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Exploring Heterogeneity of International Students' Racial and Native/Non-Native Language Backgrounds in Learning Engagement, Cultural Adjustment, Social Connections from QuantCrit Perspective

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ABSTRACT

The academic engagement of international students is intricately linked to their diverse social and cultural adjustments in the host culture. However, these aspects have often been investigated from a homogeneous point of view. This study explores the interpersonal characteristics of students from different racial groups and native/ non-native language backgrounds in learning engagement, cultural adjustment, social media use, and social capital. Data were collected using the Qualtrics Survey from 209 international students between November 2021 and May 2022. The results of the MANOVA indicate significant disparities based on their race and native/ non-native language backgrounds within the examined constructs. The findings enrich the body of research through the QuantCrit lens, underscoring that international students are not monolithic. Generalizing their experiences by aggregating various identity group data may fail to capture their complexities. The results revealed that Black students exhibited elevated levels of bridging social capital and learning engagement, potentially linked to increased social media usage. Hispanic students demonstrated lower levels of engagement and socialization. White international students displayed superior cultural adjustment and bonding capital. Conversely, Asian students reported lower levels of learning engagement, cultural adjustment, social media use, and social capital compared to their White, Black, and Hispanic peers. Native language international students outperformed non-native speakers in all assessed areas. The potential reasons for these group differences and administrative support that assists in

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coping with language, socialization and acculturation challenges are discussed.

Keywords: International Students; Heterogeneity; Social; Social Adjustment; Learning Engagement; QuantCrit

1. Introduction

Studying abroad poses challenges for international students as they simultaneously navigate academic activities, cultural adjustment, and social connections. Data from the Institute of International Education[1] reveal a 12 percent increase in international students' enrollments in the United States for the 2022/23 academic year, reaching 1,057,188. Despite the continuous rise in enrollment, there is a lack of research examining the differences in diversified interpersonal characteristics. They have often been studied as a homogeneous group[2–7]. However, international students come from various countries of origin and possess diverse backgrounds in race and ethnicity, gender, degrees, academic fields, language proficiency, and other factors[1]. Notably, over 60% of them are women. Students from China constitute the largest representation (27%), followed by India (25%) and South Korea (4%), making students from Asia the largest population. Fifty-five percent focus on science, technology, engineering, and mathematics (STEM) fields. Graduate students make up 44% of the total population, and undergraduates account for 33%. These statistics highlight certain patterns. However, they barely scratch the surface of the various characteristics, while the underlying diverse experiences are largely unexplored.

Treating international students as a homogeneous group can make it harder to identify the unique needs and challenges of different subgroups[2, 3]. An increasing number of scholars have argued against this approach, highlighting the recognition of the heterogeneity and uniqueness of international students[2–7]. This study attempts to distinguish international students with different racial identities and whether they have a native or non-native English background to showcase their diverse experiences in the United States. Emphasizing heterogeneity aligns with the principle of QuantCrit.

The QuantCrit's theoretical framework, proposed by scholars in CRT, such as Gillborn et al. (2018)[8] and Ladson-Billings (2006)[9], critically interrogates racism and inequities in education through quantitative analysis methods[2]. Aggregating group data and analyzing populations

as a monolithic group may fail to capture the disadvantaged experiences encountered by some marginalized groups[2]. Thereby, differences within populations are unexplored. This study informs itself with the QuantCrit theoretical framework, disaggregates international students into racial groups—Asian, White, Black, and Hispanic—and distinguishes between native/non-native English speakers to explore the heterogeneity in their academic and social experiences.

International students enhance social connections through online resources, which are often considered effective coping strategies to overcome academic challenges and better adjust to a new culture[10, 11]. As students' engagement in learning activities and materials is considered a predictor of academic performance[12], Dong et al. (2022)[11] employed structural equation modeling (SEM) to examine how social connections/resources and cultural adjustment influence international students' learning engagement. The model suggests various approaches that leverage social media to facilitate social resources and cultural adjustment, positively affecting learning engagement. Specifically, using social media to follow academic leaders or share information directly boosts learning engagement. Additionally, social media connects students with family and friends in their home countries or the United States, enhancing learning engagement through the mediation of cultural adjustment and social resources.

Recognizing the pivotal influence of social and cultural factors in learning engagement, researchers aim to explore the levels of each aspect and how the heterogeneity of racial and native/non-native English backgrounds contributes to the disparities. The findings of this study offer insights that are both theoretical and practical in nature. Theoretically, the current study enriches the literature by applying the QuantCrit framework to explore distinctions within race and native/non-native language backgrounds. It encourages researchers to adopt a heterogeneous perspective to study both the uniqueness and commonality of international students. From a practical view, it is crucial for administrators and educators to avoid treating international students as a "monolithic group" (p. 57)[2]. Students from varying back-

grounds may have unique needs that call for customized support. Voices need to be heard, particularly from those less represented. Achieving academic success in the United States while ensuring well-being is crucial. Therefore, higher education institutions should foster international students' social and cultural adjustment alongside academic support by providing various cultural fit opportunities.

