



The effect of perceived discrimination on cross-cultural adaptation of international students: moderating roles of autonomous orientation and integration strategy

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Abstract

This study explores the associations between perceived discrimination and cross-cultural adaptation among 335 international students in China. Drawing on self-determination theory, we propose that autonomous orientation can weaken the relationship between perceived discrimination and cross-cultural adaptation. Integration strategy can be seen as a mechanism that encourages international students to embrace both their original and host culture when they feel be discriminated. Results indicate that perceived discrimination is negatively associated with sociocultural adaptation and psychological adaptation among international students in China. Our research identifies autonomous orientation as an important contingency that weakens the effects of perceived discrimination on cross-cultural adaptation, confirming the moderating role of integration strategy in the relationship between perceived discrimination and sociocultural adaptation. Integration strategy mediates the moderating effects of autonomous orientation on the relationship between perceived discrimination and sociocultural adaptation. The findings provide valuable insight into the positive impact of autonomous orientation and integration strategy on the cross-cultural adaptation of international students when they feel be discriminated, which is beneficial to the education and management of international students at the theoretical and practical levels.

Keywords Perceived discrimination · Cross-cultural adaptation · Autonomous orientation · Integration strategy

Introduction

In light of the internationalization of higher education, cross-cultural adaptation may be a challenge for international students while studying in a new country (Yang & Clum, 1994). For example, international students often report language barriers, culture shock, loneliness, and homesickness. These experiences are strongly associated with perceived discrimination, which is a common phenomenon among international students when studying abroad (Trilokekar

& Kukar, 2011). Perceived discrimination has been linked to depression, anxiety, sadness, and other psychological problems that could be detrimental to the willingness and behavior of international students to integrate into the host country (Suh et al., 2019). Based on this detrimental outcome, we need to understand what may weaken the effects of perceived discrimination.

Although research on cross-cultural adaptation is growing in western countries (Yu et al., 2019), more attention should be given to Asian countries, such as China, which has become the most popular destination for international students in Asia (Institute of International Education, 2020). In 2018, international students in China reached 492,185, and they were mainly from Pakistan, Thailand, South Korea, India, and the United States (Ministry of Education of the People's Republic of China, 2019). Universities in Mainland China have adopted a series of measures to promote international students' cultural integration and reduce their perception of discrimination. For example, they organize activities such as national Chinese culture week, international culture festivals or establish a "local student partner"

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system (Jia & Dervin, 2021), or hire full-time counselors to help international students (Yu et al., 2021).

According to self-determination theory and causality orientations theory, autonomy-oriented individuals tend to perceive events and choose behaviors based on their intrinsic functions. Autonomous orientation refers to the tendency to regulate behavior independently, as people act in accordance with their goals, values, and interests (Deci & Ryan, 1985). When international students move to other countries to pursue their educational goals, they need to integrate with the studying abroad destination (McGarvey et al., 2021), which may be beneficial to their personal development. We view autonomous orientation as a mitigating factor, examining how autonomy-oriented individuals act to adapt to the host culture when they perceive discrimination. Empirical studies also have shown that adaptation relates to acculturation in some way—either to one or both cultural orientations, or one or more acculturation strategies (Ward & Kennedy, 1994; Neto et al., 2005). Among these, the integration strategy is the most adaptive acculturation strategy, and it has been supported to predict the overall degree of international students' cross-cultural adaptation (Yoon et al., 2012). Thus, we propose that integration strategies can influence cross-cultural adaptation.

This study purposes to expand the understanding of cross-cultural adaptation, and how autonomous orientation and integration strategies influence it. And we focus on the samples in China, which responds to calls for research on the international students' cross-cultural adaptation of the eastern countries (Yu et al., 2019).

Theoretical conceptualization and empirical studies

Cross-cultural adaptation

Cross-cultural adaptation can be defined as the process of establishing (or reestablishing) and maintaining relatively stable, reciprocal, and functional relationships with individuals from different cultures (Kim, 2001, p. 31). Within acculturation framework theory, international students can be seen as sojourners studying abroad and temporarily living in a new city (Bochner, 2006). They are likely to experience acculturative difficulties (eg., follow social norms, understand customs, and values) in the process of adapting to the host culture (Toyokawa & Toyokawa, 2002), which may cause the negative impact of cultural conflict between the original and host cultures.

Searle and Ward (1990) proposed that cross-cultural adaptation was composed of sociocultural and psychological adaptation. Sociocultural adaptation refers to the social skills of coping with daily life in a new culture; while

psychological adaptation refers to emotional well-being, including self-esteem, life satisfaction, and positive emotions. These two types of adaptation are discrete as well as interrelated. Psychological adaptation is positively associated with sociocultural adaptation, while poor sociocultural adaptation is related to higher levels of psychological problems (Berry, 1997; Pernice et al., 2009). A study in Turkey found that international students' sociocultural adaptation was positively correlated with psychological adaptation (Gibbs et al., 2020).

The existing research on cross-cultural adaptation has emphasized the individual factors (such as age, gender, time spent studying abroad, language proficiency, and cultural distance) that affect how an individual will adjust to a new culture (Pan & Wong, 2011; Luo et al., 2021). At the same time, in the case of international students, their adaptation experience may be influenced by situational factors, including social support (Shu et al., 2020; English et al., 2020), perceived discrimination (Smith & Khawaja, 2011; Scott et al., 2015; Kunuroglu, 2021), and social interactions (Kim, 2001; Szabo et al., 2020). The specific situational factor that we focus on is perceived discrimination, which has been studied more frequently than other adaptation-relevant factors (Bierwiazzonek & Waldzus, 2016).

