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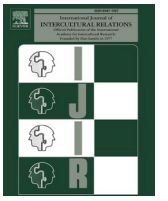

Crossing digital borders: Exploring the role of non-Chinese social media use in the cross-cultural adaptation of Chinese international students

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ABSTRACT

The use of social media may play an important role in international students' cross-cultural adaptation. When moving to a new country, many international students maintain the same set of social media they use back home. For Chinese international students, however, pursuing studies in a different country means not only physical but also digital border-crossing. Aside from the Chinese social media platforms (e.g., WeChat, Weibo, Xiaohongshu) they use to communicate with the home-country network, they also have to use non-Chinese social media platforms (e.g., Facebook, Instagram, WhatsApp) to connect with the host-country network. This paper addresses the research question: How does the engagement of Chinese international students on non-Chinese social media within the host country context impact their cross-cultural adaptation? Using a cross-sectional survey, we examined the associations of engagement in non-Chinese social media platforms of international Chinese students ($N = 352$, $M_{age} = 24.13$) with their psychological and sociocultural adaptations. We proposed and employed a comprehensive measure of engagement in (non-Chinese) social media. Results indicate that higher engagement in non-Chinese social media significantly enhanced both psychological and sociocultural cross-cultural adaptations. The association between non-Chinese social media engagement and psychological adaptation was stronger for those who intend to stay in the host country. This study validates previous findings that social media engagement with the host-country network is important in international students' adjustment. Moreover, this study presents a comprehensive measure of social media engagement to better capture international students' social media usage.

Introduction

International students represent a unique demographic, crossing geographical, national, and cultural boundaries as they begin a new chapter of life in their host country. Upon their arrival in the host country, they are confronted with the imperative task to adapt in the new cultural environment, necessitating the acquisition of useful information and the establishment of social networks (Dekker & Engbersen, 2013). One way to facilitate cross-cultural adaptation is by using social media platforms to establish social connections in

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the host-country (Forbush & Foucault-Welles, 2016; Hofhuis et al., 2023).

The majority of international students use the same set of social media platforms for both their host- and home-country networks (Billedo et al., 2020). Having both networks in one platform provides a sense of connection and integration among international students and other migrants (Ihejirika & Krtalic, 2020). For Chinese international students, however, the set of social media platforms they use for their home- and host-country networks differs. Due to the regulation in mainland China, access to non-Chinese social media platforms like Instagram and WhatsApp is restricted within its borders (Chandel et al., 2019). However, these non-Chinese social media platforms become indispensable tools for communication and information exchange for Chinese international students the moment they set foot in the host country (Saari et al., 2022). Thus, the cross-cultural adaptation process for Chinese international students entails not only physical but also digital migration, with their social media interactions within the host country context exclusively transpiring via non-Chinese platforms.

Previous studies noted that many migrants manage their social media interactions (e.g., professional, personal, intimate) by strategically dividing their home- and host-country audiences by platform or varying the privacy settings for these networks in the same platform (Barbour & Ali, 2023; Hong et al., 2021). Among Chinese international students, this differentiation might occur by default: they stay connected with family and friends in China using Chinese social media, and establish new connections in the host country using non-Chinese social media. Thus, their non-Chinese social media network is isolated from their pre-existing home network. This presents a unique circumstance that has not been accounted for when it comes to social media use among other non-Chinese international students (Forbush & Foucault-Welles, 2016). It is relevant, therefore, to investigate the relationship between digital border-crossing and cross-cultural adaptation among Chinese international students.

Earlier studies on the use of social media by international students in relation to cross-cultural adjustment present contradicting findings. Several studies suggest that greater social media use with the host country network increases sociocultural adaptation and enhances well-being (Billedo et al., 2020; Hofhuis et al., 2019; Wilson et al., 2013). On the other hand, it has been shown that increased social media use with the host country network is associated with poorer psychological adaptation and increased loneliness (Bilecen et al., 2024; Gaitán-Aguilar et al., 2022). A systematic review on social media use and international students' acculturation process pointed out that the conflicting conclusions regarding the role of social media might be due to the way social media use has been conceptualized and operationalized (Pang & Wang, 2020). First, many of the earlier studies conceptualized the use of social media as including both the home- and the host-country contexts and focusing on only one platform (e.g., Facebook), as this is the case of use for many international students (Billedo et al., 2019). However, this conflation of social networks in one platform poses a potential challenge for international students to isolate and accurately evaluate their behavioral patterns between the two contexts (i.e., home and host) of use. By focusing on digital migration, this study presents an opportunity to separate social media use in the host country context from the home country context, contributing to a more accurate measure of international students' social media engagement within the host country. Second, there is a research gap in the the operationalization of social media use, as it was limited to temporal assessment such as time spent on social media and frequency of use (Pang & Wang, 2020). These measures do not account for the relational, cognitive, and affective experiences of social media use which may hinge on aspects such as self-disclosure and types of relationships maintained (Pang & Wang, 2020; Rui & Wang, 2015).

Building upon these insights, the primary objective of this study is to understand:

RQ. : *How does the engagement of Chinese international students on non-Chinese social media within the host country context affect their cross-cultural adaptation?*

To attain this, we also aim to provide a comprehensive conceptualization and operationalization of social media use.

Cross-cultural adaptation of international students

Cross-cultural adaptation refers to "changes that take place in individuals or groups in response to environmental demands in a different culture" (Berry, 1992), where adaptation includes individual's process of handling emotions that one experiences in a new culture and the activities of learning new social skills to fit in the foreign culture and society (Berry, 2009; Ward, 2013). Therefore, cross-cultural adaptation involves two dimensions: Psychological and sociocultural adaptation (Ward & Kennedy, 2001; Ward, 2013). Psychological adaptation refers to the individual's ability to cope with the changes and pressures of being abroad to maintain their general well-being or emotional satisfaction (Ward & Kennedy, 2001). This includes dealing with negative experiences related to living abroad, such as discrimination and homesickness (Hofhuis et al., 2019; Smith & Khawaja, 2011). Sociocultural adaptation refers to individuals' ability to understand the host culture and function appropriately in the new cultural environment. This is a process where individuals learn new cultural knowledge, acquire new skills, and gradually fit in the host cultural environment (Masgoret & Ward, 2006; Ward & Kennedy, 2001). This entails the establishment of social connections, as well as arranging for necessary living arrangements, from handling city council registration to securing accommodation Smith & Khawaja, 2011).

For international students, achieving successful cross-cultural adaptation is paramount as it significantly impacts both their overall well-being and academic success (Hofhuis et al., 2023). By navigating cultural differences and forging connections within the host community, international students can cultivate a sense of belonging and fulfillment, thereby enhancing their overall well-being (Bethel et al., 2020). Moreover, a well-adapted student is better equipped to navigate the academic challenges leading to academic success (Shafaei & Razak, 2016).