2. Literature Review

2.1. Theoretical Framework

The QuantCrit theoretical framework is guided by Critical Race Theory (CRT) principles, examining oppressive power structures[8, 9]. Different from using narrative and counter-narrative, which are predominantly considered qualitative methods to investigate racial injustice[13], QuantCrit critically utilizes quantitative analysis approaches to discover social injustices and racial disadvantage. Diverging from viewing numbers and data as 'neutral' and 'objective,' QuantCrit's theoretical framework offers a lens to challenge statistical approaches that may exacerbate racial inequalities. Scholars[2, 8] have outlined five core QuantCrit tenets to study critically: (a) the centrality of racism, (b) numbers are not neutral, (c) categories are neither natural nor given, (d) data cannot speak for itself, and (e) the importance of using numbers for social justice endeavors.

Scholars have scrutinized the assumption that data and quantitative analysis inherently ensure neutrality and found that aggregating categories may manipulate research findings[8, 14]. Cruz et al. (2021)[14] employed the QuantCrit framework to analyze how level factors, such as temporal, student, and school, were manipulated and disproportionately affected the application of exclusionary discipline among disabled youth in one school district. The study suggests that schools may offer or restrict discipline opportunities for various student groups based on students' social-demographic labels and education identification. Conversely, Gillborn et al. (2018)[8] critically examine the underlying racist biases in statistical analysis structured by categories. Their study refuted the claim that minorities attending elite universities exceeded White British. The QuantCrit methodology uncovered that aggregating all minority groups rendered the specific experiences of marginalized minority groups invisible. Such a generalized approach provides a misleading

and biased perspective of the racial dynamics within higher education in Britain, masking disparities among different minoritized populations. Moreover, George Mwangi et al. (2019)[2] suggested that by using aggregated data, academic research often overlooks the unique needs of international students from less-represented regions by generalizing them with aggregated samples from predominant regions.

The following literature review synthesizes the QuantCrit theoretical perspective to examine international students' challenges in learning engagement, cultural adjustment, and social resource development. While not all studies discussed in this literature review originate from CRT, they were still incorporated to highlight the disparities in racial identities and disadvantages associated with non-native language speakers. This review underscores the critical role of using quantitative endeavors for social justice and emphasizes the imperative of investigating the heterogeneity among international students.

2.2. Learning Engagement

Academic success is a crucial goal for international students[15, 16]. Learning engagement, integral to this success, encompasses multiple dimensions, including behavioral, cognitive, and emotional aspects[17, 18]. Behavioral engagement describes the involvement in learning materials and activities, such as attending classes, completing assignments, engaging in discussions, and utilizing resources. Cognitive engagement refers to utilizing intellectual strategies, including seeking instructions and exhibiting critical thinking skills. Emotional engagement pertains to the affection, motivation, interest, and emotional responses to learning.

International students may have experienced learning challenges varying by their racial group. Few studies have highlighted this heterogeneity concerning behavioral, cognitive, and emotional engagement. George Mwangi et al. (2019)[2] used a critical race theory to examine the experiences of sub-Saharan African international students at a predominantly white institution (PWI), pointing out that their emotional engagement in learning was affected by feelings of marginalization based on skin color. Sakurai et al. (2016)[19] studied the types of cognitive learning strategies among international students at a university in Finland, finding that Asian students tended to use memorization strategies more frequently than their European peers. Another study by Saku-

rai et al. (2014)[20] found that Chinese international students were less actively engaged in classroom activities and employed cognitive strategies to a lesser extent than other international students in the same university. Although some cognitive and behavioral strategy differences have been found, the underlying reasons—whether they are culturally related or a reflection of previous educational approaches—remain undetermined.

Having a non-native language background is another essential characteristic that influences international students' learning engagement[7, 15, 16]. Studies show that international students' language barriers, such as difficulty comprehending lectures, reading materials, and engaging in oral discussions and presentations, negatively impact learning participation[7, 15]. Conversely, strong English communication skills encourage students to utilize learning strategies. Martirosyan et al. (2015)[15] found a significant positive relationship between English proficiency and international students' GPA. Participants who perceived themselves as having better English communication skills displayed a stronger willingness to seek help from peers and instructors.

Limited studies have explored the heterogeneity of international students concerning behavioral, cognitive, and emotional aspects of learning engagement among each racial group and native/non-native language background.

2.3. Cultural Adjustment

Integration into the host culture while valuing their home country's connections and heritage is essential for international students[21, 22]. Problematic acculturation may arise when assimilating into dominant cultural characteristics such as being White, English-speaking, male, or Christian[2] while abandoning origin/home culture. Cross-cultural factors such as ethnic proximity and host-country conformity pressure influence international students' acculturation experiences[23]. The Integrative Theory of Cross-Cultural Adaptation (ITCCA)[24] serves as a framework for analyzing how international students interact, transform, and negotiate with the host culture. Kim and Kim (2016)[23] compared the experiences of international students in Asia and Europe in the United States. They found that European students exhibited higher adjustment competence due to their closer ethnic and cultural proximity, resulting in less pressure to conform to the host culture and more accessibility to social

activities than Asian students.

