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Life satisfaction and acculturation of European students in the Chinese context

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Life satisfaction is a crucial aspect of psychological well-being for international students during the process of acculturation. Among international students in China, European students constitute a significant demographic, making it imperative to examine their life satisfaction. However, existing research has primarily focused on theoretical literature reviews regarding the factors that impact European students' life satisfaction and acculturation, with few empirical investigations conducted. This study aims to explore European students' perceptions of life satisfaction in acculturation to China and the factors affecting their life satisfaction in acculturation. Through three rounds of semi-structured interviews involving 27 European students, this study employed NVivo 12 software to conduct sentiment analysis on interview materials to investigate European students' perceptions of life satisfaction. Additionally, a coding analysis was conducted to identify the factors affecting their life satisfaction in acculturation. The results from the sentiment analysis reveal that European students generally experience a relatively high level of life satisfaction while acculturating to China. The coding analysis highlights several factors that affect their life satisfaction during this process, including social activity, social support, academic performance, language proficiency, consumption, diet, transportation, and safety. These findings offer researchers and scholars a theoretical understanding of acculturation and life satisfaction research on European students in China and could be referential for international education administrators.

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Introduction

Life satisfaction is regarded as an essential positive perception of psychological well-being during the acculturation among international students (Abolghasemi and Varaniyab, 2010; Diener et al., 2013; Huebner, 1991; Jiang et al., 2020; Karaman and Watson, 2017; Navarro et al., 2014; Pan et al., 2008; Sam, 2001). International students constitute a prominent group of sojourners with the purpose of studying and gaining professional qualifications (Bochner, 2006). Their duration often spans from a few months for language students to a few years if they attend university. Several studies have explored life satisfaction and acculturation among various international student groups in different host countries, such as Chinese students in Australia (Anderson and Guan, 2018; Pan et al., 2008), Asian students in the United States (Liu et al., 2016; Merola et al., 2019), Turkish students in the United States (Kilinc and Granello, 2003), international students in Ghana (Sam et al., 2015), etc. These studies mainly discussed the topics of life satisfaction in acculturation and the relationship between life satisfaction and its related affecting factors, including the meaning of life, discrimination, academic performance, nationality, integration, help-seeking, and psychological symptoms among the international student groups.

According to the Ministry of Education of the People's Republic of China (2019), the total number of European students in 2018 reached 73,618, accounting for 14.96% of the total number of international students in China. Such a significant international student group warrants research focused on their life satisfaction in acculturation in China. In the realm of life satisfaction and acculturation research on international students in China, scholars such as Jiang et al. (2020) and Smith and Khawaja (2011) have discussed factors influencing life satisfaction in acculturation for international students studying in China, including European students from Western countries. However, previous studies have primarily focused on theoretical literature reviews regarding the factors that impact the life satisfaction and acculturation of European students, with limited empirical investigations undertaken. The current study aims to address this gap by conducting qualitative research to explore the lived experiences of European students, providing a deeper and more nuanced understanding of their acculturation process. Additionally, while Ding (2016) investigates the experiences of European students in China, the study did not comprehensively cover various factors like social activity, social support, academic performance, language proficiency, consumption, diet, transportation, and safety. By investigating the factors that influence their life satisfaction, this study can contribute to the existing literature by offering insights into aspects that were not extensively covered in prior research.

This study aims to explore the life satisfaction of European students and identify the factors affecting their life satisfaction. We conducted three rounds of semi-structured interviews involving a sample of 27 European students studying in China. The interviews aimed to obtain qualitative data concerning their acculturation experiences and perceptions of life satisfaction in China. The collected data were coded and analyzed using NVivo 12 software to uncover significant themes and patterns. By delving into the realm of European students' life satisfaction and exploring the factors that shape their experiences, this study seeks to provide valuable insights for researchers and administrators involved in the field of international education.

