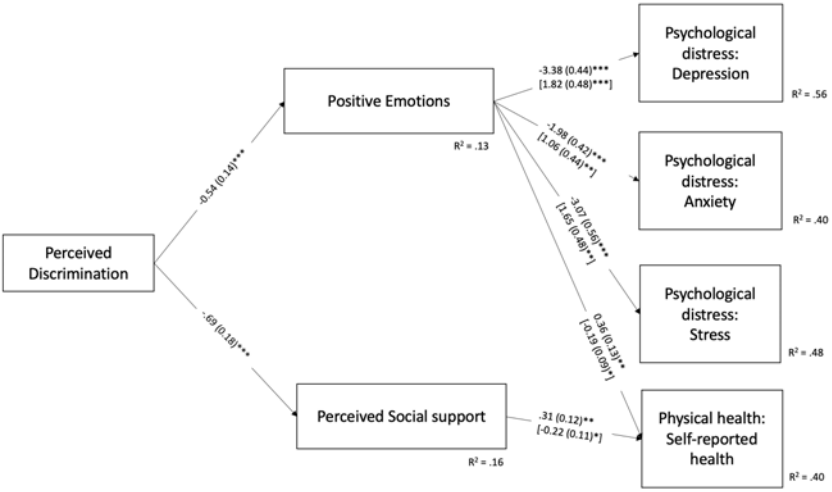

Figure 1: Path Analysis Model of Association between Perceived Discrimination and Health

Note. Unstandardized and standardized (in parenthesis) beta coefficients are presented.

Solid lines for significant paths and absent lines for non-significant paths. Paths for error terms, covariates, and covariances are omitted. Indirect associations between perceived discrimination and outcome variables are presented in square brackets.
* $p < .05$. ** $p < .01$. *** $p < .001$

Table 3: Total, Direct, and Indirect Associations among Study Variables: Multivariate Models

Variable	Outcome 1: Depression (R^2 = .5576)			Outcome 2: Anxiety (R^2 = .3957)			Outcome 3: Stress (R^2 = .4833)			Outcome 4: Physical Health (R^2 = .4038)		
	B	***SE***	***beta***	**B**	***SE***	***beta***	**B**	***SE***	***beta***	**B**	***SE***	***beta***
Predictor												
Perceived discrimination												
Total associations	3.14***	0.79	.30	3.41***	0.64	.40	3.88***	0.78	.36	-0.33	0.18	-.16
Direct associations	1.25	0.67	.12	2.19**	0.66	.26	2.38**	0.79	.22	0.08	0.15	.04
Indirect associations	1.88***	0.52	.18	1.23**	0.39	.14	1.51**	0.45	.14	-0.41**	0.11	-.20
via positive emotions	1.82***	0.48	.17	1.06**	0.33	.12	1.65**	0.48	.15	-0.19*	0.09	-.09
via perceived social support	0.07	0.32	.01	0.16	0.34	.02	-0.14	0.38	-0.01	-0.22*	0.11	-.11
Positive emotions	-3.38***	0.44	-.57	-1.98***	0.42	-.41	-3.07***	0.56	-.50	0.36**	0.13	.31
Perceived social support	-0.10	0.46	-.02	-0.24	0.47	-.05	0.20	0.56	.04	0.31**	0.12	.30
Covariates												

Age	-0.15	0.19	-.07	-0.01	0.17	-.01	-0.01	0.20	.00	-0.08*	0.03	-.20
Gender (1 = male)	0.17	1.22	.01	-0.22	1.21	-.01	-0.46	1.33	-.02	-0.35	0.29	-.08
East Asian	-0.16	1.66	-.01	2.45	1.74	.11	2.44	1.85	.09	0.37	0.37	.07
South Asian	-0.27	1.81	-.01	0.95	1.82	.04	-0.41	2.07	-.01	-0.24	0.39	-.05
Degree program (1 = undergraduate)	-1.53	1.85	-.07	-1.63	1.63	-.09	-1.26	1.82	-.05	-0.58	0.35	-.13
University (1 = university 1)	-5.10**	1.64	-.23	-2.81	1.69	-.16	-6.98***	1.79	-.31	0.32	0.34	.07
Months stayed in the U.S.	0.00	0.02	.00	0.03	0.03	.09	-0.01	0.03	-.02	0.00	0.01	-.04
Current location (1 = U.S.)	-4.54*	2.24	-.13	-0.96	2.04	-.03	-2.44	1.98	-.07	0.54	0.52	.08
Self-diagnosed with COVID-19	1.07	2.61	.03	1.99	2.86	.06	1.41	3.11	.03	-0.28	0.54	-.04
Self-test with COVID-19	-1.42	1.65	-.06	2.58	1.52	.14	-0.36	1.69	-.02	-0.38	0.30	-.09
Family-diagnosed with COVID-19	2.07	1.47	.09	-0.23	1.34	-.01	2.96	1.72	.12	0.86**	0.33	.18