In addition to the disparities in cultural adjustment stemming from ethnic and cultural proximity, linguistic factors are intertwined with cultural contexts[3, 16, 25]. Risager(2020)[25] introduced the term "Linguaculture" by combining "linguistic" and "culture" to emphasize the concept that language functions as a cultural practice that encapsulates cultural norms, values, and patterns of thinking. When observed through the Linguaculture lens, Lee's (2007)[6] study implies that the potential advantages experienced by certain groups may be due to their ethnic, linguistic, or cultural closeness. Lee (2007)[6] studied discrimination in American universities and revealed that international students from Asia, Africa, Latin America, and the Middle East experienced discrimination. In contrast, students from Europe or Anglo-English countries such as Canada and Australia did not experience the same. Nevertheless, the heterogeneity of how international students from varying racial groups and native/ non-native language backgrounds navigate host cultural adaptation while maintaining their home culture identities calls for more investigation.

2.4. Social Connections

2.4.1. Social Media Use

International students extensively use social media across various platforms, and their goals vary[11, 26]. Popular platforms such as Facebook, Twitter, WhatsApp, and Instagram, along with regional apps from their home countries, offer opportunities for social connections, information sharing, language learning, and emotional support. Dong et al. (2022)[11] found that international students actively collaborating with peers and instructors, following academic leaders, or accessing learning resources improved learning engagement. Conversely, using social media to expand networks or maintain close connections with family and friends enhanced the integration of sociocultural resources.

Previous studies suggest that the language preference for social media among international students may vary based on purpose. Tu (2018)[27] observed that using one's native language is often linked to entertainment or communication with family and friends, which can alleviate stress. In contrast, using English on social media is associated with expanding social networks and engaging in academic tasks.

Gomes (2015)[28] found that Asian international students frequently connected with peers from their home countries through regional platforms, providing a sense of security but leading to disengagement from the host culture. While social media serve as vital channels for international students' social connections, ranging from information collection to emotional support, less is known about whether different racial and linguistic groups experience disparities in accessing these resources.

2.4.2. Social Capital

The accumulation of social connections/resources is often gauged by the level of social capital that individuals generate[26, 29–31]. The concept of social capital encompasses bridging and bonding. Bridging social capital involves weak connections that expand networks and provide access to broader networks, while bonding social capital entails emotional support and financial security through strong relationships[27, 30, 32].

Social capital improves international students' connection with their university as well as the community in which they live[33–35]. Dong et al. (2022)[11] found that bridging social capital serves as a crucial mediator between social media use and host cultural adjustment, indirectly affecting international students' learning engagement. Glass and Westmont (2014)[36] also concluded that with increased social capital, students can cope better with the challenges of cultural adjustment and academic work.

Racial disparities are implied in expanding the bridging social capital. International students of color may encounter challenges establishing friendships with domestic students[28, 33, 37]. Briscoe et al. (2022)[33] conducted longitudinal interviews with first-year undergraduate international students and suggested that participants from Africa and Asia found it challenging to forge relationships with their American counterparts. Although the authors considered the barriers may stem from lacking commonality in culture, lifestyle, and learning goals[33], the racial and language background differences in social capital among international students warrant exploration in the present study.

Concerning the linguistic aspect, some researchers noted the impact of English social media on social capital accumulation. Li and Chen (2014)[26] observed an association between the use of social media and the increase in bridging social capital for Chinese international students. More specifically, the results indicated that using English on social media platforms, like Facebook, can enhance social capital among Chinese international students more effectively than native platforms like Renren.

While recognizing the crucial influence of the different intents behind social media use and levels of social capital on learning engagement, there is a gap in understanding how these aspects are influenced by international students' race and native/non-native language background.

2.5. Research Questions

This study is informed by the QuantCrit framework, which emphasizes data disaggregation to examine the heterogeneity among international students in the United States:

RQ1: How do learning engagement, cultural adjustment, intents of social media use, and social capital vary across Asian, White, Black, and Hispanic racial groups?

RQ2: How do learning engagement, cultural adjustment, intents of social media use, and social capital vary across native/non-native language backgrounds?