Literature review

Acculturation and life satisfaction. "Acculturation comprehends those phenomena which result when groups of individuals having different cultures come into continuous first-hand contact, with subsequent changes in the original cultural patterns of either or

both groups" (Redfield et al., 1936, p.149). In the field of psychology, psychologists focus on psychological changes at the individual level in acculturation. Specifically, acculturation is used to describe psychological changes after contact between individuals from different cultures or involvement in foreign cultural activities (Graves, 1967, 338). Some scholars have proposed their definitions of acculturation from a psychological perspective. For example, Berry (2003) regards acculturation as the cultural and psychological changes that occur after contact between individuals of different cultural backgrounds. In the process of acculturation, the changes in individual subjective well-being have received extensive attention, mainly focusing on the evaluation and measurement of psychological distress, emotional state, acceptance, and life satisfaction (Aycan and Berry, 1996; Berry and Hou, 2017, 2021; Hamamura and Laird, 2014; Hashemi et al., 2021; Ji et al., 2020; Peng and Wu, 2019; Tartakovsky and Schwartz, 2001). Among these topics, life satisfaction is regarded as one of the important indicators for measuring subjective well-being. Shin and Johnson (1978) regard life satisfaction as "a global assessment of a person's quality of life according to his chosen criteria" (p. 478). Judgments of life satisfaction are based on a comparison of one's circumstances with an appropriate standard that one ought to reach (Diener et al., 1985). The above definitions indicate that life satisfaction is not a universally established criterion of quality of life but is dependent on the individual's self-evaluation.

Previous research has commonly assessed life satisfaction through the use of survey items or a single question pertaining to an individual's level of satisfaction. For instance, Diener et al. (1985) employed a set of items aimed at gauging participants' overall assessment of life as a means to measure life satisfaction. In the research conducted by Appleton and Song (2008), respondents' life satisfaction was measured using a survey question that inquired, "Considering all aspects of your life, how satisfied are you?". Similarly, Ehrhardt et al. (2000) posed the question, "What do you think, how satisfied are you at present, all things considered, with your life?" as a means of assessing life satisfaction. These seminal studies serve as valuable references, offering insights for the formulation of interview questions designed to investigate the life satisfaction of participants.

International students' life satisfaction and acculturation. In the acculturation process, most international students would feel stressed and anxious to adapt to a new host country, which seriously affects their life satisfaction in the host country. Extensive research has indicated that higher-level life satisfaction has a positive effect on psychological acculturation (Abolghasemi and Varaniyab, 2010; Samani et al., 2007; Suldo and Huebner, 2006). In the field of psychological acculturation, prior studies have measured international students' life satisfaction (Dew and Huebner, 1994; Diener et al., 1985; Huebner, 1991; Taft, 1985) and have examined the factors that influence their life satisfaction, including social support (Kilinc and Granello, 2003), academic performance (Cruwys et al., 2021; Vyas and Yu, 2018), lifestyle (Machul et al., 2020), language ability, interpersonal communication, and physical health (Ward and Masgoret, 2004). Besides, a growing number of studies investigated the life satisfaction of international students through qualitative approaches such as interview methods and showed that teaching level, campus experience, school service, discrimination, and employment guidance also affect the life satisfaction of international students (Jiang et al., 2020; Seng, 2013). The above research has provided some theoretical evidence for exploring international students' life satisfaction in acculturation and its affecting factors.

With regard to international students' life satisfaction in China, Ding (2016) investigated international students' satisfaction with academic and support services in China. From Niu et al.'s (2023) mixed study, African students' satisfaction with their experiences in China is influenced by several factors, including their Chinese language proficiency level, the length of their stay in China, and their financial situation. Jiang et al. (2020) and Smith and Khawaja (2011) reviewed the factors influencing international students' life satisfaction in China, such as language barriers, educational difficulties, loneliness, discrimination, and practical problems associated with changing environments. Chiang (2015) examined several factors that affect sociocultural acculturation among international students in China, such as language, Chinese foods, mass transportation, low prices of products, and discrimination. However, these studies only incorporated European students as a smaller part of the total sample of international students in China than Asian students or African students. Additionally, the studies did not comprehensively cover factors like social activity, academic performance, consumption, and safety. The overall life satisfaction and the factors affecting satisfaction among European students in China warrant further study. Thus, through a qualitative approach, this study attempts to explore European students' life satisfaction in acculturation to China.