Perceived discrimination

Perceived discrimination is quite common among international students, which may affect international students' attitudes toward studying in a specific country. Perceived discrimination is defined as “the consequences of the subjective perception that one faces discrimination in everyday experience” (Schmitt et al., 2014). The social dominance theory shows that the dominant ethnic group has ownership of the nation and holds ingrained beliefs of superiority in a multiethnic society, this may exacerbate the sense of exclusion of ethnic minorities from the national identity (Devos & Mohamed, 2014). International students may be seen as a racial minority in the host countries, which increases their vulnerability to race-based discrimination (Sun et al., 2021). As a minority group, international students may feel be treated unfairly in their host country by the administration, teachers, or classmates due to racial or ethnic stereotypes (Gosset et al., 1998). If local Chinese call foreigners' names, and point or stare at them, these behaviors are likely to be interpreted as discriminatory toward international students (Chiang, 2015). Since the implementation of the Chinese Reform and Opening Policy, the number of international students in China has been increasing continuously, especially after the policy of “the Belt and Road Initiative” issued in 2013, China has become an important destination for higher education. Considering the relatively recent development of China as a culturally diverse society, it is necessary to

understand how international students cope with perceived discrimination in China.

Perceived discrimination has become a major pressure source for international students that may further hinder their cross-cultural adaptation (Lee, 2005). Previous researches have also confirmed that perceived discrimination can negatively predict cross-cultural adaptation (Smith & Khawaja, 2011; Benson et al., 2012). On the one hand, perceived discrimination is negatively associated with socio-cultural adaptation. Duru and Poyrazli (2011) have found that perceived discrimination could result in international students' negative attitudes towards the new culture, which may impede social interaction as well as normal life and study. Swami's (2009) study found that Malaysian students in Britain may suffer from perceived discrimination, that this may affect their daily lives (prayers, eating habits, and so on) and hinder their sociocultural adjustment. Buchanan et al. (2018) also found that immigrant youth who experienced more perceived discrimination had significantly poorer sociocultural adaptation. On the other hand, perceived discrimination could be detrimental to the psychological adaptation of international students (Virta et al., 2004; Yu et al., 2019). For example, Finch et al. (2000) and Hashemi et al. (2019) found that the experience of perceived discrimination was associated with poor mental health outcomes, such as lower self-esteem, more severe symptoms of depression, and lower life satisfaction (Greene et al., 2006; Prelow et al., 2006). The worsening of perceived discrimination will be accompanied by more negative effects on individual psychology (Foster & Dion, 2001). Thus, it is essential to summarize the factors that may lessen the negative effects of perceived discrimination. Luo and Zhang (2021) came up with some factors, such as self-deterministic motivation and strategies of acculturating population.

The moderating effect of autonomous orientation on perceived discrimination and cross-cultural adaptation

Not all international students will react identically to perceived discrimination, their existing levels of autonomous orientation may explain for this phenomenon. Ideas from self-determination theory may shed light on why autonomous orientation might be beneficial for international students' cross-cultural adaptation. Causality orientations theory, a component of self-determination theory, asserts that autonomous orientation refers to the individuals regulating behavior based on their goals, values, and interests (Deci & Ryan, 1985). Individuals with an autonomous orientation often show autonomous forms of self-regulation (Martinek et al., 2020) and they will be reflective and interested in their own experiences when facing social pressure (Weinstein et al., 2012).

These theories indicate that autonomous orientation is an important predictor of how individuals incur and respond to stress. Autonomy-oriented individuals are likely to be less sensitive to stressful events or situations, which will lead them to interpret stressors as challenges rather than threats and choose adaptive actions or strategies in the face of adversity (Blais et al., 1990; Skinner & Edge, 2002). In stressful situations, high autonomy-oriented individuals tend to be more self-dependent, their behaviors are influenced by abiding values, needs, and interests (Deci & Ryan, 1985), and they can cope effectively with adversity; while less autonomy-oriented individuals reflect a low level of self-efficacy, their behaviors are influenced by external contingencies and pressures, and they may lack the confidence to handle the same stressors. A previous research has also discussed the moderating role of autonomy orientation and researchers have found that autonomy orientation could interact with contextual determinants in influencing motivation (Hagger & Chatzisarantis, 2011).

However, not all individuals will initiate and regulate behaviors according to their needs, interests, or values. Individuals may differ in their levels of autonomous orientation. Autonomy orientation characterizes the degree to which the individual regulates their behavior based on integrated goals and values (Weinstein et al., 2012). As described previously, autonomous self-regulation is associated with lower feelings of pressure and tension (Ryan et al., 1989; Vallerand, 1997). Autonomy orientation leads individuals to engage in less avoidant coping strategies for down-regulating stress. Existing research has found that autonomy orientation could lead to greater psychological resilience and subjective well-being, and was positively correlated with an adaptive ability (Gagné et al., 2014). And autonomous orientation has become an important predictor of sociocultural adaptation in students studying abroad (Ganotice et al., 2022). Thus, we expect that autonomy-oriented international students will be more likely to hold positive attitudes toward adaptation; those who are less autonomously orientated will be less likely to change their attitudes toward adaptation and will focus on the difficulties when they feel discriminated against.

The moderating effects of integration strategy on perceived discrimination and cross-cultural adaptation

Existing research showed that acculturation strategies promoted the individuals' adjustment to a new culture (Ward & Kennedy, 1994). In Berry's (1990) study, acculturation strategies has been classified as integration strategy, assimilation strategy, separation strategy, and marginalization strategy. Individuals choose their strategy based on their acculturation orientations toward maintaining their original culture and

towards establishing relationships with people in the host culture. The bidimensional acculturation orientations are orthogonal and independent and adopting the host culture does not necessarily involve rejecting the original culture (Berry, 1997). Based on this bidimensional acculturation framework, integration strategy will be adopted when individuals' acculturation orientations towards the original culture and host culture.