Impact of social media use in the host-country context on cross-cultural adaptation

Effective communication with host-country relations leads to a heightened level of sociocultural and psychological adaptation (Ward & Kennedy, 2001). Social media platforms are now considered as indispensable tools and facilitators in building connections within the context of the host country (Saari et al., 2022). By using social media to build connections with the host country, international students are able to forge relationships, access social support networks, and navigate unfamiliar environments more conveniently (Billedo et al., 2019; Forbush & Foucault-Welles, 2016; Hofhuis et al., 2019). In the context of mainland China's social-political conditions and censorship, access to non-Chinese social media platforms such as Instagram and WhatsApp is restricted for Chinese citizens residing in China (Chandel et al., 2019). However, for Chinese students studying abroad, these platforms become necessary tools for communication and information exchange (Saari et al., 2022). Hence, the cross-cultural adaptation process for Chinese international students entails digital border-crossing, where they need to make a transition from one digital bundle of platforms to another during their study abroad (Qi et al., 2021). It is important to clarify that digital border-crossing does not necessarily mean abandoning their Chinese-based social media platforms altogether. However, there is a delineation between the contexts of use: Home-country network for the Chinese platforms and host-country network for the non-Chinese platforms. Central to this study is the investigation of the impact of non-Chinese social media use on cross-cultural adaptation among Chinese international students.

Conceptualization of social media engagement

In addressing the main objective of this study, it is crucial to tackle the limitations and variability of previous conceptualizations and operationalization of "social media use" in previous research (Pang & Wang, 2020; Valkenburg, 2021). The extant quantitative research on this topic mostly conceptualized social media use with the host country using temporal assessments such as time spent on social media and frequency of use (Billedo et al., 2019; Gaitán-Aguilar et al., 2022; Hofhuis et al., 2019; Hofhuis et al., 2023). Although the temporal aspect of social media use is quite important, accounting only for this dimension is a narrow conceptualization. Social media use extends beyond duration and frequency of use and encompasses a wider range of aspects as documented in qualitative research. Previous findings point to relational, cognitive, and affective aspects of use (such as level of self-disclosure and emotional attachment to social media) as impacting cross-cultural adaptation (Dong et al., 2020; Martin, 2020; Rodgers et al., 2020). These aspects are often overlooked in quantitative research and warrant further investigation (Pang & Wang, 2020; Rui & Wang, 2015). If we want to investigate how social media use impacts international students' cross-cultural adaptation, it is important to acknowledge its multifaceted character and provide a more holistic conceptualization (Calder et al., 2015; Valkenburg, 2021). Thus, in this study, we present a more comprehensive conceptualization of social media use that encompasses not only duration and frequency of use, but also the internalized relational, cognitive, and affective experiences that underpin one's interactions. To differentiate the conceptualization in this current study from previous ones, we will use the label (non-Chinese) *social media engagement* instead of social media use or interactions.

In this study, (non-Chinese) *social media engagement* is conceptualized as multidimensional and includes the following: 1) *time spent on social media*, 2) *frequency of behaviors on social media*, 3) *number of (non-Chinese) social media platforms used*, 4) *relationship-based usage frequency*, 5) *self-disclosure level*, and 6) *emotional attachment to non-Chinese social media platforms.*

The first two indicators, *time spent on social media* and *frequency of behaviors on social media*, are the widely used conceptualizations in previous quantitative research on social media use of international students (Billedo et al., 2019; Gaitán-Aguilar et al., 2022; Hofhuis et al., 2019; Lin et al., 2011; Li & Peng, 2019; Pang & Wang, 2020). Thus, they are included in this study as indicators reflecting the level of engagement.

The third indicator, *number of (non-Chinese) social media platforms used*, denotes not only the variety but also the purposive simultaneous adoption of social media platforms. In the contemporary interconnected media landscape, individuals strategically leverage a diverse array of media platforms and resources to fulfill varying needs (Madianou & Miller, 2013). Qualitative research provides initial evidence for the advantages of adopting diverse social media platforms in the cross-cultural adaptation of Chinese international students. It has been shown that the use of diverse social media platforms provides greater opportunities to fulfill their goals and satisfy their needs in the host country (Dong et al., 2020).

Relationship-based usage frequency aspect is the frequency of interactions on social media with host-country network differentiated on the degree of intimacy of relationships (e.g., friends, romantic partner, etc.). Research has shown that international students often struggle to form close friendships within host country, leading to fragile, purpose-oriented relationships that hinder discussions on emotionally stressful issues or seeking social support (Seo et al., 2020; Sinanan & Gomes, 2020). Low intimacy of relational networks on social media have been linked to poor adaptation outcomes (Best et al., 2014), underscoring the importance of evaluating the relational quality of relationships that the social media platforms are used for.

Self-disclosure level reflects the willingness to share personal information on social media platforms, serving as a predictor of user engagement and indicating the depth of individuals' involvement and investment in social media interactions (Sultan, 2021). Furthermore, self-disclosure on social media platforms regarding daily life abroad has been correlated with improved psychological adaptation outcomes (Park et al., 2014).

E*motional attachment to non-Chinese social media platforms* pertains to the degree of integration of social media into users' social behaviors and daily routines, reflecting the significance and emotional connection individuals attribute to their social media engagement (Ellison et al., 2007). This indicator provides valuable insights into the subjective experience and perceived importance of social media use.

Given this more holistic conceptualization, we predict that non-Chinese social media engagement will facilitate cross-cultural adaptation among Chinese international students. Specifically:

H1. : *Non-Chinese social media engagement is positively related to psychological adaptation among Chinese international students.*

H2. : *Non-Chinese social media engagement is positively related to sociocultural adaptation among Chinese international students.*

International students' intention to stay

A key aspect in international student experiences is their post-graduation plan, particularly their intention to stay in the host country. It has been shown that among Chinese international students, those who have a higher intention to stay are more likely to immerse themselves in host country events and networks, thus experiencing deeper cross-cultural adaptation (Dong et al., 2020). The direction of association, however, is not clear. It appears that the link between cross-cultural adaptation and intention to stay indicates a reciprocal relationship (Chang et al., 2023; Tsang & Nguyen, 2023). On the one hand, it could be that it is their intention to stay that serves as a motivation for better cross-cultural adaptation (Toth-Bos et al., 2019). Intention as a pivotal precursor to behavior (Ajzen, 1991), the decision to stay or leave holds significant sway not only over their future trajectories, but also on international students' relational and acculturation motivations and efforts during their academic sojourn. On the other hand, it is possible that because of better cross-cultural adaptation, international students more strongly consider staying in the host country even after achieving their academic goals. Similarly, the direction of association between intention to stay and social media engagement among international students is not clear (Dong et al., 2020; Manchin & Orazbayev, 2018). Those who intend to stay in the host country might be more motivated to use social media to engage with the host country network, or those who have higher social media host country network engagement are more encouraged to consider staying longer in the host country. Despite the lack of clear directions, it is evident that the intention to stay in the host country is related to both social media engagement and cross-cultural adaptation of international students. It is, therefore, necessary to account for its influence to infer the relationship between social media engagement and cross-cultural adaptation better. In this study, intention to stay in the host country is accounted for as a control variable.