3. Methods

3.1. Research Design and Quantitative Data Analysis

This study utilized a quantitative survey approach to investigate group effects on international students' learning engagement, cultural adjustment, social media use, and social capital. Guided by QuantCrit tenets, this study centralizes race identity and disaggregates groups by their race and native/ non-native language background. Multivariate Analysis of Covariance (MANOVA) is suited for analyzing the group differences between independent variables (IV) among a linear combination of multiple dependent variables (DV)[38]. In this study, the DVs were the quantitative measurements, including mean scores of learning engagement, cultural adjustment, social media use, and social capital, while the IVs were two interpersonal categories among international students: racial grouping (Asian, White, Black, or Hispanic) and the native/ non-native language background. Data were analyzed using SPSS 28. The mean score of each subscale was calculated, with higher scores indicating higher levels. Wilk's Lambda *F* statistic is used to determine whether there

are statistically significant differences between groups based on the linear combination of DVs when the multivariate normality is assumed. If the statistics *p*-values are significant at a level of .05, ANOVA analysis is needed to explore the specific DV effect, and a consequent post hoc analysis is to identify the pairwise racial differences. Effect size is measured by partial Eta Squared (η^2) and is defined as small (0.01 to ≤ 0.06), medium (0.06 to < 0.14), and large (≥0.14).

3.2. Procedure

The Institutional Review Board (IRB) approved this study. A purposeful sampling approach was utilized to recruit eligible international students in higher education across the United States. From November to December 2021, the Office of International Programs at a large Southeast university sent email invitations to international students through an email list, directing recipients interested in this study to an anonymous online Qualtrics survey. A reminder was sent to the same email list to ensure participation. An invitation was shared on the Journal of International Students' social media accounts in the first week of November to broaden the network to a diverse group of international students. A repost was distributed two weeks later. International students accessing this social media were invited to click the survey link attached to the social media post. Additionally, snowball sampling was employed to encourage faculty members or participants to share the survey link with other international students in their networks. Data collection concluded in May 2022, and survey entries with less than 80% completion were removed to avoid potential sample biases.

3.3. Participants

The demographic information is presented in **Table 1**. A total of 209 participants, who were international students enrolled at various colleges and universities, exhibited a diverse range of backgrounds in the United States. Among these participants, the majority, constituting 61.2% (*n* = 128), were from the Southeast region, followed by 11.5% (*n* = 24) from the Midwest, 10.5% (*n* = 22) from the Northwest, 8.1% (*n* = 17) each from the Southwest and Western regions, with only one missing value. Gender distribution showed that 42.1% were female (*n* = 88) and 56.5% were male (*n* = 118). Of the participating students, 47.8% (*n* = 100) identified as

Asian, 31.1% (*n* = 65) as White/ Caucasian, 10% (*n* = 21) as Black, 7.7% (*n* = 16) claimed their race as Hispanic, and the remaining 3.6% (*n* = 7) were categorized as "other". Most of the students (75.6%, *n* = 158) reported being STEM majors, and 70.8% (*n* = 148) were not native English speakers. Among the 209 participants, 63.2% (*n* = 132) were studying at four-year research institutions, 38.3% (*n* = 80) were enrolled in undergraduate degree programs, 31.6% (*n* = 66) were pursuing master's degrees, and 29.7% (*n* = 62) were enrolled in doctoral programs.

3.4. Measurements

3.4.1. Learning Engagement

In this study, learning engagement was assessed using a modified version of the College Student Course Engagement Questionnaire (SCEQ) developed by Handelsman et al. (2005)[18]. Sixteen out of 23 items were included in the measurement, exhibiting a factor loading higher than 0.5. The SCEQ measured coursework engagement in three categories: cognitive engagement (8 items, sample item: "*making sure to study on a regular basis*"), emotional engagement (3 items, sample item: "*finding ways to make the course interesting to me*"), and behavioral engagement (5 items, sample item: "*participating actively in small-group discussions*"). Participants rated each item on a scale of 1 to 5, indicating the extent to which the learning behavior applied to them, with 1 = *not at all characteristic of me* to 5 = *very characteristic of me*. The internal consistency of Cronbach's α was deemed acceptable for the subscales of cognitive (0.92), emotional (0.81), and behavioral engagement (0.79).

3.4.2. Cultural Adjustment

This study employed the Brief Acculturation Orientation Scale (BAOS) developed by Demes and Geeraert (2014)[38]. The BAOS is a two-dimensional construct with host (four items) and home culture (four items) adjustments. Participants rated their levels of agreement with each item using a 5-point Likert scale, where 1 = *Strongly disagree* and 5 = *Strongly agree*. A sample item for the home cultural adjustment was "*It is important for me to take part in my home country's traditions*," whereas a sample question for the host cultural adjustment was "*It is important for me to develop my U.S. characteristics*." The internal consistency of Cronbach's α demonstrated adequate reliability for the

Table 1. Participants' demographical information (n = 209).