Integration strategy is benefit for cross-cultural adaptation (Nguyen & Benet-Martínez, 2013). International students who adopt integration strategies tend to have a lower level of acculturation stress (Sam & Berry, 1995), and their performance in sociocultural adaptation and psychological adaptation is better than those who use other acculturation strategies (Xue et al., 2004; Castro, 2011; Ng et al., 2013). For example, Cohen-Louck and Shechory-Bitton (2021) conducted a study in Israel and found that immigrants showed higher levels of personal well-being when an integrated acculturation strategy was employed. In a study of migrants from the North Caucasus in Moscow, migrants who preferred an integration strategy in intercultural interaction demonstrated a high level of psychological and socio-cultural adaptation (Lepshokova & Лепшоков, 2020). Castro's (2011) study indicated that migrants who opted for the integrative strategy experienced more life satisfaction and better academic adjustment. A study of Chinese international students in Australia showed that those who selected integration strategy reported significantly higher subjective well-being (Xue et al., 2004). Thus, we expect that integration strategy will moderate the negative effect of perceived discrimination on cross-cultural adaptation.

Autonomous orientation and integration strategy

As explained above, international students can vary in their consequent reactions when they are confronted with discriminatory experiences. Self-determination theory suggests that the degree of autonomy orientation influences an individual's interpretation of a situation and pattern of motivation and behavior (Deci & Ryan, 1985). That is to say, individuals' chosen behaviors may be the consequence of their autonomy orientations. Autonomy-oriented individuals possess high self-reflective ability, they can react proactively and adopt constructive, task-oriented coping strategies in the face of adversity (Lumb et al., 2017). They may get adaptive motivational resources, tolerate negative experiences, and transform the negative into positive (Ryan & Deci, 2000). Existing studies have shown that those who are more self-determined experience a higher quality of relationships (Ryan & Deci, 2017). Intervention to promote students' self-determination can help them build better social networks (Walker et al., 2011) and lead to short- and long-term mental health (Frone et al., 1998). These autonomy-orientated

people may be more likely to adopt the integration strategy and foster positive social integration during acculturation, in which they have access to social networks, social resources, and protective messages from both cultures. To understand why autonomy orientation moderates the influence of perceived discrimination on cross-cultural adaptation, we predict that autonomy-orientated people will be more likely to adopt the integration strategy.

Research questions and hypotheses

This article aims to explore the effect of perceived discrimination on cross-cultural adaptation using data from international students in China. Although previous researches have studied the connection, there is a scarcity of quantitative research on how and when the impact of perceived discrimination on cross-cultural adaptation will be moderated. To explore this, we introduce autonomous orientation from self-determination theory as having an important influence on this association. We also draw on integration strategy, showing how embracing the original and host culture can weaken the negative associations between perceived discrimination and cross-cultural adaptation. Therefore, we propose the following hypotheses:

H1: Perceived discrimination can negatively predict cross-cultural adaptation (sociocultural adaptation [H1a] and psychological adaptation [H1b]).

H2: Autonomous orientation moderates the negative relationship between perceived discrimination and cross-cultural adaptation (sociocultural adaptation [H2a] and psychological adaptation [H2b]).

H3: Autonomous orientation can positively predict integration strategy.

H4: Integration strategy moderates the association between perceived discrimination and cross-cultural adaptation (sociocultural adaptation [H4a] and psychological adaptation [H4b]).

H5: Integration strategy mediates the moderating effect of autonomous orientation on the association between perceived discrimination and cross-cultural adaptation (sociocultural adaptation [H5a] and psychological adaptation [H5b]).

Participants and survey procedures

We obtained institutional review board (IRB) approval from a university in the east region of China, protocol title: "Cross-cultural Adaptation". Data was collected from 13 universities in Beijing, Shanghai, Suzhou, Nanjing, and Hangzhou, these five cities are economically developed areas in mainland China. We recruited the participants via the school of overseas education in September 2019, which

is the specialized department for overseas students in Chinese universities. We entrusted these units to issue invitation letters to international students from overseas. In the invitation, we explained the objectives and the selection criterion of this study and told the students they would be invited to participate in a study about cross-cultural adaptation, and that the study would guard their personal information. Once agreed to participate in the study, students would be provided with the link to the online survey's URL. Considering that the language requirement for recruiting international students in China is English, we provided an English version of the questionnaire to the subjects. The survey was conducted in two stages, two weeks apart. International students rated the perceived discrimination, autonomous orientation, and integration strategy in the first survey. After a two-week interval, they assessed their socio-cultural adaptation and psychological adaptation in the second survey. We shared the survey's URL with 450 international students and 335 of them complete questionnaires, a response rate of 74.4 percent. The valid samples were aged from 19 to 50 ($M=23.73$, $SD=4.77$). Of the international students, 52.5 percent were male ($n=176$), and their length of residence ranged from 1 year to 10 years ($M=3.76$ years, $SD=1.79$). The following educational backgrounds were included: undergraduate ($n=16$, 4.8%); bachelor ($n=236$, 70.4%); masters ($n=62$, 18.5%); doctorate ($n=21$, 6.3%). The country of origin were included: Pakistan ($n=56$, 16.7%), United States ($n=46$, 13.7%), Thailand ($n=33$, 9.9%), South Korea ($n=31$, 9.3%), France ($n=18$, 5.4%), Others (eg., India, Canada, Australia, UK) ($n=151$, 45.0%).

We used G-power 3.1.9.2 for sample size estimation. Input parameters specifying a regression analysis, a medium effect size of $f=0.25$, $\alpha=0.05$, and $1-\beta=0.8$, would result in a total sample size of $N=48$. The sample size of the international students in this study is 335, which meets the requirements of the sample size.