A conceptual model (please see Fig. 1) is presented below to provide a summary of the main concepts, their indicators, and the predicted relationships in this current study.

Method

Study design and procedure

A cross-sectional survey was conducted in English with Chinese translation utilizing Qualtrics. Ethical approval for this study was obtained from the Institutional Review Board of the University of Amsterdam (FMG-8838) and pre-registration was uploaded to OSF (https://osf.io/um8tq/) before data collection.

Upon accessing the survey, the participants were presented with an informed consent. Subsequently, a filter question was employed to ensure the eligibility of participants: Participants included in the study must be aged 16 years or older, must hold citizenship from mainland China, and must currently be pursuing education outside of mainland China. Participants who met the inclusion criteria and signed the informed consent were directed to the main questionnaire.

The main questionnaire has three main sections: 1) non-Chinese social media engagement, 2) intention to stay in the host country, and 3) cross-cultural adaptation processes (psychological and sociocultural adaptation). To mitigate potential order effects, the three sections were presented in a randomized sequence. Data were collected using Qualtrics, where all survey questions were set as mandatory, preventing participants from proceeding without answering each question. Additionally, two attention check questions[1] were included. Sociodemographic variables were asked on the last part of the questionnaire (i.e., age, educational level, and length of time away from China).

The survey was conducted from April 30th to May 11th 2024. Participants were recruited utilizing snowball and convenience sampling techniques through the first author's network. For the statistical analysis required to test the model (i.e, structural equation modeling approach), a sample size was determined adhering to the N:q rule for structural equation modeling as posited by Kline (2016). According to this rule, in latent variable models characterized by continuous, normally distributed outcomes and employing maximum likelihood estimation, sample size requirements are contingent upon maintaining a 20:1 ratio between the number of samples (N) and the number of model parameters necessitating statistical estimation (q). To ascertain the requisite sample size, a monk structural regression (SR) model was constructed in AMOS (Version 29; Arbuckle, 2023), encompassing all six hypothesized latent factors and two dependent variables as well as control variables in the hypotheses. The resultant analysis revealed the presence of 16 free parameters necessitating statistical estimation. Thus, to conform to the prescribed 20:1 ratio, a sample size of 320 participants was determined as necessary for robustness and statistical validity.

Sample

There were 373 who answered the survey. Participants who failed one of the attention checks or those who consistently selected one scale point across all measures were excluded from the analysis ($n = 21$). Thus, a total of 352 valid samples were collected. The average

[1] To ensure data quality, two attention checks were strategically embedded between the scales measuring non-Chinese social media engagement and cross-cultural adaptation with following attention prompt: "If you are paying attention, please select 1."

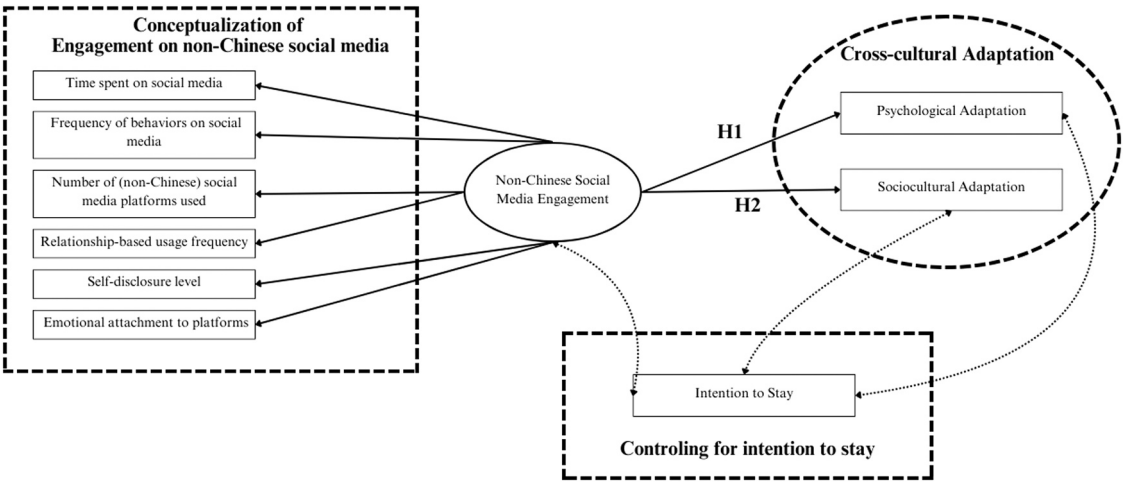

Fig. 1. The conceptual model.

age of the participants was 24 years old ($M = 24.13$, $SD = 3.26$, *Range* = 18–36). The average length of time they have been residing abroad is 37.18 months. Participants are studying in 25 different countries. The top 3 countries were the Netherlands ($n = 136$; 38.6 %), the UK ($n = 54$; 15.3 %), and Australia ($n = 46$; 13 %). Most of the participants' highest degree is Master ($n = 208$; 59.1 %).

Measures

All the measurements and scales used in the study can be found in the appendix as well as OSF platform https://osf.io/um8tq/.

Non-Chinese social media engagement

The assessment of the non-Chinese social media engagement encompasses six latent indicators:

Time spent on social media. Time spent on social media was measured using a 5-point scale (1 = Less than 1 hour per day; 2 = 1–2 hours per day; 3 = 2–3 hours per day; 4 = 3–4 hours per day; 5 = More than 4 hours per day) in response to the question: 'For all the social media you selected from the last question, approximately how much time per day do you spend on them?' Participants reported an average score of 2.76, corresponding to a usage range of approximately 2–3 hours per day, though individual usage varied substantially with a standard deviation of 1.90.