Note. Coefficients presented are direct associations unless noted. 5000 bootstrapped standard errors are presented. All three predictors and four outcome variables were examined in a single model. B = unstandardized coefficients; SE = bootstrapped standard errors, and β = standardized coefficients. * $p < .05$. ** $p < .01$. *** $p < .001$

DISCUSSION

Our study enhanced the understanding of the associations between discrimination and health to find ways to enhance international students' overall well-being, by parsing out the underlying mechanisms in this relationship while using both mental and physical health as outcomes of interest. We found that (1) international students' perceived discrimination was directly and negatively associated with positive emotions and social support, (2) positive emotions were significantly associated with both psychological health and physical health, and (3) perceived social support was only significantly associated with students' physical health not psychological health.

Importantly, we found positive emotions to be a significant mediating factor in the relationship between perceived discrimination and psychological distress as well as their self-reported physical health. Positive emotions have consistently shown as an effective factor in fostering physical health particularly in the face of negative events, such as discrimination (Fredrickson, 2000; Kok et al., 2013). One explanation may be that positive emotions enhance individuals' coping resources and therefore enable them to effectively maintain physical health (Tugade et al., 2004). Our research suggests that it is important to explore avenues to increase international students' experiences with a wide range of positive emotions such as incorporating relaxation therapies, increasing rates of pleasant activities, teaching optimism, and finding positive meaning (Fredrickson, 2000).

Another key finding is that perceived social support is a significant mediator in the relationship between international students' perceived discrimination and physical health, which aligns with previous literature (Chen et al., 2021; Lee & Waters, 2020). Social support provides psychological and tangible resources for international students to cope with stressors (Chavajay, 2013), benefits their psychological adjustment (Bender et al., 2019), can significantly predict health outcomes, and becomes more valuable when facing adversities, such as discrimination (Wang et al., 2003). Since international students from collectivist cultures tend to have less perceived social support (Cipolletta et al., 2022), universities could consider customizing the strategies to cater to these more vulnerable student groups.

Limitations

Readers should be aware of several key limitations and interpret results with caution. First, all key variables were collected through self-reported measures, which are prone to response bias. For example, sensitive questions asking students about their COVID testing and infection history may suffer from social desirability bias. Second, we used convenience and snowball sampling, which could result in selection bias. For example, the more disadvantaged and vulnerable students who were more heavily

affected by the pandemic may not have the capacity to participate in this kind of survey, which could undermine the effects found. Third, the analysis is correlational in nature and cannot support causal claims. Fourth, the small sample and bi-university sampling could limit the external validity and generalization of the results. Fifth, because the missingness in the study variables were associated with the university membership, the findings of the study may need to be understood with caution. Since the FIML computation method assumes the sample to be missing variables at random, violation of this assumption might introduce bias in the results. Sixth, the model may miss some unmeasured mediators. For example, self-esteem may be a potential mediator between discrimination and social support (Ji et al., 2019). Future studies should consider incorporating objective measures, adopting random sampling and longitudinal data, and recruiting a larger and more diverse sample of international students. Despite the limitations, our study amplifies the understanding of the relationship between perceived discrimination and overall health as well as the mediating roles of positive emotions and social support among international students during the COVID-19 pandemic. Based on the results, we offered implications for higher educational institutions that strive to enhance international students' well-being.

Implications

To combat perceived discrimination, universities should stand in solidarity with international students on the issue of discrimination to create a safe and supportive environment to protect them from repercussions of on-campus hate crimes. One way to show support is to implement zero tolerance policies and educating students about such policies. Secondly, our results suggested that it is critical for universities to provide programs that focus on providing emotional and social support for international students. Due to social stigma against mental health issues in some conservative societies, international students who experience discrimination may prefer to not disclose such feelings or seek professional help (Patel et al., 2017). Workshops and programs are more easily accepted by international students and can help them build a more supportive social network. In fact, individuals' perceptions of social connections and positive emotions are strongly and positively correlated that together they build better physical health (Kok et al., 2013). One way to provide resources is to have on-campus support groups for international students, especially those who are new to the environment, which can reduce a sense of alienation and increase the level of social support. Even though those implications are based on our research conducted during the COVID-19 pandemic, universities may still apply those recommendations to help their international students thrive after the pandemic due to the importance of social support (Bender et al., 2019) and the great needs for a safe environment (Maffini, 2017) among international students in general.

CONCLUSION

Our research suggests universities to adopt more positive psychology-based approaches that simultaneously improve positive emotions and social support to foster a healthier and more supportive environment for international students. Future research on developing practical programs and interventions is needed to identify the most cost-effective way to help international students overcome challenges related to discrimination and help universities create space and opportunities for a more supportive and friendly environment.

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