Measures

Perceived Discrimination This study uses Sandhu and Asrabadi (1994)'s perceived discrimination scale to measure the level of perceived discrimination against international students. The scale includes eight items that are scored on a five-point Likert-type scale (1 = strongly disagree, 5 = completely agree). Higher scores indicate higher levels of perceived discrimination. For example: "I am treated differently in social situations". We obtained a Cronbach's alpha coefficient of 0.913 for the scale ratings in this study. The results of confirmatory factor analysis showed that the construct validity of the perceived discrimination questionnaire was acceptable ($\chi^2/df = 1.280$, $RMSEA = 0.020$, $SRMR = 0.017$, $TLI = 0.996$, $CFI = 0.994$).

Autonomous Orientation This study uses three items to measure the autonomous orientation of international students. These items are adapted from the Weinstein et al.'s (2012) scale that measures the level of autonomous orientation, for example: "My decisions represent my most important values and feelings". These items use a five-point scoring method, 1 = strongly disagree, 5 = completely agree. The higher the score, the higher the level of autonomous orientation. In this study, Cronbach's alpha coefficient was 0.710. The structure of this measuring tool is a saturation model, the correlations between the total score and each item of the questionnaire were 0.800-0.740, and correlations between items were 0.531-0.480. These results showed that the autonomous orientation questionnaire had good construct validity.

Integration Strategy The instrument used to measure the integration strategy is adapted from the cultural adaptation strategy section of the Mutual Intercultural Relations in Plural Societies (Berry, 2017; Victoria University of Wellington, 2021). The scale contains three items and are scored on a five-point Likert-type scale (1 = strongly disagree, 5 = completely agree). The higher the score, the higher the level of the integration strategy used by international students. For example: "I prefer to have both local friends and friends from my home country". In this study, Cronbach's alpha coefficient was 0.737. The structure of this measuring tool is a saturation model, the correlations between the total score and each item of the questionnaire were 0.859-0.786, and correlations between items were 0.539-0.435. These results showed that the integration strategy questionnaire had good construct validity.

Sociocultural Adaptation We selected and adapted five items from the scale of social connections which developed by Lee and Robbins (1995). These items explored the subjective sense of connection between international students and the society of the host country. For example: "The locals are polite and friendly". The scale is scored on a five-point Likert-type scale (1 = strongly disagree, 5 = completely agree). The higher the score, the higher the level of socio-cultural adaptation. Cronbach's alpha coefficient of this study was 0.723. The results of confirmatory factor analysis showed that the construct validity of the sociocultural adaptation questionnaire was acceptable ($\chi^2/df = 1.093$, $RMSEA = 0.017$, $SRMR = 0.018$, $TLI = 0.998$, $CFI = 1.000$).

Psychological Adaptation This study uses the satisfaction with life scale developed by Neto (1993) to measure the level of psychological adaptation of international students to the host country. The scale includes five items that are scored on a seven-point Likert-type scale (1 = strongly disagree, 7 = strongly agree). The higher the score, the higher the level

of psychological adaptation. For example: “In most ways my life is close to my ideal”. In this study, Cronbach’s alpha coefficient was 0.870. The results of confirmatory factor analysis showed that the construct validity of the psychological adaptation questionnaire was acceptable ($\chi^2 / df = 2.219$, $RMSEA = 0.060$, $SRMR = 0.014$, $TLI = 0.987$, $CFI = 0.996$).

Control Variables We selected age, gender, educational level, and length of residence as control variables. Based on age, gender and educational level were related to socio-cultural adaptation and psychological adaptation, they were controlled in the analysis. Age was measured in years, gender (1 = female, 0 = male), and education level (1 = undergraduate, 2 = bachelor, 3 = masters, 4 = doctorate). Length of residence was also controlled for in the analysis, this is because the length of stay in the host country plays an essential role in the interaction with residents which may further influence cross-cultural adaptation.

Data Analysis

We used SPSS 22.0 to analyze the data. First, descriptive statistical analysis and correlation analysis were performed to define the nature of and relationships among the variables. Second, hierarchical regression analysis was used to investigate the influence of perceived discrimination on cross-cultural adaptation, and the moderating effects of perceived discrimination and cross-cultural adaptation between them after the four key control variables were considered. Third, we applied bootstrap procedures (5,000 bootstrap samples) to construct 95% bias-corrected confidence intervals for examining whether integration strategy and autonomous orientation moderated the effect of perceived discrimination on cross-cultural adaptation by using PROCESS macro, and also examining the indirect moderating effects of autonomous orientation through the mediator of integration strategy (Hayes, 2013; Preacher et al., 2007).

Results

Descriptive statistics of study variables

Table 1 presents the descriptive statistics and correlations of all the variables. Correlation analysis results show that there is a significant negative correlation between perceived discrimination and sociocultural adaptation ($r = -0.37$, $p < 0.01$) and psychological adaptation ($r = -0.11$, $p < 0.01$). There are no significant relationships between perceived discrimination and autonomous orientation ($r = -0.05$, $p > 0.05$) and integration strategy ($r = 0.02$, $p > 0.05$).