Frequency of behaviors on social media. Using the Passive-Active Use Measure of Facebook (PAUM) (Gerson et al., 2017), we assessed the frequency of specific behaviors while using social media, including active social use, active non-social use, and passive use (chatting, posting, browsing, etc). Statements were altered to assess the frequency of these behaviors across all the social media platforms (not only Facebook). For example: "How often do you post status updates and/or photos on the social media you selected?". Items were rated on a 5-point Likert scale (1 = *Never*; 5 =*Very often*). The Cronbach's α was .86, the mean score of 2.88 ($SD = 0.75$) indicates that, on average, participants reported engaging in social media activities with moderate frequency.

Number of (non-Chinese) social media platforms used. Participants were prompted to select from a predetermined list of non-Chinese social media apps utilized in the past month, with the recorded count indicating the number of platforms they use ($M = 4.00$, $SD = 1.91$, *Range* = 0–10). The most used social media platform is Instagram (87.8 %; $n = 308$). For participants who do not use any non-Chinese social media platforms ($n = 7$), all six factors of their non-Chinese social media engagement were coded 0. This value represents the baseline, indicating minimum (i.e., non-engagement) with non-Chinese social media.

Relationship-based usage frequency. This measurement was constructed based on Knapp's (1978) relationship model, which delineated five distinct relationship types categorized by degrees of intimacy: Strangers, acquaintances, friends, family, and romantic partners. However, given the focus on Chinese international students residing abroad, the inclusion of family relations in the scale was deemed not relevant, as their family relations residing in China do not have access to these social media platforms. Consequently, the family relationship category was omitted from the scale. The scale participants were asked to assess the frequency of their interactions/connections with individuals categorized among the various relationship types, i.e., strangers, acquaintances, friends, and romantic partners, across the various non-Chinese social media platforms they use. The question: "On the social media platforms you have selected, how often do you interact or connect with people you consider as…?" was asked for each of the relationship types. The question was answered using a 5-point Likert scale assessing frequency ranging from 1 = *never* to 5 = *very often.* Each relationship type was assigned a numerical value corresponding to its level of closeness, ranging from 1 for strangers to 4 for romantic partners. The final

score for this scale was computed by summing the products of the assigned values and the reported frequency of interaction across all relevant relationship types ($M = 27.00$, $SD = 9.00$, Range = 0–47).

Self-disclosure level. The level of self-disclosure on social media was measured utilizing the Self-Disclosure on Social Media scale developed by Gruzd and Hernández-García (2018). This scale originally consisted of 18 items that represent four distinct dimensions of self-disclosure. To simplify our questionnaire while retaining the scale's accuracy, two items with the highest measurement reliability from each sub-concept were selected (e.g., "My expressions of my own feelings, emotions, and experiences on social media are true reflections of myself"), resulting in an 8-item scale. The mean score was 2.87 ($SD = 0.79$), indicating an overall moderate self-disclosure level, with a Cronbach's α of.86.

Emotional attachment to non-Chinese social media platforms. This was measured using the validated 6-Item Social Integration and Emotional Connection scale (Jenkins-Guarnieri et al., 2013; e.g., "I feel disconnected from friends when I have not logged into those social media"). The mean score was 2.99 ($SD = 0.93$), indicating that participants reported a moderate emotional attachment to non-Chinese social media platforms, with a Cronbach's α of.88.

Psychological adaptation

Psychological adaptation was evaluated using the 10-item scale developed by Demes and Geeraert (2014). A sample item was "Thinking about living in your host country in the last 4 weeks, how often have you felt happy with your day-to-day life in the host country?". The reliability analysis of the ten-item scale indicated suboptimal internal consistency (Cronbach's $\alpha = .56$). Item analysis revealed that "Homesick when you think of your home country" had a negative corrected item-total correlation (-0.60), indicating that it did not align with the overall scale. To improve the internal consistency of the scale, this item was excluded. This significantly improved the scale's reliability to an acceptable level (Cronbach's $\alpha = .74$). The mean score of 3.03 ($SD = 0.48$) indicated a moderate psychological adaptation among Chinese international students.

Sociocultural adaptation

This was measured using Wilson et al.'s (2017) cultural competencies in the host country scale (e.g., "Thinking about life in your host country, please rate your competence at dealing with the bureaucracy"; 1 = *not at all competent;* 5 = *extremely competent*). The mean score for this measure was 3.62 (SD = 0.61), indicating that participants felt higher-moderately competent in adapting to their host country. The Cronbach's α of.83 suggests a high level of internal consistency, meaning the scale reliably measures sociocultural adaptation.

Intention to stay

Intention to stay was measured using the statement "From your point of view, how likely would you like to stay in the host country after finishing your education?" on four answer categories (1 = *a definite stay*; 4 = *definite no stay*) (Koenings et al., 2020), resulting in a mean score of 2.71 ($SD = 0.92$). This indicates that, on average, participants expressed a neutral inclination toward staying in the host country after completing their education, leaning slightly towards the possibility of staying.

Results

Measurement model: non-Chinese social media engagement

To validate the proposed measurement model, confirmatory factor analysis (CFA) was used to assess how the proposed 6 indicators (based on computed mean scores of *time spent on social media*, *frequency of behaviors on social media*, *number of (non-Chinese) social media platforms used*, *relationship-based usage frequency*, *self-disclosure level*, and *emotional attachment to non-Chinese social media platforms.*) relate to the latent construct: Non-Chinese social media engagement.

All the indicators had skewness values within the ± 1 range. Additionally, the overall Mardia's normalized multivariate kurtosis is 2.30. These suggest that the distribution of all the indicators is approximately symmetric and closely follows a normal distribution, representing good data quality. For convergence, Maximum Likelihood estimation converged to an acceptable solution with no Heywood cases (Kline, 2016). For the assessment of discriminant validity, the correlations among the factors ranged from 0.21 to 0.62. These values indicate that while the constructs are related, they are sufficiently distinct to warrant being treated as separate factors, justifying that no factors should be merged (Kline, 2016). In terms of convergent validity, the R^2 values for the indicators with respect to their latent variables ranged from.20 (*number of (non-Chinese) social media platforms used*) to .77 (*emotional attachment to non-Chinese social media platforms*). These R^2 values are within acceptable limits, demonstrating that the indicators adequately represent the latent constructs (Kline, 2016).