Methodology

Participants. The study was carried out in China for a period of 10 months in 2021. A purposive sampling method was employed to select participants. Based on the statistics from the Ministry of Education of the People's Republic of China (2019) and the data accessibility of participants within the specified timeframe of our study, Beijing, Shanghai, Hangzhou, and Wuhan were selected due to their large and diverse populations of international students. In the four cities, potential participants were contacted through offices of international affairs, key persons within the offices, and students' international communication associations in six universities where European students accounted for a significant proportion of the international student population in China. The authors contacted the key persons at the offices and associations to provide background information about the study. The key persons helped facilitate the contacts and distribute the invitation letters to potential participants.

The number of participants was decided based on the principle of data saturation, as we reached a point where no new insights or themes were emerging from the data during our qualitative analysis (Glaser and Strauss, 1999). Therefore, we brought participants continually to the interviews until the data set was complete and saturation was achieved. In this way, 27 European students (names were coded from Y01 to Y27) participated in the present study. The participants include 16 males and 11 females,

aged between 22 and 27. The nationalities of these participants cover eight European countries, including Germany ($n = 6$), the United Kingdom ($n = 4$), France ($n = 4$), Ukraine ($n = 3$), Spain ($n = 3$), Netherlands ($n = 3$), Russia ($n = 2$), and Belgium ($n = 2$). The cities they live in are Wuhan ($n = 10$), Shanghai ($n = 8$), Beijing ($n = 5$), and Hangzhou ($n = 4$). Participants' length of stay ranges between 6 months and 3 years, and the majority of them had studied in China for more than 1 year. All participants engaged in degree studies, and the academic degrees they pursued in China were Bachelor's Degree ($n = 6$), Master's Degree ($n = 16$), and Ph.D. ($n = 5$). They majored in Corporate Management ($n = 7$), Information and Communication Engineering ($n = 6$), Chinese Language and Literature ($n = 5$), Clinical Medicine ($n = 5$), and Law ($n = 4$).

Interview procedures. The ethical review approval was obtained before the official interview. The authors provided all participants with information about the background and the purpose of the study. They all understood that their participation was voluntary, and they were assured of the confidentiality of their participation. No identifying information was revealed to anyone. The authors conducted three rounds of semi-structured interviews from the start of the spring semester to the end of the fall semester in China (February 2021 to December 2021). The first round of interviews was conducted in February 2021. The second round of interviews took place approximately 4 months after the first round, in June 2021. The third round of interviews occurred approximately 6 months after the second round, in December 2021. By conducting interviews over this period, we had the opportunity to collect data from a diverse range of participants, allowing for a comprehensive exploration of different perspectives and experiences related to participants' acculturation and life satisfaction in China.

We conducted face-to-face interviews for participants in Wuhan, while for participants in other provinces, we conducted online interviews via WeChat or ZOOM Meeting. The language we adopted in the interviews was English to achieve more effective communication. The interview questions of the three rounds were formed based on life satisfaction research works by Appleton and Song (2008), Diener et al. (1985), and Ehrhardt et al. (2000). Table 1 lists the major semi-structured interview questions in the three rounds. In the first round of interviews, we mainly asked participants to tell the initial acculturation experiences and the overall evaluation of their life satisfaction. The second and third rounds of interviews focus more on their recent acculturation experiences and perceived levels of satisfaction about life. Each interview in the first round lasted about 40–50 min, and the average interview time in the second round and the third round was nearly 30 min. We recorded the three rounds of interviews and converted the audio files to text files.

Table 1 Interview questions.

Major semi-structured interview questions		References
Round 1	What's your first impression of China? Did that meet your expectations? How would you rate your overall life satisfaction since you came to China? What factors do you think contribute to your life satisfaction or dissatisfaction as an international student in China?	Appleton and Song (2008) Diener et al. (1985) Ehrhardt et al. (2000)
Round 2	How has your life satisfaction evolved or changed over the duration of your studies? What acculturation difficulties did you encounter recently? Did they affect your life satisfaction?	
Round 3	Looking back at your time in China, how has your life satisfaction evolved or changed over the duration of your studies? How do you envision your future in China? Do you plan to stay or return to your home country? What factors contribute to this decision?	

The total text of all interview transcripts is 129,203 English words, and the average text of each interview transcript is about 4,785 English words.