Hierarchical regression analysis

We used hierarchical regression analysis to test the relationship between perceived discrimination and sociocultural adaptation, and the moderating effect of autonomous orientation and integration strategy in this relationship. Table 2 shows the results. Controlling for variables of gender, age, educational level, and length of residence were put into the model. In the first step (Model 1), perceived discrimination was entered and was found to be negatively associated with sociocultural adaptation ($\beta = -0.35$, $p < 0.001$, 95%CI [-0.275, -0.151]), supporting H1a. The results in step two suggest that autonomous orientation moderates the relationship between perceived discrimination and sociocultural adaptation ($\beta = 0.13$, $p < 0.01$, 95%CI [0.033, 0.196]). In step three, perceived discrimination and integration strategy interacted to predict sociocultural adaptation significantly ($\beta = 0.09$, $p < 0.05$), and the moderating effect of autonomous orientation became relatively weaker ($\beta = 0.09$, $p > 0.05$). The 95% confidence interval of the bootstrap test of the moderating effect of autonomous orientation on the relationship between perceived discrimination and sociocultural adaptation was 0.001 to 0.166, which did not include 0; the

Table 1. Means, standard deviations, and correlations of variables.

Variable	M	SD	1	2	3	4	5	6	7	8	9
1 Gender	0.47	0.50	1								
2 Age	23.73	4.77	-0.28**	1							
3 Educational level	2.26	0.65	-0.16**	0.69**	1						
4 Length of residence	3.76	1.79	-0.18**	0.22**	0.19**	1					
5 Perceived discrimination	2.32	1.12	-0.08	0.06	-0.08	0.01	1				
6 Autonomous orientation	2.53	0.55	0.13*	-0.01	0.05	-0.03	-0.05	1			
7 Integration strategy	3.03	0.95	0.08	0.13*	0.11*	0.05	0.02	0.21**	1		
8 Sociocultural adaptation	3.94	0.69	0.03	0.06	0.20**	0.19**	-0.37**	0.32**	0.30**	1	
9 Psychological adaptation	5.18	1.20	-0.10	0.12*	0.02	-0.12*	-0.11*	0.22**	0.29**	0.47**	1

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$

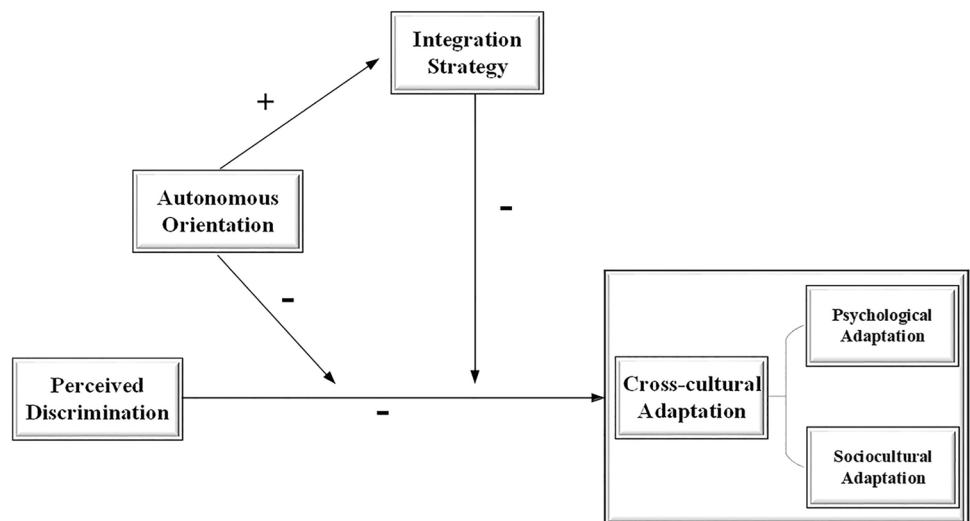
Table 2. Hierarchical regression analysis of variables predicting sociocultural adaptation.

Model(Outcome) /Step	Included Variable	Coefficients				Overall Statistics			
		β	SE	t	p	Adj.R ²	F	p	
Model 1 (Sociocultural Adaptation)						0.19	16.82	<0.001	
Step 1	Gender	0.03	0.07	0.55	0.583	0.29	20.28	<0.001	
	Age	-0.11	0.01	-1.51	0.133				
	Educational level	0.22	0.07	3.17	0.002				
	Length of residence	0.19	0.02	3.76	<0.001				
	Perceived discrimination	-0.35	0.03	-6.87	<0.001				
Step 2	Gender	-0.01	0.07	-0.29	0.769	0.35	20.93	<0.001	
	Age	-0.09	0.10	-1.40	0.162				
	Educational level	0.19	0.07	2.87	0.004				
	Length of residence	0.19	0.02	3.85	<0.001				
	Perceived discrimination	-0.34	0.03	-7.30	<0.001				
	Autonomous orientation	0.27	0.06	5.74	<0.001				
	Perceived discrimination * Autonomous orientation	0.13	0.04	2.75	0.006				
Step 3	Gender	-0.03	0.07	-0.69	0.488	0.09	0.03	1.93	0.047
	Age	-0.12	0.01	-1.91	0.057				
	Educational level	0.18	0.07	2.95	0.003				
	Length of residence	0.18	0.02	3.87	<0.001				
	Perceived discrimination	-0.36	0.03	-7.93	<0.001				
	Autonomous orientation	0.22	0.06	4.80	<0.001				
	Perceived discrimination * Autonomous orientation	0.09	0.04	1.97	0.051				
	Integration strategy	0.25	0.03	5.42	<0.001				
Perceived discrimination * Integration strategy	0.09	0.03	1.93	0.047					

moderating effect of integration strategy on the relationship between perceived discrimination and sociocultural adaptation was 0.001 to 0.120, which did not include 0. These results support H2a and H4a (Fig. 1).