The overall fit of the unidimensional measurement model is mediocre based on the Chi-square test (χ^2 (9) = 29.38, $p < .001$), the root mean square error of approximation (RMSEA =.08, 90 % CI[.05;.11]), and the comparative fit index (CFI =.97, PCLOSE =.06).[2]

[2] The result of the Chi-square test can be expected to be significant, given the relatively large sample; CFI values, which should be above 0.95 for a good fit and above 0.90 for an acceptable fit; and RMSEA values should be below 0.08 for a mediocre fit and 0.05 for a good fit (with the upper bound of the 90 % confidence interval below 0.10 and the PCLOSE value non-significant). (Kenny, 2020; Kline, 2016)

To improve the model fit, modification indices indicate that two error correlations could be added: between *self-disclosure level* and *emotional attachment to non-Chinese social media platforms*, as well as between *time spent on social media* and *relationship-based usage frequency*. Theoretically, *self-disclosure level* and *emotional attachment to non-Chinese social media platforms* both pertain to respondents' subjective feelings associated with their use of social media. The association of *time spent on social media* and *relationship-based usage frequency* is theoretically warranted (Heyman et al., 2021). It is likely that the more intimate relationships one has on their social media platforms, the more time one might spend on them, leading to potential shared method variance. With these two error correlations, the model improved significantly ($\Delta\chi^2$ (2) = 15.96, $p < .001$) and showed a better model fit (χ^2 (7) = 13.43, $p = .06$, CFI = .99, RMSEA = .05, 90 %CI[.00;.09], PCLOSE = .42.). Convergent validity also improved for each item. This enhanced model is a robust and well-fitting measurement model for non-Chinese social media engagement (see Table 1). Therefore, non-Chinese social media engagement is adequately measured through all the six indicators.

Structural model: testing hypotheses 1 & 2

Using the tested CFA structure, Hypotheses 1 and 2 were tested using SEM by adding direct paths from non-Chinese social media engagement to Psychological and Sociocultural Adaptations. Age, education level, and length of time residing abroad were added as control variables (Table 2 & Fig. 2). An error correlation between Psychological Adaptation and Sociocultural Adaptation was added as they are nested under the concept of cross-cultural adaptation. The overall fit of the hypothesized structural model is acceptable,χ^2 (32) = 78.01, $p < .001$, CFI = .95, RMSEA = .06, 90 %CI[.05;.08], PCLOSE = .09.

Path from non-Chinese social media engagement to psychological adaptation

The path coefficient from non-Chinese social media engagement to Psychological Adaptation was significant (β=1.21, *SE*=0.31, $t = 3.89$, $p < .001$) with a moderate positive effect (b*=.23). This indicates that for each unit increase in non-Chinese social media engagement, Chinese international students' Psychological Adaptation is expected to increase by 1.21 units, holding all other variables constant. Therefore, Hypothesis 1 is supported.

Path from non-Chinese social media engagement to sociocultural adaptation

The path coefficient from non-Chinese social media engagement to Sociocultural Adaptation was significant (β=1.60, *SE*=0.36, $t = 4.40$, $p < .001$) with a moderate positive effect (b*=.27). This indicates that for each unit increase in non-Chinese social media engagement, Chinese international students' Sociocultural Adaptation is expected to increase by 1.60 units, holding all other variables constant. Therefore, Hypothesis 2 is also accepted.

Controlling for intention to stay

To investigate how intention to stay contributes to the model, we tested the same hypothesized structural model with Intention to Stay added as a control variable (see Fig. 3). This modified model had a mediocre fit (χ^2 (37) = 89.03, $p < .001$, CFI = .95, RMSEA = .06, 90 %CI[.05;.08], PCLOSE = .09). The hypothesized paths from non-Chinese social media engagement to Psychological Adaptation ($\beta = 0.89$, *SE* = 0.30, $t = 3.89$, $p = .010$) and Sociocultural Adaptation ($\beta = 1.50$, *SE* = 0.37, $t = 4.09$, $p < .001$) were significant, demonstrating moderate effect sizes ($b^{*Psychological\ Adaptation}$ =.17; $b^{*\ Sociocultural\ Adaptation}$ =.25). However, the effect sizes of these paths decreased compared to the values in the initial model. This indicates that Intention to Stay accounted for a portion of the variance in psychological and sociocultural adaptation previously attributed to non-Chinese social media engagement. In other words, some of the initial relationship observed between non-Chinese social media engagement and adaptation outcomes was due to the shared variance with Intention to Stay.

The path coefficients between Intention to Stay and non-Chinese social media engagement (β=0.25, *SE* = 0.06, $t = 4.05$, $p < .001$) and Psychological Adaptation (β=1.24, *SE* = 0.27, $t = 4.55$, $p < .001$) were significant, both with moderate positive effects ($b^{*\ Non\text{-}Chinese\ social\ media\ engagement}$ =.25; $b^{*Psychological\ Adaptation}$ =.28). These indicate that Chinese international students' higher Intention to Stay is significantly associated with higher non-Chinese social media engagement and better Psychological Adaptation. The path coefficient between Intention to Stay and Sociocultural Adaptation ($p = .310$) was not significant, indicating that Intention to Stay does not significantly associate with Sociocultural Adaptation.

To determine the contribution of Intention to Stay to the overall model fit, a Chi-square difference test was performed comparing the models with and without the control effects paths from Intention to Stay to the main variables (Non-Chinese social media engagement, Psychological Adaptation, and Sociocultural Adaptation). The Chi-square Difference test results ($\Delta\chi^2(3) = 41.24$, $p < .001$) indicated that the model without the control effects from Intention to Stay fits significantly worse than the one including these effects. These results underscore the importance of considering intention to stay as a key factor in understanding the dynamics of social media engagement and adaptation processes, particularly psychological adaptation, among international students.

Discussion

The integration of social media has increasingly played a pivotal role in facilitating the adaptation of migrants and sojourners to new environments (Polat & ÜmiT, 2023). For Chinese international students specifically, this process necessitates crossing digital borders. The primary objective of this study was to examine how the level of engagement on non-Chinese social media platforms predicts the cross-cultural adaptation of Chinese international students. Moreover, recognizing the limitations in previous research,

Table 1
Factor loadings and R^2 values for non-Chinese social media engagement construct indicators after re-specification.

Factors	Factor Loading	R^2
Frequency of behaviors on social media	0.91	0.83
Emotional attachment to non-Chinese social media platforms	0.68	0.46
Relationship-based usage frequency	0.68	0.46
Self-disclosure level	0.66	0.44
Time spent on social media	0.49	0.24
Number of (non-Chinese) social media platforms used	0.45	0.20

this study proposed and tested a more comprehensive conceptualization and operationalization of non-Chinese social media engagement. The influence of Chinese international students' intention to stay in the host country was also considered in testing the predicted associations.

Social media engagement and cross-cultural adaptation

The results showed that non-Chinese social media engagement predicted both psychological and sociocultural adaptations. This implies that the more engaged a Chinese student is on non-Chinese social media platforms, the better their sociocultural and psychological adaptations in the host country. These results align with the findings of previous research on the positive impact of social media use in cross-cultural adaptation (Billedo et al., 2020; Gaitán-Aguilar et al., 2022; Hofhuis et al., 2019).