Data analysis. With regard to the research procedures of this study, we conducted: first, three rounds of semi-structured interviews among 27 European students to collect qualitative data about their life satisfaction in acculturation to China; second, sentiment analysis using software NVivo 12 to examine the students' perception of life satisfaction; and third code analysis to find the factors affecting their life satisfaction in acculturation to China. Finally, the research findings from the two analyses were discussed.

Sentiment analysis has been defined as the use of computational linguistics and bibliometrics to identify opinions, sentiments, and emotions expressed in source materials, mainly focusing on opinions that imply positive or negative sentiments in text data (Liu, 2020). Based on algorithms related to text analysis and natural language processing (NLP), sentiment analysis extracts both sentiment expressions and sentiment targets and quantifies attitudes, opinions, and emotions related to a topic. Researchers usually conduct sentiment analyses with the use of sentiment analysis tools. NVivo 12 is a software that can quickly identify expressions of sentiment in the uploaded content using the Auto Code Wizard function. In NVivo, the sentiments in selected multiple files, nodes, or cases can be analyzed, and results would be produced, including four sentiment nodes: "Very positive", "Moderately positive", "Moderately negative", and "Very negative". After obtaining the results, users can review the references of each sentiment node and refine the sentiment results. In this study, we selected the 27 interview transcript files and used the Auto Code Wizard function in NVivo 12 to identify four sentiment nodes: very positive, moderately positive, moderately negative, and very negative. The sentiment analysis results may help reveal European students' perception of their life satisfaction in acculturation to China.

Coding refers to an approach of indexing or categorizing the text data to establish a framework of thematic ideas about it (Gibbs, 2018). In research, the coding analysis identifies concepts in texts, audio files, or graphs and finds relations between the concepts. Two approaches are commonly adopted in coding analysis: concept-driven coding and data-driven coding. In concept-driven coding, the data are processed with a developed system of codes, and researchers look for concepts in the text, while data-driven coding emphasizes identifying concepts in the text without a preceding conceptualization (Gibbs, 2018). This study adopted a data-driven approach to coding the interview transcripts based on grounded theory, which emphasizes bottom-up creation and identification of topics from qualitative data rather than analyzing data based on theoretical assumptions (Strauss and Corbin, 1997). Specifically, we coded the interview data through three levels of coding: open coding, axial coding, and selective coding, following the principles of grounded theory.

Results and discussion

The sentiment analysis: the perception of European students' life satisfaction in acculturation to China. Using the Auto Code Wizard function of NVivo 12 software, this study analyzed the interview transcripts to identify sentiment nodes present in the text. Four distinct sentiment nodes were identified: "very positive," "moderately positive," "moderately negative", and "very negative." To ensure the accuracy of the sentiment nodes, we reviewed the sentiment nodes and removed the irrelevant references in the sentiment nodes, such as responses to the question

raised in the interview, "How do you deal with the problem?". Subsequently, the study summarized the proportions of the four sentiment nodes among the total references provided by the interviewees. Notably, the sentiment node "moderately positive" exhibited the highest representation, constituting 40% of the total references. This sentiment was often expressed through sentences such as "I even made a Chinese friend there, which was so cool." The sentiment node "very positive" accounted for 23% of the references with sentences such as "To be honest, I find the way I can communicate in Chinese to be quite respectful." On the other hand, both the "moderately negative" sentiments and "very negative" sentiments nodes constituted 21% and 16% of the references, respectively. These sentiments were reflected in sentences such as "If one doesn't speak Chinese, at least, it will be a real problem" and "It's really uncomfortable when people treat me differently."

In total, positive sentiments account for 63% of the total sentiment references, while negative sentiments account for 37%. The findings of the sentiment analysis suggest that European students generally express satisfaction with their life in China. Previous quantitative research has found that international students in China, in general, have reported a relatively low emotional state (Zhang et al., 2020; Zhu et al., 2013). However, it is important to note that the international student groups examined in these studies primarily consisted of individuals from East Asian and African countries. Based on the proportion of "very positive" sentiments and "moderately positive" sentiments, it becomes evident that European students' experiences in China are relatively favorable. This finding aligns with Yang's (2005) research finding that European students adapt better to China than other cultural groups. Jiang et al. (2020, p.13) reported a similar observation made by Sun et al. (2009) that European and American students studying abroad demonstrated a higher level of adaptability in China when compared to Asian students. In addition, perceived lower level of racial discrimination could be a contributing factor to the higher level of life satisfaction among European students compared to African students. Previous studies have shown that international students from African regions experience more discrimination than students from other regions (Bodomo, 2015; Jiang et al., 2020). The negative sentiment results revealed various adaptation issues faced by European students in China, such as academic challenges, cultural differences, social integration, accommodation, and other contextual factors. All these issues and their impact on European students' life satisfaction will be explored and discussed in the subsequent section: The coding analysis.