Following the procedures of Aiken and West (1991), we used simple slope analyses to examine these interaction patterns. Figure 2 shows that perceived discrimination was negatively related to sociocultural adaptation when autonomous

Fig. 1. Summary of Hypotheses. + represents positive relation, - represents negative relation



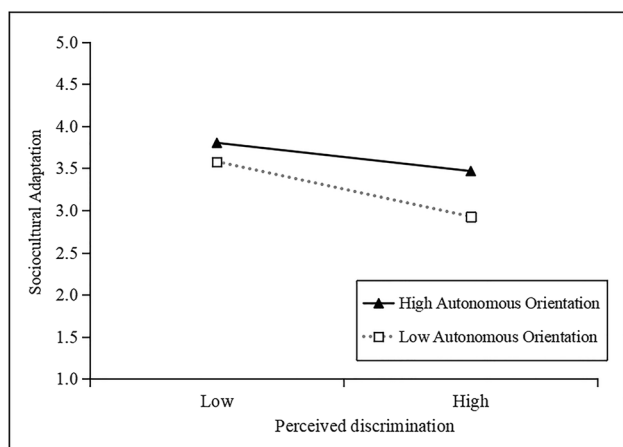


Fig. 2. The moderating effect of autonomous orientation on the relationship between perceived discrimination and sociocultural adaptation.

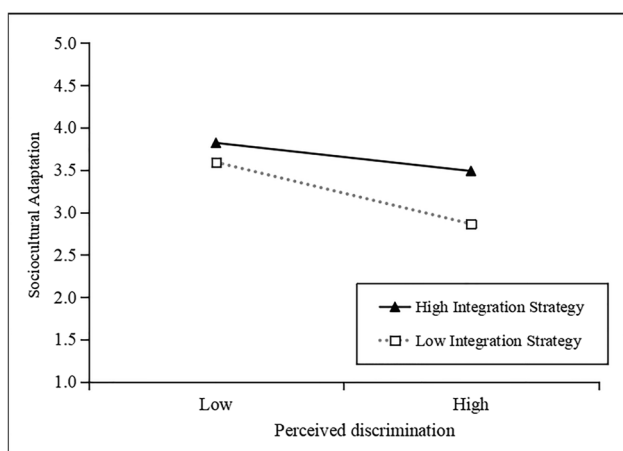


Fig. 3. The moderating effect of integration strategy on the relationship between perceived discrimination and sociocultural adaptation.

orientation was low (one SD below the mean; $b = -0.29$, $p < 0.001$) but became weaker when autonomous orientation was high (one SD above the mean; $b = -0.15$, $p < 0.001$). Meanwhile, Figure 3 showed that perceived discrimination was negatively related to sociocultural adaptation when integration strategy was low (one SD below the mean; $b = -0.33$, $p < 0.001$) but became weaker when integration strategy was high (one SD above the mean; $b = -0.15$, $p < 0.001$).

We then analyzed the relationship between perceived discrimination and psychological adaptation, as well as the moderating effect of autonomous orientation and integration strategy in this relationship. Table 3 shows that perceived discrimination was found to be negatively associated with psychological adaptation ($\beta = -0.14$, $p < 0.01$, 95%CI [-0.268, -0.038]) in the first step (Model 2). Autonomous orientation moderated the relationship between perceived

discrimination and psychological adaptation ($\beta = 0.49$, $p < 0.05$, 95%CI [0.026, 0.345]) (see Table 3, step two). In step three, the moderating effect of integration strategy was not significant ($\beta = 0.01$, $p > 0.05$). The 95% confidence interval of the bootstrap test of the moderating effect of autonomous orientation on the relationship between perceived discrimination and psychological adaptation was 0.015 to 0.340, which did not include 0; the moderating effect of integration strategy on the relationship between perceived discrimination and psychological adaptation was -0.117 to 0.119, which contained 0. These results support H1b and H2b, but not H4b. Furthermore, it also means that H5b doesn't need to be analyzed.

Figure 4 showed that perceived discrimination was negatively related to psychological adaptation when autonomous orientation was low (one SD below the mean; $b = -0.18$, $p < 0.05$) but became weaker when autonomous orientation was high (one SD above the mean; $b = -0.08$, $p > 0.05$).

Autonomous orientation is positively associated with integration acculturation strategy ($\beta = 0.21$, $p > 0.001$), which supports H3. We applied the Edwards and Lambert (2007) mediated moderation procedures to examine H5a. The size of the indirect effect was -0.064, and the 95% confidence interval from the bootstrap procedure and analysis excluded zero [-0.134, -0.020]. This indicates that integration strategy mediates the relationship between perceived discrimination and sociocultural adaptation, moderated by autonomy orientation. Thus, the results support H5a.

Discussion

This paper investigates the relationship between perceived discrimination and cross-cultural adaptation among international students. We further consider the roles played by autonomy orientation and integration strategy. Although previous studies have confirmed the negative influence of perceived discrimination on cross-cultural adaptation (Scott et al., 2015), little is known about the individual differences that contribute to this relationship. Drawing on self-determination theory, we hypothesized that autonomous orientation moderated the effect of perceived discrimination on cross-cultural adaptation. In addition, we introduce integration strategy as a mediator variable that can influence the moderating effects of autonomy orientation on the relationship between perceived discrimination and cross-cultural adaptation.

Compared with the previous researches that focused on the international students of different ethnic groups, the level of international students' perceived discrimination in China was similar to Romania and the United States (Iorga et al., 2020; Wei et al., 2012). In this study, after controlling variables of gender, age, education, and length of residence,

Table 3. Hierarchical regression analysis of variables predicting psychological adaptation.