This study contributes to a more nuanced understanding of the relationship between social media use and well-being. The field has long grappled with inconsistent findings on whether social media usage enhances or undermines well-being. While some studies suggest that social media can promote positive psychological outcomes (Zhang et al., 2023), others highlight its potential negative effects, including social isolation and decreased mental health (Faelens et al., 2020). Considering these conflicting results, our study contributes to theorizing by explicating the multidimensional character and the contextual factors of social media use. By providing a more comprehensive conceptualization of social media use and focusing on host-country networks, the findings validate previous findings that social media use may support better acculturation and well-being. Thus, to fully understand the associations of social media and cross-cultural adaptation, future research should specify the various dimensions and contexts in which social media are used.

Beyond its theoretical contribution, this study also emphasizes the importance of digital inclusion for international students and, more broadly, for migrant populations. Digital inequity between migrants and local residents is often overlooked in support programs (Alam & Imran, 2015). Our findings suggest that fostering social media engagement in the host country context may enhance newcomers' adaptation experiences. Universities, policymakers, and community organizations should recognize that social media are not merely an entertainment tool but a vital resource for sociocultural integration. To effectively support the cross-cultural adaptation of international students and other migrants, support programs should be designed to address the key dimensions of social media engagement identified in this study. Initiatives should provide comprehensive information identifying social media platforms and online communities that may support different aspects of international students' cross-cultural adaptation. For example, guiding students on where to find and join local community (Facebook) groups—such as those for second-hand selling, housing, language learning, and networking—can enhance their integration into host-country social networks where they can build connections, interact with locals, and develop a support network. By addressing various dimensions, institutions can help international students integrate into local social media communities, facilitating a smoother adaptation process. Bridging this digital divide will foster a more inclusive and supportive social media environment, contributing to their cross-cultural adjustment and overall well-being.

The role of intention to stay

This study explored the role of intention to stay in the host country in the relationship between non-Chinese social media engagement and cross-cultural adaptation. Results indicated that higher intentions to stay were significantly associated with higher non-Chinese social media engagement and better psychological adaptation. However, there was no significant association between intention to stay and sociocultural adaptation. We argue that this is because sociocultural adaptation is a practical necessity for daily functioning. It is necessary for international students to acquire the skills and knowledge during their stay in the host country, regardless of their future plans (Masgoret & Ward, 2006; Ward & Kennedy, 2001). Future studies should examine the dynamics between sociocultural adaptation and intention to stay more closely, potentially exploring other moderating factors such as personal goals, academic demands, and social support networks (Toth-Bos et al., 2019).

Social media engagement measure

To provide a more comprehensive conceptualization and operationalization of non-Chinese social media engagement, a measurement model for the construct non-Chinese social media engagement was developed by incorporating six factors: *Time spent on social media, frequency of behaviors on social media, number of (non-Chinese) social media platforms used, relationship-based use frequency,*

Table 2
Descriptive statistics and correlations of the main and control variables.

Variable	*n*	*M*	*SD*	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
(1) Time spent on social media	352	2.76	1.9	—										
(2) Frequency of behaviors on social media	352	2.88	0.75	0.44	—									
(3) Number of (non-Chinese) social media platforms used	352	4.00	1.91	0.21	0.42	—								
(4) Relationship-based usage frequency	352	27.00	9.00	0.44	0.62	0.33	—							
(5) Self-disclosure level	352	2.87	0.79	0.31	0.62	0.22	0.43	—						
(6) Emotional attachment to platforms	352	2.99	0.93	0.40	0.61	0.32	0.48	0.55	—					
(7) Psychological adaptation	352	3.03	0.48	0.01	0.23	0.25	0.13	0.07	0.08	—				
(8) Sociocultural Adaptation	352	3.62	0.61	0.08	0.26	0.22	0.20	0.17	0.05	0.48	—			
(9) Education	352	2.76	0.64	0.14	0.05	0.08	0.03	0.05	−0.04	−0.01	0.08	—		
(10) Age	352	24.10	3.26	−0.04	−0.11	0.05	−0.03	−0.04	−0.05	0.11	0.12	0.46	—	
(11) Length of time residing abroad	352	37.20	38.83	0.14	0.05	0.16	0.14	−0.03	0.04	0.09	0.14	0.08	0.28	—

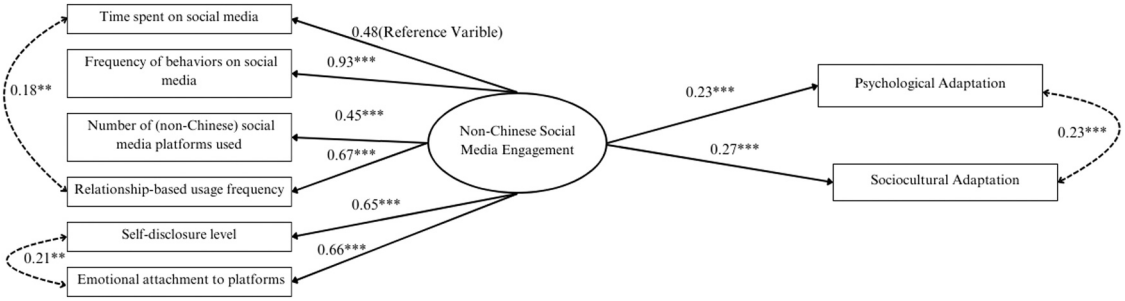

Fig. 2. Structural model showing the association of non-Chinese social media engagement with cross-cultural adaptation. *Notes.* The dotted lines represent error correlation; ***$p < .001$, ** $p < .05$; control variables are not shown in the figure although tested to provide a simplified version of the model.

self-disclosure level, and emotional attachment to non-Chinese social media platforms. The results of the confirmatory factor analysis demonstrated a well-fitting model with robust discriminant and convergent validity. These results demonstrate that each indicator distinctly and adequately represents the latent construct of non-Chinese social media engagement. Thus, non-Chinese social media engagement could be more comprehensively conceptualized and effectively measured, offering a holistic view of social media use and interactions. This multifaceted measurement approach provides a nuanced understanding of how engagement with non-Chinese social media platforms influences the adaptation process for international students.

The convergent validity and factor loading of the measurement model indicated that the *frequency of behaviors on social media* demonstrated the highest contribution to the latent construct of non-Chinese social media engagement. This finding suggests that measuring the (perceived) frequency of social media behaviors is a rather effective way to capture social media engagement. Thus, this gives substance to previous studies (Billedo et al., 2020; Gaitán-Aguilar et al., 2022; Hofhuis et al., 2019; Hofhuis et al., 2023) that used only frequency indicators to assess social media use. In contrast, *Time spent on social media*, another commonly used measure, performed poorly, with low convergent validity and factor loadings. This indicates that simply measuring the duration of social media use does not adequately reflect the complexity of engagement (Valkenburg, 2021).