The coding analysis: the factors affecting European students' life satisfaction in acculturation to China. The factors affecting European students' life satisfaction in China were identified through a coding analysis of the interview texts using NVivo 12 software. The coding process involves three steps: open coding (first-level coding), axial coding (second-level coding), and selective coding (third-level coding).

During open coding, we thoroughly examined the interview transcripts to identify concepts related to "life satisfaction" and generated 438 free nodes. These free nodes were then labeled, resulting in 14 open codes. Axial coding emphasizes the construction of linkages between the codes developed in open coding (Charmaz, 2006). We established linkages among the 14 open codes and grouped the codes into four parent-nodes. The parent-node "Social activity and perceived school-related social support" encompassed five codes with 153 references. Similarly, four codes were classified under the parent-code "Academic performance and language proficiency", containing 114

Table 2 Coding table.

Child-nodes	Parent-nodes	Core theme
● Experience particular treatment ● Be involved in social interaction ● Have a good relationship with people ● Perceive support from universities ● Participate in cultural and physical activities	Social activity and perceived school-related social support (153 references)	The factors affecting European students' life satisfaction in acculturation to China
● Experience pressure in academic learning ● Achieve the set goals ● Improve Chinese ● Have good marks and a high GPA	Academic performance and language proficiency (114 references)	
● Feel unaccustomed to Chinese food ● Find Chinese food various and delicious ● Use convenient mobile payments	Diet and consumption (90 references)	
● Feel safe in living in China ● Receive good transportation services	Transportation and safety (81 references)	

Table 3 Information of child-nodes in parent-node "Social activity and perceived school-related social support".

Child-nodes	Number of files	Number of references	Examples
Experience particular treatment	12	15	"I just want to be treated fairly, just like any Chinese student. I don't want to be above or beyond. Equality is important to me. I don't want to be given any preferential treatment simply because I'm a foreigner."
Be involved in social interaction	15	30	"I socialize a lot more with Chinese, and I think my social life is pretty good."
Have a good relationship with people	21	30	"Whenever you encountered a teacher, they would always be really nice. They would greet you, ask about your day, and make small talk with you, which was really nice."
Perceive support from universities	27	42	"Sometimes, I engage in activities organized by the International Student Office (ISO), which is responsible for managing all the foreign students. They are helpful and can assist with purchasing certain items."
Participate in cultural and physical activities	21	36	"I have participated in the SICA activities sometimes. It's basically a Chinese corner activity, but it goes beyond just practicing the Chinese language. It also offers opportunities to learn about Chinese culture, festivals, and other related aspects."

references. Three codes were categorized under the parent-node "Diet and consumption," which covered 90 references. The remaining two codes were grouped within the parent-node "Transportation and safety," covering 81 references.

Finally, during selective coding, the core category should be determined by systematically connecting all the categories developed in axial coding (Charmaz, 2006). Grounded theory emphasizes that core coding needs to include most coding results in a relatively broad theoretical range (Strauss and Corbin, 1997). Therefore, the core code was defined as "The factors affecting European students' life satisfaction in acculturation to China." Table 2 provides a comprehensive summary of the core theme, parent-nodes, and their corresponding child-nodes.

Social activity and perceived school-related social support. The parent-node "Social activity and perceived school-related social support" has six child-nodes covering 153 references, and the labels of the five child-nodes are "Experience particular treatment," "Be involved in social interaction," "Have a good relationship with people", "Perceive support from universities", and "Participate in cultural and physical activities" (see Table 3).