Model(Outcome) /Step	Included Variable	Coefficients				Overall Statistics		
		β	SE	t	p	Adj.R ²	F	p
Model 2 (Psychological Adaptation)						0.06	4.89	<0.001
Step 1	Gender	-0.09	0.14	-1.69	0.093			
	Age	0.23	0.02	3.04	0.003			
	Educational level	-0.14	0.14	-1.82	0.070			
	Length of residence	-0.16	0.04	-2.85	0.005			
	Perceived discrimination	-0.14	0.06	-2.62	0.009			
						0.12	7.29	<0.001
Step 2	Gender	-0.13	0.13	-2.36	0.019			
	Age	0.27	0.02	3.79	<0.001			
	Educational level	-0.16	0.14	-2.24	0.026			
	Length of residence	-0.16	0.04	-3.07	0.002			
	Perceived discrimination	-0.58	0.21	-2.89	0.004			
	Autonomous orientation	0.17	0.23	0.16	0.874			
	Perceived discrimination * Autonomous orientation	0.49	0.08	2.29	0.023			
						0.18	8.92	<0.001
Step 3	Gender	-0.16	0.13	-2.92	0.004			
	Age	0.21	0.02	2.87	0.004			
	Educational level	-0.17	0.13	-2.37	0.019			
	Length of residence	-0.17	0.04	-3.35	0.001			
	Perceived discrimination	-0.57	0.24	-2.57	0.011			
	Autonomous orientation	-0.02	0.23	-0.23	0.822			
	Perceived discrimination * Autonomous orientation	0.47	0.08	2.14	0.033			
	Integration strategy	0.26	0.15	2.15	0.032			
	Perceived discrimination * Integration strategy	0.01	0.06	0.03	0.975			

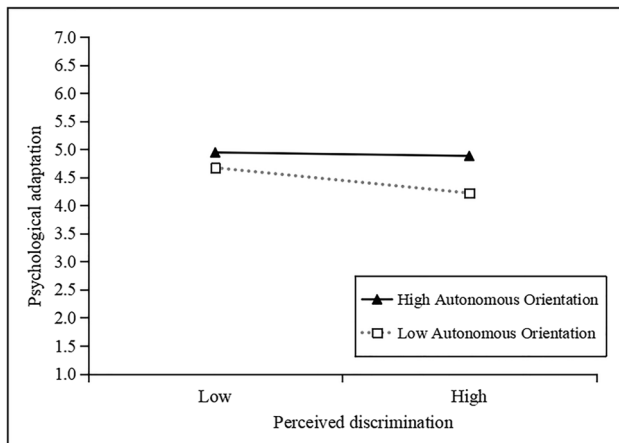


Fig. 4. The moderating effect of autonomous orientation on the relationship between perceived discrimination and psychological adaptation.

perceived discrimination can negatively predict sociocultural and psychological adaptation. The result supports H1a and H1b, and the conclusion is consistent with previous studies

(Lee, 2005; Smith & Khawaja, 2011). Although various studies have revealed the negative impacts of perceived discrimination on the adaptation of international students, fewer studies have focused on Asian countries, such as China (Yu et al., 2019). Our study has expanded the understanding of the issues of stress and adaptation within a Chinese cultural context. The results show that in general, the degree of perceived discrimination against international students in China is low, but as the perceived discrimination still significantly hinders their sociocultural and psychological adaptation, it is advisable to explore the conditions that can lessen the relationship between perceived discrimination and cross-cultural adaptation. It is also a reminder that the governments and universities in the host countries need to pay attention to perceived discrimination and cross-cultural adaptation among international students.

Moderation analysis revealed that the relationship between perceived discrimination and cross-cultural adaptation is contingent on the degree of autonomy orientation, which is consistent with H2a and H2b. Our research suggests that autonomous orientation can weaken the negative effects of perceived discrimination on sociocultural

adaptation when autonomous orientation was high; when autonomous orientation was low, the negative effects of perceived discrimination on sociocultural adaptation was stronger. Similarly, autonomous orientation can inhibit the negative effects of perceived discrimination on psychological adaptation. Previous studies have revealed that autonomous-oriented individuals would adopt effective coping strategies and demonstrate more resilience in the face of dilemma (Weinstein & Hodgins, 2009; Weinstein & Ryan, 2011). Even when international students perceive discrimination, those with autonomy orientation will take the initiative to enrich their life experience (Fridgen, 1984), establish an emotional connection with residents (Joo et al., 2019) and seek more social support (Cho & Yu, 2015), to better adapt to the abroad studying life. Our study reveals different effects of perceived discrimination on sociocultural and psychological adaptation under different degrees of autonomy orientation, this provides a basis for future research. Because of the important role of autonomy orientation, it is very important to help international students to shape a stronger autonomy orientation.

Our findings provide support for the hypothesis that autonomous orientation can positively predict integration acculturation strategy (H3). International students who are autonomously motivated tend to respond more adaptively to the specific stressors of perceived discrimination. In addition, our study demonstrates that integration strategy is another moderator that weakens the negative effect of perceived discrimination on sociocultural adaptation, and integration strategy mediates the moderating effects of autonomous orientation on the relationship between perceived discrimination and sociocultural adaptation, results that support H4a and H5a. These findings explain why some international students adapt well to a new culture, while others do not. As a personal resource, autonomy orientation has the same effect as self-efficacy, resilience, core-self evaluations (Bandura et al., 1997; Judge et al., 2005; Luthans et al., 2006). Autonomous-oriented individuals will choose active and adaptive coping styles and endorse behavior volitionally. A previous study has revealed that the integration strategy is the best strategy for positive outcomes among migrants (Gui et al., 2012). The strategy of integration reflects the tendency of migrants to give equal importance to the acceptance of heritage and host culture, through which they can access local resources. International students who choose the integration strategy have better sociocultural adaptation. These findings enrich current knowledge by showing that integration strategy can be seen as the underlying mechanisms to predict sociocultural adaptation. The results do not support H4b, which is consistent with existing related studies. For example, Zhang et al. (2010) found that cultural orientation was a poor predictor of psychological adaptation. It may be due to international students can not get enough

social support from heritage culture to buffer the negative influence of perceived discrimination, they may enjoy better sociocultural adaptation, but not necessarily psychological adaptation. It also may be due to acculturation variables play a small role on psychological adaptation outcomes. This aspect is worthy of further investigation.