Nevertheless, previous studies that made use of only the frequency of social media use to assess impacts on cross-cultural adaptation reported small effect sizes (Hofhuis et al., 2019; Hofhuis et al., 2023). In this current study, the impacts of social media engagement on cross-cultural adaptations yielded moderate effect sizes, consistent with a previous study that similarly made use of a multi-level operationalization of social media use (Yang, 2018). Taken together, these findings indicate that a limited scope of measurement (e.g., only one indicator, such as frequency of social media use) might underestimate the true extent of social media's impact. The relational, cognitive, and affective aspects of social media use (i.e., *self-disclosure level*, *emotional attachment to non-Chinese social media platforms*) showed strong convergent validity and high factor loading, reinforcing the importance of incorporating these dimensions when operationalizing social media use. Through a more nuanced and comprehensive operationalization of social media engagement, content validity was improved, which resulted in the detection of relatively larger effect sizes. The multidimensional measurement model allows for a more accurate assessment of the multifaceted nature of social media use and its impacts on cross-cultural adaptation.

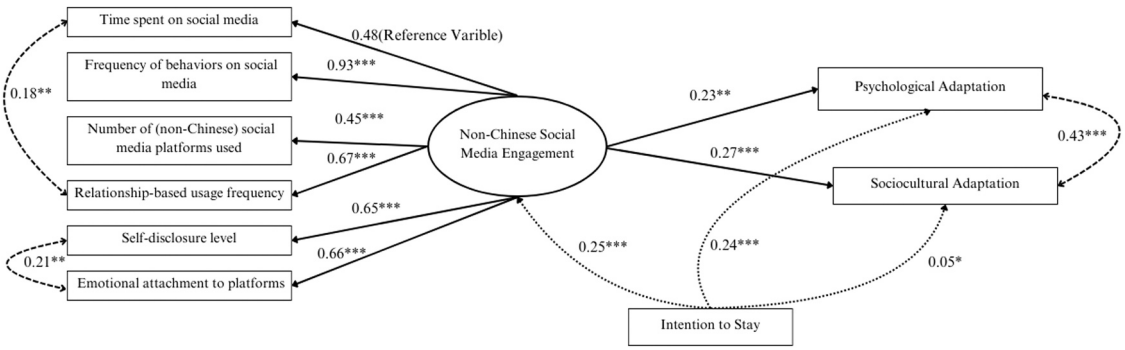

Fig. 3. Structural model showing the association of non-Chinese social media engagement with cross-cultural adaptation with Intention to Stay as a control variable. *Notes.* The dotted lines represent error correlation; ***$p < .001$, ** $p < .05$; control variables other than *Intention to Stay* are not shown in the figure although tested to provide a simplified version of the model.

Limitations and future research directions

This study has limitations that need to be acknowledged. The data collection was cross-sectional in nature. As the study aimed to investigate how engagement on non-Chinese social media platforms impacts international students' cross-cultural adaptation, it would be ideal to conduct a longitudinal examination to observe changes over time and establish predictive relationships more robustly. Therefore, future researchers should replicate this study using a longitudinal approach to gain deeper insights into these dynamics.

The structural regression model used for hypothesis testing achieved only a moderate fit, which is not entirely unexpected. Engagement on non-Chinese social media is only one aspect of building connections in the host country. It is likely that this behavior explains cross-cultural adaptation partially, as international students can also establish meaningful connections through offline, face-to-face interactions, which are equally important for their adaptation process. Future research should therefore build on earlier theorizing that incorporated both offline and online interactions (e.g., Billedo et al., 2019) in developing a more comprehensive model of international students' social network interactions and cross-cultural adaptation.

One item in the 10-item Psychological Adaptation scale developed by Demes and Geeraert (2014) was excluded to improve the scale's internal consistency. On the one hand, it is possible that this item, "Homesick when you think of your home country", could be assessing a different construct (e.g. Hannigan et al., 2006; Stroebe et al., 2015). Unlike the other items that predominantly reflect relocation difficulties or challenges in adjusting to a new situation (e.g., frustration, loneliness, or nervousness in being in a new culture), homesickness may reflect not only relocation difficulties, but also a negative emotional state because of one's separation from home. According to Stroebe et al. (2015), homesickness is a negative emotional state that is primarily due to separation from home and may go hand in hand with relocation (new place) difficulties. These two are independent processes that may co-occur. On the other hand, the low internal consistency could be due to the item formulation in the Chinese version of the scale. Thus, further studies are needed to establish the psychometric properties of the translated version of this scale.

While major social media platforms such as Instagram, WhatsApp, and Facebook are widely used across various host countries, future research could explore whether country-specific differences in digital infrastructure, cultural norms, or policies shape international students' adaptation through social media use. Investigating this variation could provide further insights into the nuances of digital acculturation across different host-country contexts. Moreover, the scope of this research was limited to engagement on non-Chinese social media platforms. However, other local digital platforms play a significant role in international students' adaptation when they migrate to a new place. For example, international students might need to download and use local transportation apps, grocery apps, and food delivery apps. These platforms are integral to daily life and can significantly impact students' ability to navigate and integrate into their new environment. Expanding future research to include engagement with these local digital platforms would provide a more comprehensive view of the digital adaptation process. Understanding these nuances can help in designing better support systems for international students and migrants, ensuring that their digital needs are met comprehensively.

Conclusion

In conclusion, this study has explored the digital border-crossing behaviors among Chinese international students, revealing the positive effects of social media on cross-cultural adaptation. The positive association between non-Chinese social media engagement and psychological adaptation was stronger for those who intend to stay in the host country. I argue that these positive effects likely extend beyond the study's demographic, suggesting that migrants and refugees could similarly benefit. We should recognize the potential social media platforms have afforded in helping bridge the digital divide and foster a more inclusive and supportive environment for newcomers.

Moreover, this study has successfully broadened the current empirical knowledge on the measurement of social media engagement, resulting in improved content validity. Future research should consider employing this measurement model in studies of social media engagement, as it provides a comprehensive framework for understanding the multifaceted nature of social media use.