The child-node "Participate in cultural and physical activities" covers 36 references from 21 files, primarily pertaining to European students' engagement in cultural and physical activities

organized by universities. Two child-nodes, namely "Have a good relationship with people" and "Be involved in social interaction", each comprise 30 references. As an essential part of international students' acculturation, social activity represents a significant dimension for measuring life satisfaction (Sam, 2001). For example, European students benefited from academic services provided by school assistants and received support from Chinese classmates regarding their academic tasks. Several interviewees also highlighted the value of various cultural, sports, and volunteer activities organized by universities, which offered them social platforms and opportunities for interaction (see Table 3).

The other child-node "Experience particular treatment", associated with social activities, emerges as a negative factor influencing the life satisfaction of European students, with 15 references identified (See Table 3). Notably, the particular treatment received from the Chinese individuals appears to reduce the life satisfaction of European students. Previous research has examined the correlation between perceived discrimination and life satisfaction among international students (Aichberger et al., 2015; Chow, 2007). Among the interviewees, the most prevalent form of particular treatment they encountered was being requested to take a photo, which arises from racial differences between Chinese and Europeans, such as complexion and facial features. As expressed by Y06, "If a Chinese person

Table 4 Information of child-nodes in parent-node “Academic performance and language proficiency”.

Child-nodes	Number of files	Number of references	Examples
Experience pressure in academic learning	15	18	“I think sometimes most of the postgraduate students are in the same situation as I am. I think you understand me. Most postgraduate students prefer to be alone because they value their time.”
Achieve the set goals	24	39	“At the beginning, it was quite difficult. I encountered some difficulties in a few classes. However, since then, I have significantly improved. Online learning has made things a bit more difficult, but I think that I’m still doing fine.”
Improve Chinese	15	18	“In terms of language, I have made a lot of improvements. Not only have I become more proficient in everyday conversational Chinese, but I have also made progress in reading articles.”
Have good marks and a high GPA	24	39	“I always achieved good grades. That’s okay for me. However, I don’t consider it to be my best performance.”

wants to take photos with me, I just get used to it. But it’s uncomfortable because I don’t want to be special just because of my skin tone and nationality”. This type of particular treatment is not uncommon in China, given that many Chinese individuals have limited prior exposure to foreigners from diverse countries (Chiang, 2015).

Among the identified child-nodes, “Perceive support from universities” has 42 references from 27 files, accounting for about 28% of the total number of references. This category reflects European students’ perceived support from the faculty or student organizations in their universities. The support mentioned in the interview data mainly includes coordination help from schools, academic guidance from supervisors, and healthcare support from the schools during COVID-19. The resources and support provided by universities and the harmonious interpersonal relationships with people are conducive to the life satisfaction of European students. Since the university campus is the primary setting where European students study and interact with people, perceived school-related social support becomes one of the most significant social supports they perceive in international education (Schachner et al., 2017). Besides, the support received during COVID-19 was underlined by some interviewees, such as receiving anti-epidemic materials from the school. For example, two interviewees praised their universities, stating: “The volunteers from our school sent thermometer, masks, safety goggles, and hand sanitizers to me” (Y08) and “The student assistant from the school contacted me and checked my situations twice or three times a week. I really appreciated that” (Y24). The support from universities was found to alleviate the stress experienced during COVID-19 and promote their overall satisfaction in China. This finding further supports the observation made by English et al. (2022) that university administration and the international student community are the major sources of helping international students cope with the emotional challenges encountered by international students in China during COVID-19.

However, we found several interviewees expressed dissatisfaction with the accommodation arrangements at their universities. Although the majority of international students were residing in a single room in the International Students Dormitory, a few had to share a double room with a roommate, and they were confronted with challenges when requesting to change the double room into a single one. For example, Y04 stated, “They told me I had to wait...because the newly coming students are given priority”. The issue aligns with the findings of Alam et al. (2021), who discovered that international students studying in China who co-resided with roommates exhibited a higher propensity to report moderate to extremely severe symptoms across all psychological indicators. Hence, Chinese universities should provide European students with ample support in addressing accommodation issues to boost their satisfaction levels.

Academic performance and language proficiency. The second parent-node “Academic performance and language proficiency” has four child-nodes and covers 114 references. The four child-nodes were labeled as “Experience pressure in academic learning,” “Achieve the set goals,” “Improve Chinese”, and “Have good marks and high GPA” (see Table 4).