Theoretical implications

This article has some contributes to the acculturation literature. Firstly, this study extends acculturation theory by verifying the negative effects of perceived discrimination on international students' cross-cultural adaptation in China, a relationship that is contingent on autonomous orientation and integration strategy. Taking international students studying in China as the research samples, this study supports the unique role of integration strategies in promoting international students' sociocultural adaptation, supplementing the relevant studies on cross-cultural adaptation. Secondly, while the majority of prior studies have probed cross-cultural adaptation by focusing on the single antecedent variables, such as individual or situational factors, fewer studies have explored the interaction of different factors on cross-cultural adaptation. This study highlights the interaction between perceived discrimination and individual factors on cross-cultural adaptation and expands on existing research on cross-cultural adaptation. It also contributes to the area of discrimination and its relationships with other factors. Self-determination theory argues that individuals with high degree of autonomous experience their actions as self-organized, they can better tolerate negative experiences, and adopt constructive coping strategies in stressful situations (Skinner & Edge, 2002). Our results suggest that autonomous orientation moderate the relationship between perceived discrimination and cross-cultural adaptation. Finally, our research presents a new relational view of autonomous orientation and integration strategy, we introduce integration strategy as a way of explaining the moderating effects of autonomous orientation on the relationship between perceived discrimination and sociocultural adaptation. Thus, we explain the impact of integration strategy on adaptive behaviors, which supports the integration strategy that is favored by China is an integral part of the international students' education. Different from previous studies, this study fully supports the specific impact of integration strategies in sociocultural adaptation and highlights the overall role of autonomy orientation and integration strategies.

Practical implications

The results of this study inform the interventions for international students. First, it was found that perceived discrimination could negatively predict sociocultural and psychological

adaptation. This reveals the importance of resolving discrimination among international students. Thus, university management should be concerned about international students' feelings in their daily life and provide enough support for those who experience stressors. Secondly, the negative effect of perceived discrimination on cross-cultural adaptation was contingent on autonomous orientation and integration strategy. Autonomous orientation can weaken the negative effect of perceived discrimination on cross-cultural adaptation, and integration strategy can weaken the negative effect of perceived discrimination on sociocultural adaptation. Third, international students should have a clear understanding of their own sociocultural and psychological adaptation, seek help from relatives, friends, and teachers when they experience discrimination, and learn to reduce the negative impact of perceived discrimination by using integration strategies. Universities can carry out cultural exchange activities for international students, such as language exchanges, local cultural experiences, expanding the channels for international students to gain a thorough understanding of local culture, customs, and living habits, and provide a platform for international students to interact with residents, to enhance their sense of belonging and identifying with the local culture. At the same time, universities should provide psychological counseling services and help international students properly use integration strategies. Finally, this study has dealt with the issues of discrimination against international students in China, which has been underrepresented in this research area. To help international students better cross-cultural adaptation, the Chinese government has established international students service system, set up Chinese government scholarships to help international students reduce the cost of studying, conduct a series of integrated activities, such as the national talent competition for foreign students, and the symposium on the quality of studying in China. These results could have implications for initiating similar discussions for international students in other countries.

Limitations and future study

Several limitations of this study should be noted. Firstly, this study selects 335 international students as research participants, and most of them come from universities in Chinese developed cities. It may not be possible to generalize these results to international students in other Chinese universities or populations in other countries. Thus, the issues of cross-cultural adaptation need to be further investigated. Considering economic development and local cultural differences, international students may have different cross-cultural experiences, so future research might recruit research participants from different countries. Besides, we should control for variables other than gender, age, educational level, length of residence, such as social class and

country of origin, which may lead to the perceived discrimination of international students (Trilokekar & Kukar, 2011; Kranz & Goedderz, 2020). Secondly, although the role of autonomy orientation has placed a high value on helping individuals cope with difficulties, few studies have included it in the education of international students. In the future, more studies in this area should be focused on putting forward measures that can intervene in autonomy orientation and integrate strategies. Moreover, although this study considers perceived discrimination, autonomous orientation, and integration strategy as relevant variables, social support, interpersonal skills, language proficiency, and other variables related to cross-cultural adaptation have not been included in our research. Future research should map the effect of perceived discrimination on cross-cultural adaptation in more detail. In addition, all measures in the present study have been assessed only one time, potentially resulting in overlooking the changes and developments of cross-cultural adaptation and other relevant factors. Future work may provide valuable insight by conducting longitudinal studies to focus on the changes in relevant variables to give an accurate understanding of the internal mechanisms of cross-cultural adaptation.

Conclusions

Our results indicate that perceived discrimination could negatively predict cross-cultural among international students in China. Self-determination theory appears a promising framework to explain the individual differences when they in the face of adversity. Our research identifies autonomous orientation as an important contingency that weakens the effects of perceived discrimination on cross-cultural adaptation and confirmed the moderating role of integration strategy in the relationship between perceived discrimination and sociocultural adaptation. Integration strategy mediates the moderating effects of autonomous orientation on the relationship between perceived discrimination and sociocultural adaptation.

Data Availability The datasets generated during and/or analysed during the current study are available from the corresponding author on reasonable request.

Declarations

Conflict of Interest No potential conflict of interest was reported by the authors.

Ethical Approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. It has been

known and approved by the Academic Ethical Group of Faculty of Education, Soochow University, China.

Informed Consent Informed consent was obtained from all individual participants included in the study.

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