Demographic	*n* (%)	Range	M	SD
Sex				
Male	118 (56.5%)			
Female	88 (42.1%)			
Other	3 (1.4%)			
Race				
Asian	100 (47.8%)			
White	65 (31.1%)			
Black	21 (10%)			
Hispanic	16 (7.7%)			
Other	7 (3.3%)			
College Type				
4-year research	132 (63.2%)			
2-year community	48 (23%)			
4-year regional	14 (6.7%)			
College Region				
Southeast	128 (61.2%)			
Midwest	24 (11.5%)			
Northeast	22 (10.5%)			
Southwest	17 (8.1%)			
West	17 (8.1%)			
Missing	1 (0.5%)			
Degree				
Undergraduate	80 (38.3%)			
Master	66 (31.6%)			
Doctoral	62 (29.7%)			
Academic Field				
STEM	158 (75.6%)			
Other	51 (24.4%)			
English is not the first language	148 (70.8%)			
English as the First Language	61 (29.2%)			
Age		18–49	28.8	6.5
GPA		1.0–4.0	3.53	0.63
US Stay		0.13–10	3.19	2.07

Note: GPA, Grade Point Average (0–4.0). Southeast (AL, AR, FL, GA, LA, MS, NC, SC, TN, VA, KY, WV), Midwest (IA, IL, IN, KS, MI, MN, MO, OH, WI, ND, SD, NE), Northeast (CT, MA, MD, ME, NH, RI, VT, NJ, NY, PA, DE, DC), Southwest (AZ, NM, OK, TX), West (CA, NV, OR, WA, ID, MT, WY, UT, CO, HI, AK).

host culture (0.80) and home culture (0.70).

3.4.3. Intents of Social Media Use

Ali-Hassan et al. (2015)[39] developed a questionnaire to measure social media usage with subscales defined by the purpose of using social media: (1) networking, (2) academic, and (3) hedonic. Participants rated their frequency of social media use on a networking subscale that included eight items (e.g., "*Obtain to know people I would otherwise not meet in my network*"), the academic subscale that comprised seven items (e.g., "*Disseminate information related to learning*"), and the hedonic subscale that included three items (e.g., "*Entertain myself after an intense learning process*").

The internal consistency of Cronbach's α demonstrated adequate reliability for the social networking (0.86), academic (0.90), and hedonic (0.72) subscales.

3.4.4. Social Capital

Williams (2006)[40] developed the Social Capital Scale (SCS) to measure bonding and bridging social capital resources. In this study, the sources of bridging social capital (10 items) and bonding social capital (10 items) were identified based on usage through social media. Survey questions included connections with peers, instructors, and communities in the host country, as well as family and friends in the home country. Participants rated their levels of agree-

ment on a 5-point Likert scale, ranging from 1 = *Strongly disagree* to 5 = *Strongly agree,* indicating the frequency of each event. For example, an item on the bonding social capital was "*The people I interact with are good job references for me,*" while an item on the bridging social capital was "*Interacting with people makes me feel like part of a larger community.*" The internal consistency of Cronbach's α value was 0.91 for bridging and .80 for bonding social capital, demonstrating adequate reliability in the measurements.

4. Results

Table 2 provides an overview of the results for the ten subscales, including descriptive statistics and internal consistency reliability. The mean scores of each subscale ranged from 3.31 to 3.96, with standard deviations from 0.68 to 0.95. Pearson's correlation coefficient was utilized to calculate bivariate correlation coefficients, revealing that the subscales were positively and significantly correlated with each other ($r = 0.20$ 0.78, $p < 0.01$), indicating that no multicollinearity was detected. The three measurements of learning engagement exhibited moderate correlation coefficients with social capital ($r = 0.43$ .58, $p < 0.01$). Both the bridging and bonding social capital variables demonstrated moderate correlations ($r = 0.43$ .58, $p < 0.01$) with the rest of the subscales. Home cultural adjustment showed lower bivariate correlations with learning engagement subscales ($r = 0.24$ 0.36, $p < 0.01$) than host cultural adjustment ($r = 0.39$ 0.42, $p < 0.01$). Finally, the three social media use subscales exhibited varied coefficients with other cultural and social factors. Specifically, social networking ($r = 0.40$ 0.51, $p < 0.01$) and academic learning ($r = 0.38$ 0.53, $p < 0.01$) presented higher correlation coefficients than the hedonic subscale ($r = 0.20$ 0.44, $p < 0.01$).

Table 2. Cronbach's α, mean, standard deviation, and correlation variables (N = 209).

		Cronbach's α	*M*	*SD*	1	2	3	4	5	6	7	8	9	10
1	Networking	0.86	3.39	0.85	–									
2	Academic	0.90	3.31	0.95	0.78**	–								
3	Hedonic	0.72	3.71	0.90	0.54**	0.51**	–							
4	Home	0.70	3.82	0.73	0.45**	0.45**	0.38**	–						
5	Host	0.80	3.93	0.78	0.44**	0.44**	0.41**	0.37**	–					
6	Bonding	0.80	3.68	0.68	0.51**	0.53**	0.43**	0.40**	0.51**	–				
7	Bridging	0.91	3.96	0.72	0.51**	0.39**	0.44**	0.34**	0.53**	0.63**	–			
8	Cognitive	0.92	3.84	0.74	0.42**	0.38**	0.40**	0.24**	0.41**	0.50**	0.58**	–		
9	Emotional	0.81	3.74	0.87	0.42**	0.44**	0.20**	0.36**	0.39**	0.43**	0.48**	0.74**	–	
10	Behavioral	0.79	3.62	0.80	0.40**	0.49**	0.32**	0.24**	0.42**	0.57**	0.50**	0.69**	0.64**	–

Note: ** $p < 0.01$. Correlation is significant at the 0.01 level.