The child-nodes “Achieve the set goals” and “Have good marks and high GPA” emerge as the two categories covering the largest references (39) from 24 files, which indicates the impact of great academic performance and goal achievement on promoting European students’ life satisfaction (see Table 3). Previous studies have established a positive correlation between goal achievement and life satisfaction (O’Sullivan, 2011), as well as the relationship between progress in learning and life satisfaction (Ojeda et al., 2011). It is noteworthy that the interviewees obtained satisfaction upon achieving their set goals related to academic, cultural, and language learning. In addition, they also derived a sense of self-efficacy from achieving a high grade point average (GPA) and getting into top rankings in academic competitions, which subsequently contributed to their increased satisfaction with their academic life. This finding is in agreement with Antaramian’s (2017) research, which demonstrated a strong correlation between international students’ life satisfaction and their academic performance.

Another child-node identified in the study is “Improve Chinese,” encompassing 18 references from 15 files. This category underscores the positive impact of Chinese language proficiency in listening, reading, and oral communication on European students’ life satisfaction. Proficiency in Chinese facilitates European students’ daily communication and the ability to read articles, thus enabling them to overcome communication barriers and improve learning efficiency. Previous studies have confirmed the influence of language proficiency on acculturation and life satisfaction among international students (Cruwys et al., 2021; Yang, 2005).

The last child-node “Experience pressure in academic learning” has 18 references from 15 files, which indicate the pressure in academic learning negatively affects their life satisfaction, especially among the MA and Ph.D. interviewees (see Table 4). Moreover, remote education and telecommunication during COVID-19 are found to have a reduced positive effect than in-person classes for some European students. For instance, Y09 said, “...But it’s different from the face-to-face class where I focus more on learning”. This finding corroborates previous research indicating that most international students prefer classroom learning environments rather than e-learning during the Lockdown of COVID-19 (Radha et al., 2020).

Diet and consumption. The third parent-node “Diet and consumption” has 90 references and consists of three child-nodes:

Table 5 Information of child-nodes in parent-node “Diet and consumption”.

Child-nodes	Number of files	Number of references	Examples
Feel unaccustomed to Chinese food	9	9	“In my country, fish is usually salty. But here, the first time, the second time, the third time, I ended up buying sweet fish.”
Find Chinese food various and delicious	24	30	“The food is definitely the best thing. When I go back to Germany, I often find myself missing Chinese food. While you can find Chinese food there as well, it has a different taste.”
Use convenient mobile payments	27	51	“I have discovered many remarkable things here, such as mobile payment methods like Alipay and WeChat. It's incredibly convenient to go out without a wallet. I no longer worry about losing money or engaging in cash transactions.”

Table 6 Information of child-nodes in parent-node “Transportation and safety”.

Child-nodes	Number of files	Number of references	Examples
Feel safe in living in China	24	39	“What I like about living here is the sense of safety when walking around, especially at night. There are always many people around, especially on busy streets, in parks, and other public areas.”
Receive good transportation services	27	42	“The transportation system was excellent. With the subway, you could easily and quickly travel to almost anywhere at an affordable price.”

“Feel unaccustomed to Chinese food”, “Find Chinese food various and delicious”, and “Use convenient mobile payments” (see Table 5).

The child-node “Use convenient mobile payments” covers 51 references from 27 files, emphasizing the experiences and evaluation of interviewees regarding the use of mobile payment platforms, such as Alipay and WeChat Pay, in China. It was found that the European students spoke highly of these two advanced mobile payments in China. Notably, the use of WeChat Pay has garnered high satisfaction among European students due to its fast payment speed, payment security, and convenient foreign exchange capabilities. In accord with the present results, previous studies have demonstrated great satisfaction of international students in China with the use of WeChat Pay (Pang, 2019; Wang et al., 2019).

The child-node “Find Chinese food various and delicious” comprises 30 references, while the child-node “Feel unaccustomed to Chinese food” includes nine references. The results suggest that most interviewees expressed their satisfaction with Chinese food when sharing their acculturation experiences in China. The references from the two child-nodes mainly capture the divergent attitudes of the European students toward Chinese food, indicating the important influence of diet on their life satisfaction. For example, Y01 was not satisfied with the flavor of fish in China, while Y22 acknowledged the wide variety of Chinese food. This finding is in line with previous research in which the correlation between diet and life satisfaction has been examined among international students in China (Zhu et al., 2013).