CRediT authorship contribution statement

Billedo Cherrie Joy: Writing – review & editing, Validation, Supervision, Conceptualization. **Chen Yuhui Olivia:** Writing – review & editing, Writing – original draft, Visualization, Validation, Software, Project administration, Methodology, Investigation, Formal analysis, Data curation, Conceptualization.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix

Measures

Social media engagement Scale
Time spent on usage
For all the social media you selected from the last question, approximately how much time per day do you spend on them?
对于您在上一个问题中选择的所有社交软件，您每天在使用它们上大约花费多少时间？
Less than 1 hour per day 每天少于一小时
1-2 hours per day 每天 1 到 2 小时
2-3 hours per day 每天 2 到 3 小时
3-4 hours per day 每天 3 到 4 小时
More than 4 hours per day 每天超过 4 小时
Frequency of Behaviors
How often do you perform the following activities on the social media you selected?
请回忆您有多经常在您选择的这些社交软件上进行以下活动？
Checking to see what someone is up to 查看关注的人的动态
Private or Group chat (text/vedio/audio) 参与一对一或群组聊天（包括文字/视频/语音聊天）
Interacting with others' posts (giving likes and comments, reposting, etc) 与他人发布的帖子/动态互动（点赞和评论、转发等）
Posting status updates and/or photos 自己发布帖子/动态
Keeping up to date with events (creating, inviting, being invited) 及时了解线上/线下活动信息（包括创建活动、邀请他人参与活动、以及被邀请活动）
Reading or discussing news 阅读或讨论新闻
Browsing the information feed 浏览算法推荐的信息流内容
Looking through my friends' profiles 查看朋友们的个人主页
Number of non-Chinese social media platforms utilized
Please select the all the social media you are using from the options below during your stay in the host country.
请从以下选项中选择您在国外留学期间使用的所有社交软件
This question focuses on the social media that you CAN NOT use without a VPN in China, so Chinese social media such as WeChat and Xiaohongshu et al. are not included in the options
这个问题主要针对在国内需要 VPN 才能使用的社交软件，因此微信和小红书等社交软件平台不包含在选项中
WhatsApp
Instagram
Facebook
TikTok
X / Twitter
FB Messenger
Line
Pinterest
Snapchat
BeReal.
Reddit
Other (Please indicate the name of the social media, If there is more than one, please separate them with commas） 其他平台（请注明社交软件名称，如有多个请用逗号隔开） --------
I do not use any non-Chinese social media 我不使用任何非中国大陆社交软件
Relational quality established on the platforms
On the social media platforms you have selected, How often do you interact or connect with people you consider as .....?
在您刚才所选择的社交软件平台上，您多经常与您认为是.....的人互动或联系？
Stranger 陌生人
Acquaintance 认识但不算朋友
Friend 朋友
Romantic relation 浪漫关系

Self-disclosure level
To what extent do you agree with the following statement, considering the social media platforms that you selceted
在您刚才所选择的社交软件平台上，您在多大程度上同意以下陈述
My expressions of my own feelings, emotions, and experiences on social media are true reflections of myself 我在这些社交软件上所表达的感受、情绪和经历反映了我自己真实的心境
My self-disclosures on social media are completely accurate reflections of who I really am 我在这些社交软件上的自我披露完全准确地反映了我的真实身份
When I express my personal feelings on social media, I am always aware of what I am doing and saying 当我在这些社交软件上表达个人感受时，我总是清楚的知道自己在做什么和说什么
When I self-disclose on social media, I am consciously aware of what I am revealing 当我在 这些社交软件上自我披露时，我有自觉意识到我所披露的程度
I usually talk about myself on social media for fairly long periods 我通常会在这些社交软件上花相当长的时间表达和谈论自己
I often discuss my feelings about myself on social media 我经常在这些社交软件上讨论我对自己的感受
I would intimately, openly, and fully disclose who I really am in my post on social media 我经常在我发布于这些社交软件上的帖子中坦诚布公地表达自我
I often disclose intimate, personal things about myself on social media without hesitation 我经常在些社交软件上毫不犹豫地透露有关自己的私密、个人的事情
Emotional attachment to non-Chinese social media platforms
To what extent do you agree with the following statement, considering the social media platforms that you selceted
在您刚才所选择的社交软件平台上，您在多大程度上同意以下陈述
I feel disconnected from friends when I have not logged into those social media 当我没有使用这些社交软件时，我感觉与朋友失去了联系
I would like it if everyone used those social media to communicate 我希望我周围所有人都使用这些社交软件进行交流
I would be disappointed if I could not use those social media at all 当我根本无法使用这些社交软件时我会感到失望
I get upset when I can’t log on to those social media 当我无法登录这些社交软件时我会感到沮丧
I prefer to communicate with others mainly through those social media 我更喜欢通过这些社交软件与他人交流
Those social media plays an important role in my social relationships 这些社交软件在我的社交关系中发挥着至关重要的作用
Intention to stay
From your point of view, how likely would you like to stay in the host country after finishing your education?
从您的角度来看，您在你毕业之后你有多大愿意留在你所留学的国家？
a definite stay 肯定想留下来
possible stay 可能想留下来
possible no stay 可能不想留下来
definite no stay 肯定不想留下来

Psychological adaptation Scale
Thinking about living in your host country. In the last 4 weeks, how often have you felt…?
在过去 4 周内的留学生活中，您有多少次感到……？
Happy with your day-to-day life in the host country. 对留学的日常生活感到开心。
Nervous about how to behave in certain situations 因为不知道在某些场合如何表现而感到紧张
Frustrated by difficulties adapting to the host country. 因为不能适应留学国家的文化或环境而感到沮丧。
Sad to be away from your home country. 对离开家乡而感到难过
Excited about being in the host country. 因为来到新的国家而感到兴奋
Out of place, like you don't fit into the host country's culture 因为不适应留学国家的文化而感到格格不入
A sense of freedom being away from your home country. 因为远离家乡的而感到自由
Lonely without your family and friends from your home country around you 因为没有家乡的家人和朋友在身边而感到孤独
Curious about things that are different in the host country 对留学国家与家乡的不同之处而感到好奇
Homesick when you think of your home country 十分想家*

*This item was excluded from the analysis.

Socio-cultural adaptation Scale
Thinking about life in your host country, please rate your competence at each of the following behaviors
考虑到您的日常留学生活，请为您在以下行为方面的能力打分
Building and maintaining relationships 建立和维护人际关系
Obtaining social and community services I require 获得我在日常生活中所需要的服务
Interacting at social events 在社交活动中与人打交道
Adapting to the pace of life 适应社会节奏
Attending or participating in community activities 出席或参加当地社交活动
Finding my way around 可以在当地认路
Accurately interpreting and responding to other people's emotions 准确的解读和回应周围人的情绪
Dealing with the bureaucracy 在政府机构办理所需要的业务
Understanding and speaking the host country's language 理解并会说留学所在国的官方语言

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