Researchers began by investigating RQ1, which explores all DVs, including learning engagement, cultural adjustment, intents of social media use, and social capital among international students across racial backgrounds—Asian, White, Black, and Hispanic. Similar analyses were utilized to examine RQ2, assessing these differences in native/non-native language backgrounds. The MANOVA results are shown in **Table 3a,b**.

The results of the first MANOVA indicated significant racial differences across all examined DVs, with moderate effect sizes [38]. The MANOVA results showed $F(9,469) = 4.82, p < 0.001, \eta^2 = 0.07$ for learning engagement; $F(6,394) = 3.83, p < 0.001, \eta^2 = 0.06$ for cultural adjustment; $F(9,474) = 4.59, p < 0.001, \eta^2 = 0.07$ for social media use; $F(6,390) = 3.58, p = 0.002, \eta^2 = 0.06$ for social capital. Upon identifying each main effect, all sub-scales under each construct had

significant effects except the home cultural adjustment scale. Furthermore, post hoc analyses were conducted to identify the differences between each pair of racial groups. The results indicated that the Asian group exhibited statistically significant lower in levels of three learning engagements relative to White and Black international students, had a lower level of host cultural adjustment than White and Hispanic students, engaged less actively in three social media intents compared to White and Black groups, and possessed lower bonding and bridging social capital than their White counterparts. Each racial group's mean, standard deviation, and group comparison results were also reported (**Table 3a**).

The second MANOVA revealed significant differences between international students with native/non-native language backgrounds across all examined constructs. The MANOVA results showed $F(3,202) = 4.51, p = 0.004, \eta^2 = $

0.06 for learning engagement; $F(2,206) = 4.94$, $p = 0.008$, $\eta^2 = 0.05$ for cultural adjustment; $F(3,204) = 8.85$, $p < 0.001$, $\eta^2 = 0.12$ for social media use; $F(2,204) = 7.57$, $p < 0.001$, $\eta^2 = 0.07$ for social capital, with all falling in the moderate effect size range. All between-subject effects except the hedonic social media use and bridging social capital were significant. Detailed group mean, standard deviation, and group comparison results were also reported (**Table 3b**).

5. Discussion

The current study discusses the effects of racism-related identity to spotlight the heterogeneity of international student populations and contextualizes the results. Inferential statistical tests, such as *p*-values significant at a level of .05, are utilized to detect group effects and support heterogeneity. Adhering to the principal tenets of QuantCrit, researchers acknowledge that data and statistical methods are not inherently neutral and may introduce bias[4]. Overgeneralizing this population in the United States can miss opportunities to uncover distinctions and explore them in a broader context.

5.1. Racial Group Effect

Researchers can discuss the significant racial differences while considering personal factors. The MANOVA results for RQ1 suggested heterogeneity across all the examined DVs, including learning engagement, cultural adjustment, social media usage, and social capital among the four international students' racial identities. Specifically, the Asian group scored the lowest compared to the other three racial groups (**Table 3a**). Sakurai and colleagues (2014, 2016)[19, 20] have contributed to this field by identifying strategy preferences when comparing Asian international students to students of other European backgrounds in Finland. The findings showed that some strategies favored by Asians, such as rote memorization, more than other European students, are often deemed surface-level cognition. To caution against potential prejudice, the researchers suggested that educators embrace a more inclusive view and avoid stigmatizing particular learning approaches without exploring their prior learning styles[19, 20].

Additionally, the Asian group showcased significantly lower scores in cultural adjustment and socialization, which can be discussed by incorporating the potential contextualized factors, such as the timing of data collection and its possible influences. Specifically, the Asian group showed less cultural adjustment compared to the White group and a lower level of engagement in social media use than both White and Black groups. Also, they possessed less bonding social capital with family and friends than the White group, as well as lower bridging social capital than the Black group. This survey data were collected between November 2021 and May 2022, during a time when higher education institutions transitioned to online learning in the spring semester of 2020[41] and switched between online and in-person learning formats in subsequent semesters in response to social distancing policies. During this period, increased mistrust and discrimination against migrants and minority groups were observed due to heightened infectious risks, as well as a notable surge of anti-Asian hate crimes in the United States[42–45]. These conditions may have posed unprecedented social and cultural adjustment challenges for Asian international students. Moreover, the anti-Asian climate permeated mass media, potentially exacerbating the situation for Asian international students[46, 47].