Transportation and safety. The last parent-node is “Transportation and safety” with 81 references, and has two child-nodes “Feel safe in living in China” and “Receive good transportation services” (See Table 6). The former has 39 references from 24 files, and the latter has 42 references from 27 files, indicating the necessity of transportation and safety in the evaluation of life satisfaction for European students in China. Interviewees highlighted that the sense of safety was associated with the dense population in China’s public places (see Table 6). A safe living environment was found to contribute to European students’ life

satisfaction in China, as most of the interviewees think the mass population in China ensures safety, especially at night.

In terms of transportation, some interviewees were found to be satisfied with the convenient transportation services offered in China (see Table 6). As transportation is an indispensable part of the acculturation among international students (Ward and Kennedy, 1994), the public transportation system in China, with a moderately complete network of metro lines and cheap tickets, facilitates European students’ commutes, which satisfies European students in acculturation to China. The same finding was also reported by Monteiro et al. (2021), who examined the correlation between the frequency of public transport use and satisfaction. However, COVID-19 impacted the students’ satisfaction with transportation in China, especially for a few interviewees who studied in Wuhan. For instance, Y02 encountered identification issues in online car-hailing during the COVID-19 as Y02 said, “During the pandemic, a lot of mobile applications require complex identification. So, I cannot use DiDi because I just have a passport and another different Chinese ID”. The results highlight the importance of transportation and safety among European students in acculturation to China. To develop a full picture of life satisfaction and acculturation among European students in China, additional studies will be needed to examine the validity of safety and transportation factors through a quantitative approach.

Conclusion

This study employed sentiment analysis and coding analysis of qualitative interview data to explore life satisfaction among European students during their acculturation in China. The findings from the sentiment analysis revealed that European students generally perceive a relatively high level of life satisfaction in their acculturation process in China. The coding analysis identified several key factors that influence their life satisfaction, including social activity, social support, academic performance, language proficiency, consumption, diet, transportation, and safety.

This research has contributed to the research literature on international students’ life satisfaction in acculturation by expanding the understanding of European students’ life satisfaction in acculturation in China. Specifically, it expands the

knowledge base by shedding light on the unique perspectives and challenges faced by European students in China. Additionally, this study may provide some valuable references for future quantitative research on measuring life satisfaction and acculturation among European (as well as other international) students in China, offering a basis for further investigation in this area.

In addition, the findings hold practical implications for Chinese universities in terms of managing and supporting European students and other international students. These results can inform the development of effective strategies and policies to enhance the overall acculturation experience and satisfaction of European students studying in China. We suggest that the administrators related to international education in Chinese universities should provide sufficient support in resolving accommodation concerns and alleviating academic pressure. Chinese universities should also take proactive measures to arrange a wide range of cultural events that can promote interaction and engagement between international students and their Chinese counterparts. These initiatives can enhance mutual understanding and help diminish instances of racial discrimination, contributing to life satisfaction among European students in China.

In this study, there is a lack of an overall picture of interviewees' acculturation experiences in China from the longitudinal perspective. Further study may be suggested to examine the European samples from a narrative perspective across time and explore more psychological factors that link to their life satisfaction in acculturation to China.

Data availability

The data presented in the current study are available from the corresponding author upon reasonable request. The data are not publicly available due to privacy or ethical restrictions.

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Author contributions

RZ devised the project, the main conceptual ideas and the proof outline. CG worked out almost all of the data collection and technical details. Both RZ and CG performed the data analysis and contributed to the final version of the manuscript. NL provided critical feedback and helped shape the research, analysis and manuscript. All authors contributed to the manuscript revision and read and approved the submitted version.

Competing interests

The authors declare no competing interests.

Ethical approval

Ethics approval was obtained from the Department Ethics Committee at the School of Foreign Languages of Huazhong University of Science and Technology. All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

Informed consent

Informed consent was obtained from all participants. They all understood that their participation was voluntary, and they were assured of the confidentiality of their participation. No identifying information was revealed to anyone.

Additional information

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