In contrast to the lower performance from the Asian group, the current study indicated the highest levels of bridging social capital and all three subscales of learning engagement among the Black group. These higher scores in social capital and learning engagement may be associated with their higher social media use, which was recognized as a helpful socialization and cultural adjustment platform for international students[11]. In a previous study, Boafo-Arthur (2014)[48] documented substantial prejudice against Black African international students, and this perceived prejudice and discrimination elicit acculturative stress, impairing academic progress in the United States. As measures against discrimination, Boafo-Arthur (2014)[48] proposed guidelines to address the adjustment of Black international students, including bonding with culturally based values, seeking social assistance from out-group members, and close incorporation with friends and family members. The current study corroborates the feasibility of these guidelines. In the present results, Black students exhibited the highest social media usage for enhancing relationships, connecting with academic materials and leaders, and fostering bridging capital and learning engagement. Strong correlations were also observed between the use of social media for networking and academic engage-

Table 3. MANOVA results (**a**: group = race. **b**: group = native vs. non-native language speaker).

(a)

Scale	1: Asian n = 100	2: White n = 65	3: Black n = 20	4: Hispanic n = 16	Box's M p	MANOVA				ANOVA				Post hoc
						F	df	p	η^2	F	df	P	η^2	
Learning engagement				0.002	4.82	9,469	<0.001	0.07						
Cognitive	3.59 (0.78)	4.01 (0.62)	4.47 (0.39)	3.93 (0.55)						11.49	3,195	<0.001	0.15	1 < 2, 3
Emotional	3.46 (0.91)	4.03 (0.63)	4.27 (0.70)	3.88 (0.81)						9.86	3,195	<0.001	0.13	1 < 2, 3
Behavioral	3.41 (0.82)	3.88 (0.73)	3.93 (0.64)	3.58 (0.87)						5.96	3,195	<0.001	0.08	1 < 2, 3
Cultural adjustment					0.004	3.83	6,394	<0.001	0.06					
Home	3.69 (0.79)	4.00 (0.66)	3.86 (0.65)	4.03 (0.46)						2.48	3,198	0.06	0.04	1 < 2, 4
Host	3.75 (0.85)	4.20 (0.59)	4.20 (0.60)	3.70 (0.87)						6.29	3,198	<0.001	0.09	1 < 2, 3
Social media use					0.002	4.59	9,474	<0.001	0.07					
Networking	3.13 (0.86)	3.61 (0.73)	4.13 (0.53)	3.27 (0.92)						10.99	3,197	<0.001	0.14	1 < 2, 3 4 < 3
Academic	3.05 (0.95)	3.60 (0.80)	3.84 (0.81)	2.94 (1.14)						8.22	3,197	<0.001	0.11	1 < 2, 3 4 < 3
Hedonic	3.49 (0.99)	3.88 (0.75)	4.27 (0.69)	3.79 (0.72)						5.80	3,197	<0.001	0.08	1 < 2, 3
Social capital					0.001	3.58	6,390	0.002	0.06					
Bonding	3.48 (0.70)	3.92 (0.56)	3.85 (0.64)	3.71 (0.72)						6.40	3,196	<0.001	0.09	1 < 2
Bridging	3.83 (0.85)	4.10 (0.50)	4.27 (0.50)	3.93 (0.48)						3.24	3,196	0.02	0.05	1 < 3

(b)

Scale	1: Native n = 61	0: Non-Native n = 148	Box's M p	MANOVA				ANOVA			
				F	df	p	η^2	F	df	P	η^2
Learning engagement			0.001	4.51	3,202	0.004	0.06				
Cognitive	4.01 (0.68)	3.77 (0.75)						4.68	1,204	0.032	0.02
Emotional	3.96 (0.78)	3.65 (0.9)						5.29	1,204	0.022	0.03
Behavioral	3.93 (0.68)	3.49 (0.82)						13.37	1,204	<0.001	0.06
Cultural adjustment			0.002	4.94	2,206	0.008	0.05				
Home	4.05 (0.63)	3.72 (0.75)						9.09	1,207	0.003	0.04
Host	4.10 (0.73)	3.86 (0.79)						3.68	1,207	0.048	0.02
Social media use			0.002	8.85	3,204	<0.001	0.12				
Networking	3.76 (0.71)	3.24 (0.86)						17.63	1,206	<0.001	0.08
Academic	3.80 (0.70)	3.10 (0.97)						25.76	1,206	<0.001	0.11
Hedonic	3.90 (0.79)	3.64 (0.93)						3.65	1,206	0.057	0.02
Social capital			0.001	7.57	2,204	<0.001	0.07				
Bonding	3.93 (0.59)	3.57 (0.68)						12.38	1,205	<0.001	0.06
Bridging	4.03 (0.62)	3.93 (0.76)						0.84	1,205	0.363	0.00

ment, cultural adjustment, and social capital (**Table 2**). The role of social media platforms in assisting cultural adjustment and connecting social resources for international students warrants further study.

The findings that White international students had the highest levels of cultural adjustment and bonding capital are consistent with previous research. The better experiences may be attributed to ethnic proximity—an aspect of personal predisposition in the Integrative Theory of Cross-Cultural Adaptation[24]. Grounded in the cross-cultural theory, Kim and colleagues (2016)[23] found that European international students exhibited better cultural adoption and greater involvement in intercultural activities than Asian students.

Similar to the Asian students, the Hispanic group also showed lower levels of learning engagement, culture, and socialization than White and Black students. While these disparities may not be statistically significant, the trend suggests some potential challenges Hispanic students face and

merit deeper investigation.

5.2. Native/Non-Native Language Background Group Effect

The RQ2 analysis results showed that, regardless of race, international students with a native language background outperform their non-first-language counterparts across behavioral, cognitive, and emotional engagement, exhibiting the linguistic advantage of congruence with the host country. Participants with a non-native English background scored lower in examined constructs except for hedonic social media use and bridging social capital. Guided by the QuantCrit principle, the current research interprets these group differences cautiously to avoid perpetuating a deficit perspective of linguistically minoritized groups[2] or deeming the disparity in English ability as a fixed and inferior personal attribute[20].

The linguistically related differences support Heng's (2019)[3] suggestion that linking academic adjustment to international students' prior exposure to curricula and assessment methods in their home countries. Heng's study on 18 mainland Chinese undergraduate students in the United States revealed varied language-related difficulties influenced by their previous academic experiences. For instance, some struggled with English writing assignments due to limited training in argumentative essays. Drawing on the concept of "Linguaculture", Singh and Jack (2022)[16] conducted a thematic analysis of 33 international graduate students at a Malaysian research university. Participants consider language and culture as deeply interconnected, particularly in contexts where their academic performances are under-assessed. They expressed a preference for written over oral assessment as verbal interactions often elicit negative emotions and a sense of inferiority.

Furthermore, the social class hierarchy can be strengthened as native English-speaking international students exhibit a greater ability to acculturate and gain social capital, which, in turn, may contribute to an advantage in gaining knowledge and natural capital[31]. The results showed that native English-speaking international students are more active in acclimating to the host culture while maintaining connections with their home culture. These results align with Tu (2018)[27], who discovered that using English on social media facilitates cultural adaptation through expanding new contacts, access to information, and reaching out to academic leaders. Although the present study found no significant difference in bridging social capital between groups, the trend of accelerating the course of economic change can be implied through the relation between cultural adjustment, social connections, knowledge, human capital, and natural capital.

6. Limitations

This study was conducted during the COVID-19 pandemic, which may have influenced the results and their generalizability to broader international student experiences beyond this historical event. The pandemic impacted the constructs examined in this study, including learning engagement, cultural adjustment, and social resources, as establishing connections and a sense of belonging became even more critical and challenging. This study disaggregated a limited number of racism-related identities, exemplifying the heterogeneity. However, more interpersonal or intrapersonal identities should be included. In addition to quantitative data and inferential statistical methods, incorporating qualitative data and exploring students' voices will enhance the comprehensiveness of the research.

7. Implications

The findings enrich the body of research through the QuantCrit lens, highlighting those investigating international students without disaggregating racism-related identities obscures the discovery of inequality situations and misses the opportunity to provide a range of support. Studies that generalize their academic, social and cultural experiences may overshadow the search for sources of disadvantage or view differences from a deficit perspective. Therefore, this research calls for future research to specify international students' identities when examining research topics and to explore how these racial or cultural group factors impact their experiences. For example, highlighting the marginalization of African international students[2, 48] contributes to developing coping strategies that counteract racial discrimination. Additionally, incorporating political economy factors, such as social classes and country-specific indicators[49], in addition to existing cultural and social factors, can provide a critical analysis of the underlying reasons that may exacerbate the inequality conditions.

Practically, heterogeneity among international students calls for administrators and educators to provide support by implementing a variety of programs and interventions to assist in coping with difficulties related to language, socialization, and acculturation[2, 50]. For instance, organizing orientation programs that help newly arrived international students familiarize themselves with their communities, cultural norms, academic expectations, and institutional conventions[37] is essential. Celebrating cultural diversity through events like "culture weeks" showcases the rich tapestry of student backgrounds, promotes the appreciation of diverse heritages, and fosters cross-cultural communication. Lastly, structuring mentorship programs can benefit international students by promoting their engagement in academic communities, providing support for seeking help, and giving them

access to career opportunities.

Author Contributions

Conceptualization, J.D., C.-H.W., D.M.S.; methodology, J.D., C.-H.W.; formal analysis, J.D.; writing —original draft preparation, J.D.; writing—review and editing, D.M.S.; supervision, C.-H.W., D.M.S.

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Institutional Review Board Statement

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Informed Consent Statement

Data were collected amorously and ethically. Informed consent was obtained from all subjects involved in the study.

Data Availability Statement

The datasets generated and analyzed during the current study are available from the corresponding author on reasonable request.

Conflict of Interest

The authors declare that they have no financial or personal relationships which may have inappropriately influenced him in writing this article.

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